MAFMC MEETING April 2019

GARFO HCD Updates

Climate Guidance

In March, the Habitat Conservation Division's *Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes* was published as part of the Greater Atlantic Region's Policy Series (19-01).

This guidance was developed to increase effectiveness, efficiency, and consistency when evaluating the effects of climate change on NOAA trust resources and develop advice to avoid and minimize adverse effects to those resources. Part 1 of this guidance includes a strategy and process for integrating climate change information into the HCD consultation processes. Part 2 provides a synthesis of global and regional information on climate change science and the effects of climate change on coastal and marine ecosystems. In addition, a summary of existing climate change resources and tools (e.g., website links to reports, studies, and climate projection models) has been included to assist HCD staff in assessing and communicating climate-related impacts on NOAA trust resources.

Johnson, M.R, Boelke, C, Chiarella, L.A, and Greene, K. 2019. Guidance for Integrating Climate Change Information in Greater Atlantic Region Habitat Conservation Division Consultation Processes. Greater Atlantic Region Policy Series 19-01.

OFFSHORE ENERGY

Note: The Secretary of the Department of Interior's Order NO. 3355: Streamlining National Environmental Policy Act Reviews and Implementation of Executive Order 13807, "Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure Projects" issued in august 2017 states that all EISs for which a bureau of DOI (ex. BOEM) is the lead agency shall not be more than 150 pages or 300 pages for unusually complex projects, excluding appendices, and shall have a target to complete the Final EIS for which it is the lead agency within 1 year from the issuance of a Notice of Intent (NOI) to prepare an EIS.

Wind

Massachusetts & Rhode Island

Project Name:	**Vineyard Wind**
Project Developer:	Vineyard Wind (Copenhagen Infrastructure Partners & Avangrid Renewables)
Turbines:	84-106 wind turbine generators (WTGs)
Permitting Status:	The public comment period on the DEIS closed on February 22, 2019. NMFS comments submitted March 15th. Federal agencies in discussion on the OFD preferred alternative (formal concurrence due April 17th). Requests for additional information for the ESA and EFH consultations

were submitted to BOEM on March 14. The EFH consultation expected to be initiated April 15, 2019 –provided all necessary information is received. The FEIS is anticipated for June 2019.

Project Name: **Bay State Wind**
Developer: Ørsted
Turbines: 110 WTGs are expected per early consultation meetings.
Status: COP submitted to BOEM on March 16, 2019. COP currently under completeness and sufficiency review. BOEM is anticipating publication of an NOI for to prepare an EIS in Q3 CY2019.

Project Name: **Revolution Wind**
Developer: Ørsted (formerly Deepwater Wind)
Turbines: Up to 50 turbines
Status: COP is anticipated in Oct 2019. Power and turbine estimates based on the developer's project website.

Project Name: **South Fork Wind Farm**
Developer: Ørsted (formerly Deepwater Wind)
Turbines: 15 WTGs
Status: The COP was submitted in June 2018, and NMFS provided scoping comments in November 2018. NMFS provided OFD concurrence on the purpose and need (September 2018) and the alternatives (March 14, 2019). The DEIS is expected May 31, 2019. The FEIS is anticipated in October 2019. Power is proposed to connect to the south fork of Long Island at East Hampton, NY.

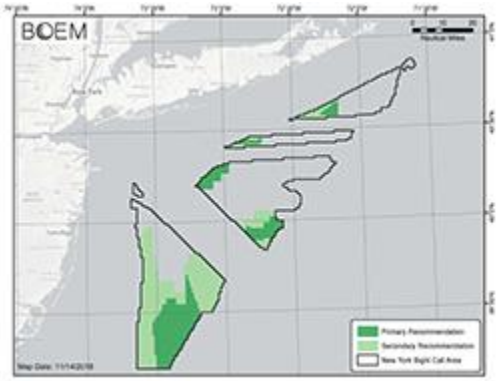
New York

Project Name: **Empire Wind**
Developer: Equinor Wind US (formerly Statoil Wind)
Status: COP submission anticipated in late summer 2019.

New WEAs (NY/NJ):

In 2017, New York State Energy Research and Development Authority asked that BOEM to identify at least four new WEAs offshore of the south shore of Long Island and the NJ Atlantic coast. BOEM issued a Call for Information and Nominations in response to this request in Dec 2017. In Nov, 2018 BOEM release the draft WEAs

BOEM will be announcing new lease areas in New York in late March. With the proposed sale notice in summer 2019, the final sale notice in late 2019 and the lease sale in early 2020.



New Jersey

Project Name: **Atlantic Shores Offshore Wind**
Developer: Atlantic Shores Offshore Wind (EDF Renewables, Shell)
Status: The site assessment plan (SAP) is anticipated for submission by March 1, 2020. (The project was approved for a 1-year extension request on Jan 30, 2019.)

Project Name: **Ocean Wind**
Developer: Ørsted
Status: COP anticipated in August 2019. Two floating LiDAR buoys were deployed in August 2018.

Project Name: **Nautilus Offshore Wind, LLC formerly Fisherman's Energy**

Nautilus is seeking to modify US Army Corps permit issued to Fishermen's Energy in 2012 and allowed for the construction of six wind turbines in the Atlantic Ocean approximately 2.8 miles offshore of Atlantic City, New Jersey. Nautilus is seeking to transfer the permit to them, extend the expiration date of the permit to December 31, 2020, reduce the number of turbines from six to three, and to increase the size and output of the of the turbines and foundations. The MMPA IHA has expired for this project. ESA issues still need to be resolved.

Delaware

Project Name: **Garden State Offshore Energy**
Developer: Garden State Offshore Energy
Status: COP anticipated in June 1, 2019, unless extension approved.

Project Name: **Skipjack Wind Farm**
Developer: Deepwater Wind/Ørsted
Status: COP submission anticipated Mar/April 2019

Maryland

Project Name: **Maryland Offshore Wind**

Developer: U.S. Wind
Status: COP anticipated in April 2019. Meteorological towers are anticipated spring/summer 2019.

Virginia

Project Name: TBD
Developer: Virginia Electric and Power Company
Status: COP is due in Q1 CY2020

Project Name: Coastal Virginia Offshore Wind Research Project
Developer: Virginia Electric and Power Company
Note: Two-turbine research project has already been permitted; currently undergoing review if ESA consultation needs to be re-opened due to modifications in turbine design (a change from jacket piles to monopoles).

Offshore Oil and Gas

Last year, the Department of Commerce provided comments to the Department of Interior on the Draft Proposed Program and Notice of Intent for a Programmatic EIS for the 2019-2024 National Outer Continental Shelf Oil and Gas leasing. We are waiting for the Proposed Program and Draft PEIS to be issued.

Geophysical Surveys:

On November 30, 2018, NOAA's Office of Protected Resources issued Incidental Harassment Authorizations to five separate applicants to incidentally harass marine mammals during geophysical survey activities the Atlantic Ocean.

The applicants are as follows:

- *ION*—ION's survey is planned to occur from Delaware to northern Florida (~38.5° N to ~27.9° N) and consists of ~13,062 km of survey line. The acoustic source planned for deployment is a 36-airgun array with a total volume of 6,420 in^3. The array would consist of airguns ranging in volume from 40 in^3 to 380 in^3. The airguns would be configured as four identical linear arrays or "strings" (see Figure 3 of ION's application). The four airgun strings would be towed at 10-m depth, and would fire every 50 m or 20-24 s, depending on exact vessel speed. ION provided modeling results for their array, including notional source signatures, 1/3-octave band source levels as a function of azimuth angle, and received sound levels as a function of distance and direction at 16 representative sites in the survey area

- *Spectrum*—Spectrum's survey was originally planned to occur from Delaware to northern Florida consisting of ~21,635 km of survey line. This plan has been modified and now consists of ~13,766 km of operations. The acoustic source planned for deployment is a

32-airgun array with a total volume of 4,920 in^3. The array would consist of airguns ranging in volume from 50 in^3 to 250 in^3. The airguns would be configured as four subarrays, each with eight to ten airguns. The four airgun strings would be towed at 6 to 10-m depth, and would fire every 25 m or 10 s, depending on exact vessel speed. Spectrum provided modeling results for their array, including notional source signatures, 1/3-octave band source levels as a function of azimuth angle, and received sound levels as a function of distance and direction at 16 representative sites in the survey area.

- *TGS*—TGS's survey is planned to occur from Delaware to northern Florida and consists of ~58,300 km of survey line. The survey plan consists of two contiguous survey grids with differently spaced lines and would involve use of two source vessels operating independently of one another at a minimum of 100 km separation distance. The acoustic sources planned for deployment are 40-airgun arrays with a total volume of 4,808 in^3. The array would consist of airguns ranging in volume from 22 in^3 to 250 in^3. The airguns would be configured as four identical strings. The four airgun strings would be towed at 7-m depth, and would fire every 25 m or 10 s, depending on exact vessel speed.

- *Western*—Western's survey is planned to occur from Maryland to northern Florida and consists of ~27,330 km of survey line. The survey plan consists of a survey grid with differently spaced lines. The acoustic source planned for deployment is a 24-airgun array with a total volume of 5,085 in^3. The airguns would be configured as three identical strings. The three airgun strings would be towed at 10-m depth, and would fire every 37.5 m (approximately every 16 s, depending on vessel speed).

- *CGG*—CGG's survey is planned to occur from Virginia to Georgia and consists of ~28,670 km of survey line. The acoustic source planned for deployment is a 36-airgun array with a total volume of 5,400 in^3. The array would consist of airguns ranging in volume from 40 in^3 to 380 in^3. The airguns would be configured as four identical strings. The four airgun strings would be towed at 7-m depth, and would fire every 25 m or 10 s, depending on exact vessel speed.

There is currently a lawsuit pending before the U.S. District Court for the District of South Carolina challenging the decision to issue the IHAs. BOEM has committed to undertaking consultations with us under the EFH provisions of the MSA. The intention was to initiate the consultations once the IHA were issued because the conditions in the IHA will define the activity BOEM would authorize. A recent update from BOEM is a decision is pending and we might see something in a couple of weeks.

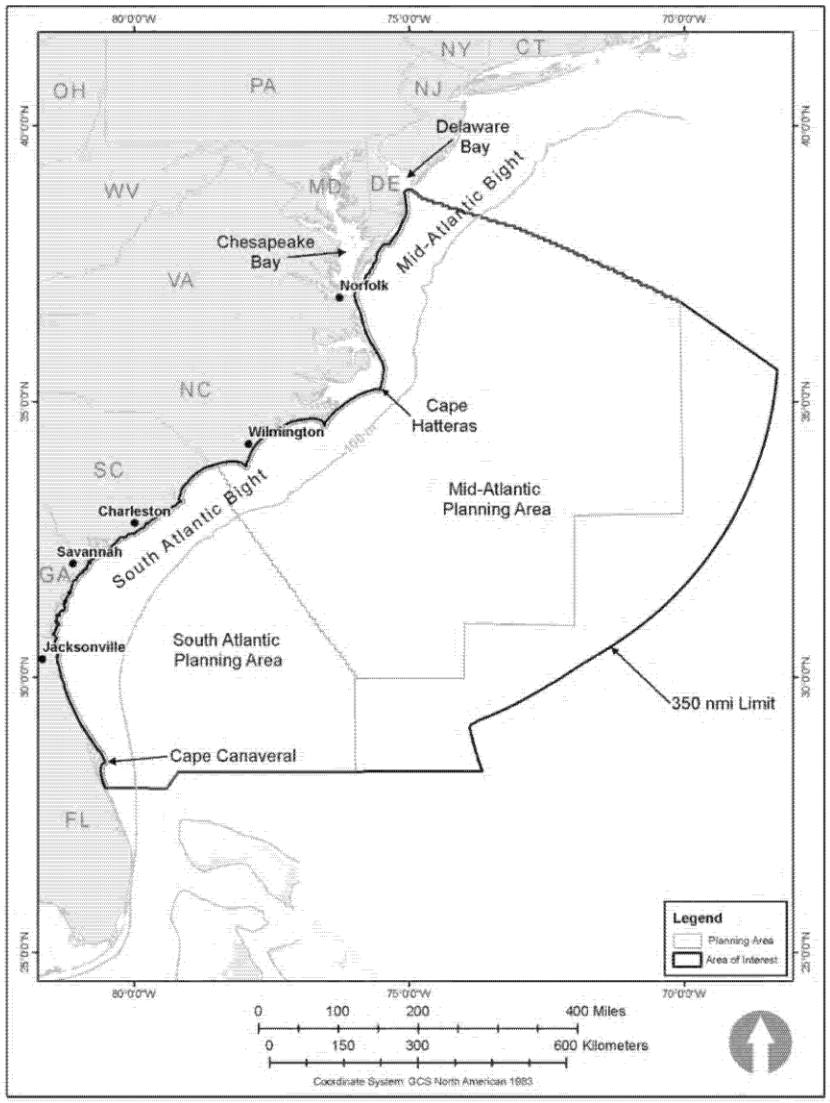


Figure 1. Specific Geographic Region.

Sand Surveys

In November 2018, NOAA Fisheries HCD (GARFO and SERO) reviewed a programmatic EFH assessment provided by BOEM for Sand Survey Activities for BOEM's Marine Mineral Management Program, Atlantic and Gulf of Mexico. The assessment evaluated the potential environmental impacts related to geophysical and geological surveys activities that support the identification, delineation, monitoring, and scientific investigation of sand resources on the Atlantic and Gulf of Mexico Outer Continental Shelf (OSC). We stated that we are concerned that sound produced by some types of surveys such as those used for the sub-bottom profiling (chirps and boomers) may adversely affect some species, such as black sea bass (Centropristis striata) and Atlantic cod (Gadus morhua) disproportionately, depending upon the time of year, life stage and bottom type. We issued the following EFH conservation recommendations:

- Continue to evaluate the acoustic effects of construction and survey activities on fish and EFH as part of your BOEM Environmental Studies Program.
- Coordinate research and data collection across BOEM programs to allow for the use of existing survey data where appropriate and to minimize the need to duplicate surveys
- Continue to outreach to federal fisheries management councils, state fisheries technical experts, and members of the commercial and recreational fishing community to identify important fishing grounds and avoid conducting survey work in these areas.

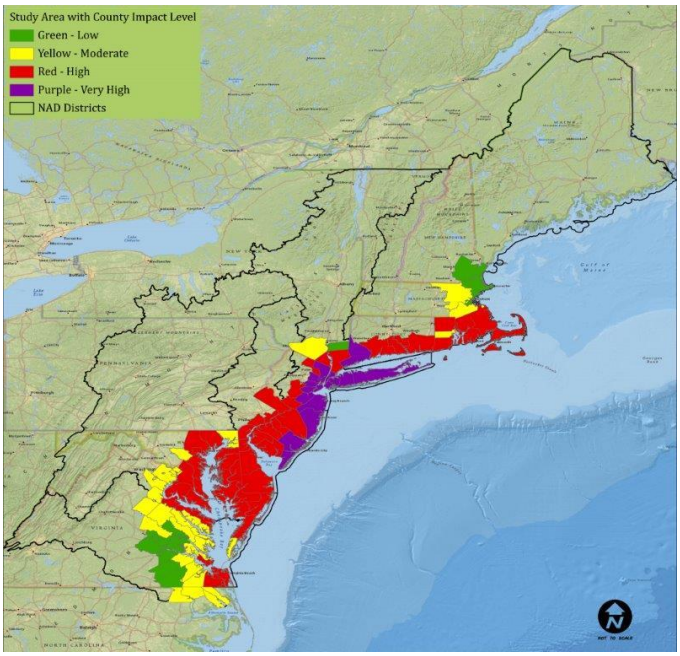
Coastal Storm Risk Management

Within the Greater Atlantic Region, there are a number of coastal storm risk management studies underway by the US Army Corps of Engineers. These studies are tiered off the larger North Atlantic Coast Comprehensive Study Report. https://www.nad.usace.army.mil/CompStudy/.

The studies include:

- New York and New Jersey Harbor and Tributaries Focus Area Feasibility Study –Interim report expected soon
- Nassau County Back Bays NY Coastal Risk Management Study- report expected sometime in 2019
- New Jersey Back Bay Coastal Risk Management Study – Interim Report issued March 2019, DEIS excepted on 2020
- Norfolk Coastal Risk Management Study – DEIS issued 2018. Tentatively selected plan has been recommended to congress for funding

All of these studies contain alternatives that involve the construction of storm gates across inlets or rivers, floodwall, berms, nature based solutions (living shoreline) and non-structural options (flood proofing or elevating structures).



Port Activities:

New York/New Jersey- the New York Army Corps has initiated the NY/NJ Harbor Anchorage Study to evaluate the federal interest in deepening and expanding anchorage areas in the port of NY/NJ. This could involve deepening some areas to -52 ft.

NJ/DE – In the Delaware River, there are a number of large port facilities under construction, proposing expansion or proposed for authorization.

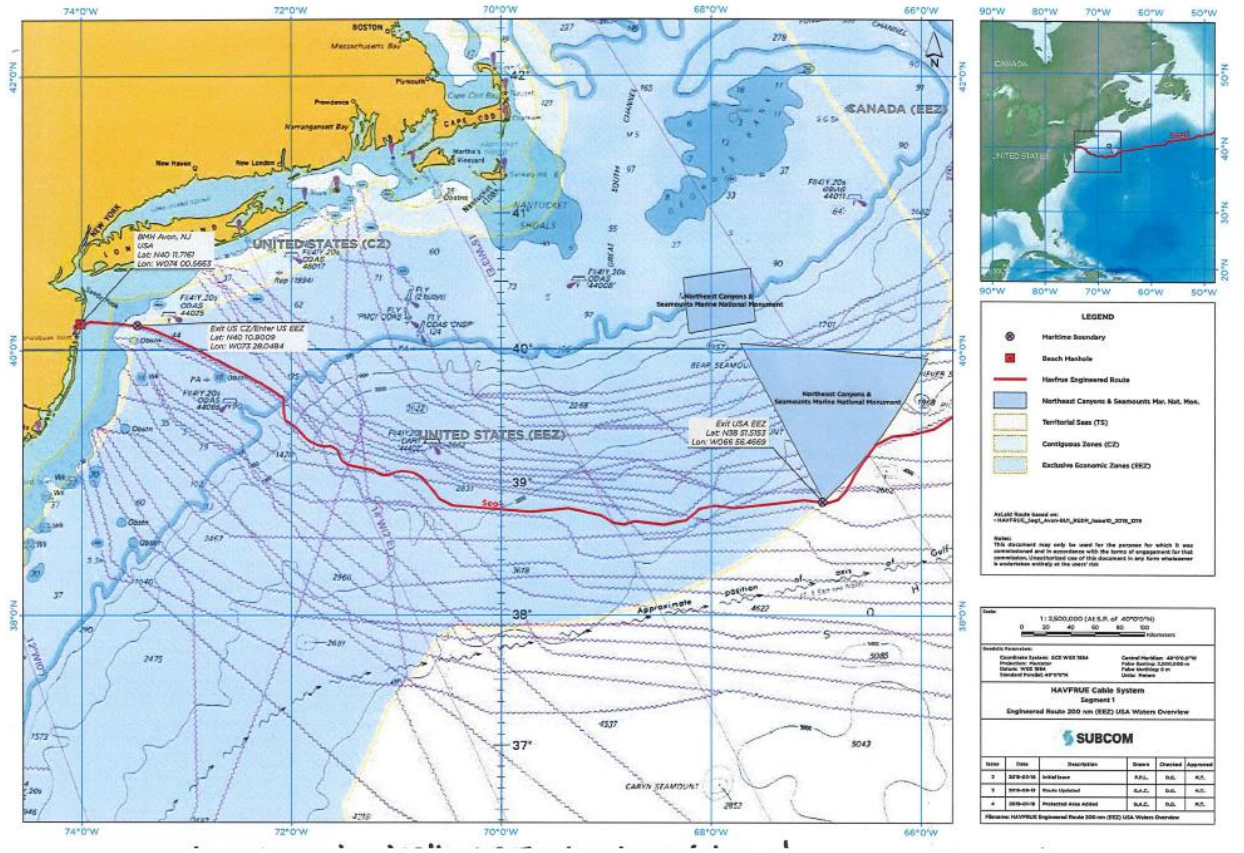
- Southport Marine Terminal- Proposed container terminal located at the former Philadelphia Navy Yard. Permitted in 2012. Allowed 12 plus acres of fill and 35 acres of dredging. Impacts to freshwater SAV permitted. In water work not constructed. Now in to renew permit.
- Delaware River Partners – DRP Gibbstown Logistics Center, a multi-use marine terminal and international logistics center to be located at the former DuPont Repauno Works site. Permitted in 2018 and allowed 29 acres of dredging one wharf. Have now approached the Corps to add a second berth and dredge another 45 acres.
- Diamond State Port Corp – DuPont Edgemoor site. A new proposed container port. Includes a new wharf of unknown size and 85.7 acres of dredging and 5.3 acres of wetland fill.

VA – Norfolk Harbor Navigation Improvement Project/Elizabeth River and South Branch Navigation Improvements includes widening and deepening more than 30 miles of channels depths between 59 to 40 feet. Overboard disposal of the some dredged material is planned.

Other Activities

Maryland – Living shorelines and impacts to SAV. We have been seeing increasing number of living shoreline projects that include impacts to SAV. Maryland's Department of Natural Resources has been advocating for these projects in support of their state law requiring the use of living shorelines for shoreline stabilization. They have been refusing to grant waivers due to impacts to SAV. This conflicts the Bay SAV restoration goals and our mandate to protect, conserve and enhance EFH, especially HAPCs like SAV.

New Jersey - America Europe Connect 2 USA, Inc., has requested Department of the Army authorization for installation of a submarine fiber-optic cable (HAVFRUE cable) in the Atlantic Ocean, from Borough of Avon-by-the-Sea, Monmouth County, New Jersey to Ireland, Norway, and Denmark. The work would involve the installation of approximately 4, 769 miles of 1.41 maximum diameter underwater fiber-optic telecommunication cable. The cable directionally drilled from uplands to a point 2,444 linear feet offshore. From there to a location where a water depth of approximately 3,281-feet (1,000-meters) is encountered, the cable will be buried to depths ranging from approximately 3.3-feet to 6.6-feet using a combination of diver-operated jetting burial tools, Seaplow and Remotely Operated Vehicle (ROV). Additionally, a buried earth ground anode array and cable would be installed by divers with manual jetting tools approximately 3.9-feet below the seabed.



Miscellaneous:

Across the region: Recently, we have seen a number of proposals to spray or place dredged material on marshes with claims of increasing resiliency or combating sea level rise. Unfortunately, little information is usually provided to demonstrate that the targeted marsh is not keeping pace with sea level rise, or is not resilient. In some instances marshes are being converted to upland bird nesting islands. While we recognize the importance of salt marshes ecologically and to fisheries, we are concerned that this practice will result in long term damage to existing, functioning salt marshes.

NORTHEAST REGIONAL MARINE FISH HABITAT ASSESSMENT

WORKPLAN

April 2019 - April 2022

DRAFT AS OF 1/31/2019

Draft reviewed on: MM-DD-2019
Final approved on: MM-DD-2019

Assessment Steering Committee:
Atlantic Coast Fish Habitat Partnership: Lisa Havel
Atlantic States Marine Fisheries Commission: Patrick Campfield
Duke University, Marine Spatial Ecology: Patrick Halpin
Mid-Atlantic Fishery Management Council: Christoper Moore
Monmouth University, Urban Coast Institute: Tony McDonald
National Fish Habitat Partnership, Science and Data Committee: Gary Whelan
New England Fishery Management Council: Thomas Nies
NOAA Fisheries Offices of Habitat Conservation: Kara Meckley, Lou Chiarella
NOAA NCCOS Marine Spatial Ecology Division: Mark Monaco
NOAA Fisheries Offices of Science and Technology: Stephen Brown, Tony Marshak
NOAA Northeast Fisheries Science Center: Thomas Noji
The Nature Conservancy: Kate Wilke

1.0 EXECUTIVE SUMMARY

This document was prepared by Northeast Regional Marine Fish Habitat Assessment - Workplan Development Teams for the Assessment Steering Committee. Five actions were identified as necessary to describe and characterize estuarine, coastal, and offshore fish habitat distribution, abundance, and quality in the Northeast. These actions will address: 1) Abundance and trends in habitat types in the inshore area, 2) Habitat vulnerability, 3) Spatial descriptions of species habitat use in the offshore area, 4) Oceanographic influences on offshore habitat, and also provide a Habitat Data Visualization and Decision Support Tool. The work to support these actions is proposed for April 2019 - April 2022. Following approval of the workplan, project teams will need to be finalized. The teams will be responsible for completing the actions as described in the workplan and providing deliverables to the Steering Committee.

2.0 FREQUENTLY USED TERMS

ACFHP	Atlantic Coast Fish Habitat Partnership
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
GARFO	Greater Atlantic Regional Fisheries Office
GB	Georges Bank
GIS	Geographic Information System
GOM	Gulf of Maine
HAPC	Habitat Area of Particular Concern
HCVA	Habitat Climate Vulnerability Assessment
MAFMC	Mid-Atlantic Fishery Management Council
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NFHP	National Fish Habitat Partnership
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NOAA	National Oceanic and Atmospheric Administration
TNC	The Nature Consevancy

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4.0 INTRODUCTION

In late 2017, a Steering Committee, comprised of leadership from the major habitat conservation, restoration, and science orgnaizations in the region, met and agreed to identify ways to improve fish habitat science within the region. They concluded that a Northeast Regional Marine Fish Habitat Assessment was needed to describe and characterize estuarine, coastal, and offshore fish habitat distribution, abundance, and quality in the Northeast. The project will align habitat science goals and priorities with human and financial resources to develop habitat science products that support an assessment.

The Steering Committee wanted an assessment that:

- Serves as a decision support tool for multiple audiences – for both inshore and offshore habitats, to assess habitat distribution, abundance, quality, species habitat use, and the combination of all of these.
- Provides foundational information to support the designation of essential fish habitat (EFH) for Councils, and supports federal EFH assessments and EFH consultations (i.e., better data, better synthesis, more specific habitat information, finer scale information).
- Identifies what habitat areas are rare, sensitive, especially vulnerable to degradation, or are uniquely important to ecosystem function, to help prioritize consultations and conservation.
- Compiles information to support a regional National Fish Habitat Partnership (NFHP)[1] assessment, to identify areas that could be considered for habitat conservation or restoration.
- Addresses NOAA's Habitat Assessment Improvement Plan (HAIP)[2] priorities.
- Characterizes habitats, their services, and vulnerabilities to better inform permitting agencies and industries in decision making with respect to multiple ocean uses (e.g. aquaculture, wild-caught fisheries, energy issues, etc.).
- Supports incorporation of ecosystem principles into fisheries management.

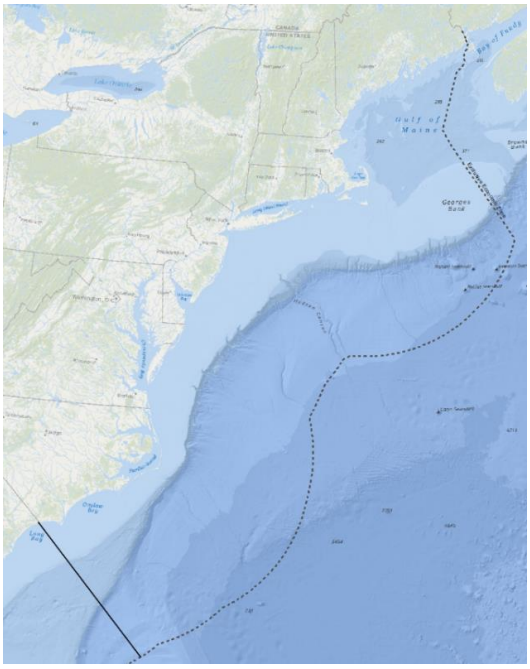
To meet these objectives, the Steering Committee supported the development of a detailed workplan to identify specific products and delivery dates, the associated financial commitments, and responsible parties to complete a regional assessment. The Steering Committee leadership specifically identified staff habitat scientists to participate on workplan development teams (see Section 7.0), to support the development of the workplan during July 2018 - December 2018. Once the workplan is finalized, project teams will be formed/finalized to conduct work on each of the actions described. There will likely be substantial overlap in membership between those who developed the workplan and those conducting the work, but those teams will not be identical.

[1] National Fish Habitat Partnership's (http://www.fishhabitat.org/about/) mission is to protect, restore and enhance the nation's fish and aquatic communities through partnerships that foster fish habitat conservation and improve the quality of life for the American people.
[2] Habitat Assessment Improvement Plan: https://www.st.nmfs.noaa.gov/ecosystems/habitat/publications/haip/index.

5.0 WORKPLAN

Geographic Scope

The workplan covers the Northeast U.S. Shelf, and extends from the North Carolina/South Carolina boundary to the western end of the Scotian Shelf and includes the Mid-Atlantic Bight, Southern New England, Georges Bank, and the Gulf of Maine. The geographic scope of this workplan includes all waters extending from the inshore tidal boundary[3] in state waters to the eastern-most boundary of the EEZ (200 miles offshore), and extends from the Canadian/US Border southwards to the North Carolina/South Carolina border. Inshore assessment actions will generally focus on habitat from the inshore tidal boundary to the eastern state waters boundary (3 miles). The offshore assessment actions will generally focus on habitat from the coastal bays to the eastern boundary of the EEZ, although data available to support work will likely only extend to the offshore canyon areas at its furthest extent. The area between the coastal bays and 3 miles is noted as an area of overlap for the actions. While important habitat for some species may occur outside the geographic scope for the actions, it is not practical to identify and assess this habitat in a transboundary way at this time.



Map 1. Geographic scope for the Northeast Regional Marine Fish Habitat Assessment.

Focus Species

The Steering Committee identified 61+ focus fish species for this habitat assessment (Table 1). All species are highly important to fisheries management organizations within the region.

[3] The inshore tidal boundary could be defined several ways. The use of the term is generalized here, but could include mean high water or head of tide, or be inclusive of tidal marsh edge.Workplan development teams recommended that tidal marsh edge be included in the assessment (Supplement 1).

Table 1. Focus fish species identified by the Steering Committee.

MAFMC	NEFMC	ASMFC (not noted in column 1 or 2)	Highly Migratory (with HAPC designations)
Atlantic mackerel	Acadian redfish	American eel	Sandbar shark
Atlantic surfclam	American plaice	American lobster	Dusky shark
Black sea bass*	Atlantic halibut	Atlantic croaker	
Bluefish*	Atlantic herring*	Atlantic menhaden	
Blueline tilefish	Atlantic salmon	Atlantic striped bass	
Butterfish	Atlantic wolffish	Atlantic sturgeon	
Chub mackeral (potentially added)	Barndoor skate	Black drum	
Golden tilefish	Clearnose skate	Coastal sharks	
Longfin squid	Atlantic cod	Cobia	
Monkfish**	Cusk	Horseshoe crab	
Ocean quahog	Haddock	Jonah crab	
Scup*	Little Skate	Northern shrimp	
Shortfin (Illex) squid	Windowpane flounder	Red drum	
Summer flounder*	Ocean pout	Shad and river herring	
	Offshore hake	Spanish mackerel	
	Pollock	Spot	
	Red crab	Spotted seatrout	
	Red hake	Tautog	
	Rosette skate	Weakfish	
	Sea scallop		
	Silver hake		
	Smooth skate		
	Thorny skate		
	White hake		
	Winter flounder*		
	Winter skate		
	Witch flounder		
	Yellowtail flounder		

* Also managed by ASMFC.
**Jointly managed with NEFMC.

Actions and Timelines

There were five core actions identified to complete the habitat assessment within 3-years (April 2019-April 2022). They are summarized as follows with more detailed action descriptions provided in Tables 2-6:

1) Abundance and trends in habitat types in the inshore area (during months 1-36). This action will map the location and extent of habitat types utilized by the focus species and quantify the areal coverage, status and trends of these habitats. It will also compile metrics that may inform an assessment of habitat quality. Key outcomes from this action include:

A. **Location and extent of habitat types** as maps (Geographic Information System (GIS) framework; to finest scale practical).
B. **Quantity** of habitat types in the entire region, sub or ecoregions, estuaries, mainstems/tributaries, to finest scale (1 km sq polygons or smaller, where possible).
C. **Status and trend** of habitat types with 1) relative proportion of habitat types to one another, 2) a baseline to track each habitat type, 3) trends in habitat quantity relative to baseline if possible, and 4) development of habitat quality metrics, if possible.
D. **Written inventory and database** of habitats and habitat use for inshore focus species.

2) Habitat vulnerability (during months 1-36). This action will involve Council and Commission staff coordination with, and participation in, the NOAA Habitat Climate Vulnerability Assessment (HCVA). That assessment will use habitat experts to examine fish habitat vulnerability to climate and non-climate stressors. Key outcomes from this action include:

A. **Qualitative evaluation** of the vulnerability of specific habitat types to non climate and climate related stressors based on expert judgement.
B. **Recommendations** from HCVA and staff leads if additional areas for future work are identified through this process.

3) Spatial descriptions of species habitat use in the offshore area (during months 1-36). This action will use model-based and empirical approaches to identify, predict, and map habitat use for each of the focus species and track and quantify changes in habitat use over time (e.g. seasonal, annual, and future predicted use). Key outcomes from this action include:

A. **Location and extent of habitat use** (spatially depicted) by individual focus species (and if possible species groups) annually, seasonally, and predicted future use.
B. **Quantify and track changes in habitat use** for focus species throughout the region, and for each Ecological Production Unit (EPU): Mid-Atlantic Bight, Georges Bank, Gulf of Maine.
C. **Identification of most important factors** (covariates) driving focus species distribution.

4) Oceanographic influences on offshore habitat (during months 1-36). This action will identify and map important features in the offshore area for key species (e.g., cold water pool, etc.), and develop metrics and indicators for how that habitat is changing. This group will also

develop approaches to describe and map pelagic eggs/larvae for all the focus species. Key outcomes from this action include:

A. **Identification of important oceanographic features** that drive habitat use.
B. **Sensitivities** of focus species to oceanographic features.
C. **Identification of most important factors** (covariates) and how they influence focus species.
D. **Recommendations** for how this oceanographic information can be used to inform habitat definitions through future modeling approaches.

5) Habitat data visualization and decision support tool (during months 24-36). Habitat information will be incorporated into a publicly accessible decision support tool, making this information available to partners to visualize habitat location, extent, and use throughout the region, and provide access to relevant data and habitat metrics developed by the assessment.

Table 2. Inventory of Key Habitat Types in the Inshore Area under Action 1.

Project Phase	Actions Needed	Timeline	Current efforts to be applied	Existing and New Resources Needed
Data identification and prioritization	Identify, inventory, and describe all inshore habitat types across and within the defined subregions with a focus on SAV, tidal river bottom, shellfish beds, tidal vegetation, hard bottom and shorelines that are utilized by the focus species in the inshore environment by life stage. This could include both natural and anthropogenic habitats (see Supplement 1). Additional metrics of habitat quality will be collected while the data is compiled (e.g. oysters per m^2., SAV shoots density, etc.).	Months 1-12	1. Existing EFH Source documents (through about 2003); 2. ELMR living marine resources documents; 3) Updated recent literature review completed by MAFMC/GARFO; 4) ACFHP Species/Habitat Matrix; 5) HAPWG Report; and 6) Deatiled state agency habitat data (e.g. MD, RI, MA all have saltmarsh, SAV, and shellfish location and extent, including some current and historic data; 7) Northeast and Mid-Atlantic data portal artificial reef data, etc; 8) Other resources as appropriate. Some early consideration should be given to SAV, shoreline marsh edge habitat, etc.	Staff members from ACFHP/ASMFC, state agencies (rep from each agency with regional habitat expertise), both Councils, NMFS HCD and NEFSC, and others as needed with inshore habitat expertise;[a] Resources to meet as a group in person (meeting space and travel) and via webinar will be needed. Some in person meetings may be needed to complete the tasks below. This will depend on location, but it is estimated that about $5,600 (4 x 2 x $700) may be needed for federal travel, and an additional $5,600 for non-federal travel (6 x 2 x $8,400) for 2-in person meetings.
Data compilation	Establish classification scheme for all identified and inventoried habitats in action 1. Evaluate and choose a habitat classification scheme to serve as an organizing framework across the subregions (e.g., CMECS - https://iocm.noaa.gov/cmecs/; Cowardian system) and determine how to best include restored or manmade habitat, if appropriate.	Months 13-18	Ensure classification includes those habitat types (class and subclass) that are identified through the NOAA Climate Habitat Vulnerablility Assessment. Work with NOAA CMECS leads to obtain a briefing and more information on how the classification system might be used to support this assessment work.	Funds are needed to support a GIS contractor to develop the geodatabase, synthesize information, and develop final spatial products; up to 2 years funding may be needed estimated at $150,000-200,000. Coordination should occur between this effort and complementary assessments by ACFHP and the Chesapeake Bay Program. The Chesapeake will be hring a contractor in spring 2019 to begin compiling estuarine habitat, biological and stressor data.
Geodatabase development	Develop geodatabase(s) with agreed upon classification scheme for all inshore habitats. In addition, specific decisions on how to organize the data including establishing inshore boundaries, mapping scale, and potential subdivision of the region to smaller inshore "sub regional" units should be made (see Supplement 1).	Months 19-24	See Supplement 1 for more detail on methods that could be used to set inshore boundaries, mapping scale, and possible inshore regional units. It is recommended as a starting point for consideration that: 1) the inshore/inland boundary include the shoreline/tidal marsh edge and be the same across the entire region, 2) data be mapped at the finest scale possible by estuary using a gridded system, 3) estuaries be aggregated using the NFHP coastal assessments biogeographic regions (or a variation on that for this assessment), and 4) consideration be given to using 3 salinity zones within estuaries.	See above (GIS contractor)

Synthesis and analysis	Utilize geodatabase(s) to determine for which habitat types location and extent can be determined based on available data, and map location and extent of habitats with available data at the finest possible scale.	Months 25-30	NA	See above (GIS contractor)
Development of habitat quantity metrics	Analyze and synthesize quantity, status and trends for all habitats in the geodatabase as available data allows.	Months 25-30	NA	See potantial experts listed above plus any additional expertise needed.
Development of habitat quality metrics	Plan and hold a Workshop, using a predetermined structured decision process (e.g. Analytical Hierarchy Process), to identify and develop habitat quality metrics based on the available data from the quantitative analysis. This group will prioritize characteristics of habitat types (natural and restored) that support fish production, and identify specific metrics to be used based on the data available. These findings will be compiled in a final report, and mapped with the location and extent data for habitat where possible.	Months 31-34	An examination of metrics used by state-agencies and others for their habitat management may be a relevant starting point.	Resources to hold a workshop in person ($20,000; meeting space and travel). This will depend on location, but it is estimated that about $8,400 (12x$700) may be needed for federal travel, $8,400 (12x$700) for non-federal travel, plus $3,200 for other associated meeting costs.
Early review and feedback on maps for location and extent and habitat quantity metrics	1) Review methods and products with a pilot group of regional experts (e.g., NMFS habitat leads, Council and ASMFC staff habitat leads); and 2) Review Products with the Steering Committee.	Months 31-34	NA	This can be done with existing staff resource commitments, if participating entities are willing to provide staff support in the form of work and travel. However, this may not require in-person meetings and could use web-based meetings to complete.
Application and final product development	Make necessary adjustments to final products and incorporate into final database and GIS visualization/Support Tool (see Action 5)	Months 35-36	NA	GIS contractor. Information access when products are complete will link to Action 5 to develop a visualization/Support Tool.
Final review	Present information to the assessment steering committee and finalize products	Complete	NA	Convene steering committee in person, once for all actions. Overall costs estimated as $9,800 (14x$700).

[a] Possible participants include: Michelle Bachman (NEFMC), Steve Faulkner (USGS), NOAA NCCOS (AK Leight and Moe Nelson), Mark Rosseau (MA-DMF), Eric Schneider (RI-DFW), Dawn McReynolds (NYDEC), TBD (ME-DMF, CT-DEP, NJ-FWS, DE-DNREC, MD-DNR, VA-VMRC, NC-DMF), Bryan DeAngelis (TNC), Julie Devers (US-FWS), TBD (ACFHP), Bruce Vogt (NFMS-Ches. Bay), Emily Shumchenia (Northeast Data Portal), and other NMFS/NEFSC experts (TBD).

Table 3. Habitat Vulnerability under Action 2.

Project Phase	Actions Needed	Timeline	Current efforts to be applied	Existing and New Resources Needed
Participation in HCVA Process	Habitat staff from ASMFC, MAFMC, and NEFMC will coordinate directly with the NOAA Northeast HCVA. This initially will involve support during "pilot assessment" work to finalize the methods for conducting the assessment including selection of priority climate and non climate stressors. This will later involve participation as subject matter experts to review the information at the in-person HCVA workshop to conduct the full assessment.	Months 1-12. Pilot assessment early 2019, with full assessment to follow later 2019.	NOAA Habitat Climate Vulnerability Assessment that is already underway. NOAA Habitat Climate Vulnerability Assessment that is already underway. The HCVA will develop a method to assess habitat vulnerability to a changing climate that can be applied directly to fisheries management. The trait-based assessment will score the sensitivity of specific habitat attributes to climate change for habitats ranging from riverine to oceanic. The result will be a ranked list of vulnerable habitats. The HCVA will be developed as a regional tool (e.g. northeast large marine ecosystem) that can be applied nationally.	Jessica Coakley (MAFMC), Michelle Bachman (NEFMC), and Lisa Havel (ASMFC/ACFHP) will participate directly in aspects of the HCVA, including pilot work to develop and improve aspects of the process. Committments from NEFMC, MAFMC, and ASMFC to cover their staff travel to participate in any in-person meetings. This will include several coordination calls or remote meetings.
Future Work	Habitat staff from ASMFC, MAFMC, and NEFMC and the NOAA HCVA will discuss lessons learned from the HCVA process and identify any areas for future work on this subject that would be beneficial to the Northeast region and fishery management agencies (Councils and Commission).	6-12 months after HCVA completion	NA	NA
Reports Provided	Provide the final report to the Steering Committee.	After report completed	NA	NA

Table 4. Spatial Descriptions of Species Habitat Use in the Offshore Area under Action 3.

Project Phase	Actions Needed	Timeline	Current efforts to be applied	Existing and New Resources Needed
Identification of Best Modeling Approaches	Assemble scientists from NOS, OAR, and NMFS laboratories, and others, to compare and contrast methods and approaches in the use of species habitat or niche models. Discussion will focus on fitting procedures and model construction, visualization and interpretation of results, and the range of applications with these data that can be used to describe and quantify habitat use. This should include a discussion of the best and most appropriate tests for model validation and performance measurements.	Months 1-12	NART Project: "Progress in habitat modelling to inform fisheries and ecosystem management" (Leads: Kevin Friedland and Scott Large (NOAA/NEFSC/READ/EDAB), Mark Monaco and Beth Turner (NOAA/NOS/NCCOS), Kimberly Hyde (NOAA/NEFSC/READ/EDAB); Existing models and approaches have been developed within NMFS-NEFSC and other institutions that could be applied or inform these approaches. NOAA Chesapeake Bay Office science: NCBO is funding four projects assessing in shore offshore habitat connecivity for black sea bass and summer flounder. Habitat suitability models and climate change impacts will be developed with products expected in 2020 (Bruce Vogt and Sara Coleman are POCs who can coordinate with researchers to contribute appraoches and information to this project).	Travel funds are available for 8-10 federal participants through this 2019 project. An additional $6,500 is needed for up to 8 non-federal travel participants (8 x $700) and misc meeting needs.[b]
Model Diagnostic Criteria Survey	A survey (via Google forms) will be developed and distributed to solicit apriori input from focus species stock assessment scientists on the most important variables driving their species distribution and habitat use, and how those would be ranked based on their expertise. This information can be used to prioritize information for modeling efforts or serve as an additional diagnostic external to the models, to be compared to model-preferred explanatory variables. It is noted that factors driving the productivity of the focus species may be different (or the same) as those driving the distribution of the focus species.	Months 1-12	Can be developed using Google forms.	This will utilize existing focus species stock assessment expertise.
Information Prioritization	Assemble data available to descibe habitat use by the focus species spatially and temporally (juveniles and adults, and if possible other life stages such as eggs/larvae) in the offshore environment. Much of this has already been done by the	Months 1-12	A number of data resources are available. Fishery independent data: State/federal fish survey data, MARMAP/EcoMon (egg/lavae), and clam or scallop survey data is accessible. Other information on primary productivity, etc. could be considered. Fishery-dependent data: commercial landings, observer or study fleet data	This can be done with existing staff resource commitments, since these data already exist. However, this may require some web-based meetings to complete.

	various modeling groups. Therefore, this should focus on supplementing the work already done by identifying missing data needs or data improvements that are needed. This should include fisheries independent and dependent data.		could be used to verify model results. Application of data provided from the NEFSC food habits database. Characterizing habitat types, making special note of any difference found by region. Habitat types differ by species and to climate change.	
Model and Data Application	1) Identify the best modeling approaches for each focus species based on the tools and data available, and using the performace diagnostics criteria identified. 2) Based on the the best approaches for each species, describe those factors that are most important in driving changes in distribution based on the covariates used (e.g., temperature, substrate type, rugosity, primary production, etc.). Variable selection should be based upon species ecology and incorporate the input from the stock assessment experts.[a]	Months 12-24	Using the NART project work described above, a core modeling team will be formed to address this step.	Funds are needed to support a contractor working on modeling approaches (GAM/MaxENT/RegTree models at NEFSC; approximately 2 years funding: $180,000); Additional funds may be needed to support travel for modeling team members to meet in-person. This will depend on location, but it is estimated that about $8,400 (6 x 2 x $700) may be needed for federal travel, and an additional $5,600 for non-federal travel (4 x 2 x $700).
Habitat Metrics and Indicators	Based on the modeling products, identify specific metrics to track changes in habitat use for the focus species. The use of smaller organizing units (based on ecology or fisheries distributions) should be used to organize information at a regional scale in a way that would support management entity decision capability. This could include examining trends in use of available (past, present, and future predicted habitats). These outputs should be linked to other regional indicators of ecosystem change of possible. This component will require additional input be provided to the modeling leads from staff at the Councils (NEFMC and MAFMC) and the Atlantic States Marine Fisheries Commission (ASMFC), as well as input from NMFS Habitat Conservation Division staff. As a starting point, the Ecological Production Units (EPUs) developed by the NEFSC based on	Months 18-30	Ongoing work at the NMFS/NEFSC to develop ecological indicators throughout the region and by EPU can be directly linked to this work and enhance decision capability. This can be directly linked to management entity EBM and EAFM approaches.	This can be done with existing staff resource commitments, if participating entities are willing to provide staff support in the form of work and travel. However, this may require some in-person or web-based meetings to complete.

	ecological/oceangraphic breaks in the region should be considered.			
Synthesis and analysis	The ouputs from the modeling work and development of ecological indicators will be compiled in a report, documenting methods and results, as well as GIS files that can be utilized to spatially understand changes in habitat use. Efforts will be made to make this information available via an online visualization/Support Tool (see other action).	Months 18-30	Utilize and build off exisiting online GIS services to make the information accessible to partners and end users.	Information access when products are complete will link to a separate action to develop a visualization/Support Tool.
Early Review and Feedback	1) Review methods and early products with a pilot group of regional experts (e.g., NMFS habitat leads, Council and ASMFC staff habitat leads); and 2) Review Products with the Steering Committee.	Months 31-33	NA	This can be done with existing staff resource commitments, if participating entities are willing to provide staff support in the form of work and travel. However, this may not require in-person meetings and could use web-based meetings to complete.
Application and Final Product Development	Make any necessary adjustments to final products.	Months 34-36	NA	NA
Final Review and Approval	Present information to the Steering Committee and finalize products.	Complete	NA	Convene Steering Committee in person, once for all actions.

[a] A number of themes should be considered as relevant to understanding distribution shifts, such as temperature, assemblages, predator-prey dynamics, and other species interactions. A selection of an ecosystem based approach applied to multiple species may be necessary for an explanation of all-inclusive factors driving habitat use. Species groups based upon similar life history traits and interactions of multiple species could be useful for modeling and understanding of habitat use. Additional methods to explore: pelagic eggs and larvae of the focus species (as a modeling group), and (if time permits) include the probable prey variable, its abundance, distribution and impacts upon the movement of juvenile and adult focus species. Additional variables such as: primary productivity, ichthyoplankton, food habit data, depth, and fishing influence could be of value to the models. In addition, fishery depedent data could be used to validate outputs. This could also involve examining changes in seasonal use where possible.

[b] Possible attendees: Arliss Winship (NOS), Matthew Poti (NOS), Elliott Hazen (NMFS), Vince Guida (NMFS), Christopher Rooper (NMFS), Paul Conn (NMFS), James Thorson (NMFS), Edward Rutherford (OAR); Victoria Kenter (NMFS); Donna Johnson (NMFS), Charles Perretti (NMFS), Rich Bell (TNC), Kathy Mills (GMRI), Vince Saba (GFDL), Heather Welch (NMFS); Jessica Coakley (MAFMC).

Table 5. Oceanographic influences on Offshore Habitat under Action 4.

Project Phase	Actions Needed	Timeline	Current efforts to be applied	Existing and New Resources Needed
Information and focus species prioritization	Assemble scientists to identify important oceanographic features that help define offshore habitat for both pelagic and benthic focus species. Because of the breadth of possibilities, a few, specific key features will be identified that are both data rich and that align with focus species of interest to the Councils and Commission will be prioritized for further work given a 3-year timeline for deliverables. A list of these prioritized species and features will be shared with the Steering Committee to solicit early feedback. These oceanographic features can be relatively persistent, seasonally reccurring or episodic in nature. This may include include current systems, fronts, or important water massess. Influences can include advection, thermal conditions, and associated changes in biogeochemisty or transport of organisms. Some specific examples of oceanographic features include the Georges Bank Gyre, Gulf of Maine Circulation, the Mid-Atlantic Bight Cold Pool, Shelfbreak front, or the influence of different Slope Water sources in the Gulf of Maine.	Months 1-6	There are a wide range of relevant ongoing and past studies, datasets and modelling efforts relavent to oceanographic process and their influence on habitat on the NEUS Shelf. Some notable areas of research include the Mid-Atlantic Bight Cold Pool, Shelfbreak fronts, Georges Bank Circulation, Gulf of Maine Circulation and water masses, and the influences climate change. This has included work by researchers at NEFSC, WHOI, GMRI, U Maine, Stony Brook, URI, SMAST, Rutgers, GFDL, U.S. GLOBEC Program and many others.	Resources to meet as a group in person (meeting space and travel) and via webinar will be needed.[a] This will depend on location, but it is estimated that about $8,400 (6 x 2 x $700) may be needed for federal travel, and an additional $5,600 for non-federal travel (4 x 2 x $700) for 2-in person meetings. Other work can be conducted using web-based meetings.
Data prep and compilation	Information will be compiled on the prioritized oceanographics features and information relevant to understanding impacts of these features on the distribution and habitat use of the prioritized species.	Months 6-18	See above	See above
Identify important trends and variability in key oceanographic features	This group will examine the influence of these important oceanographic features on the distribution and abundance of the prioritized focus species. This strategy should include an examination of the: 1) Sensitivity of focus species to oceanographic drivers through various mechanisms including advective, thermal and biogeochemical drivers; 2) Spatial extent of oceanographic features; 3) Variability, periodicity and long-term trends in oceanographic features. In addition, specific recommendations on how this information could be used to improve fish habitat use models should be developed.	Months 19-31	See above	See above

Synthesis and analysis	The ouputs from the modeling work will be compiled in a report, documenting methods and results, as well as GIS files that can be utilized to spatially understand changes in habitat use relative to these features. Efforts will be made to make this information available via an online visualization/Support Tool (see other action).	Months 32-35	NA	Information access when products are complete will link to a separate action to develop a visualization/Support Tool.
Early review and feedback	1) Review products with a pilot group of regional experts on oceanography and habitat (NMFS, Council, state and academic); and 2) Review Products with the Steering Committee; in particular to obtain input.		NA	This can be done with existing staff resource commitments, if participating entities are willing to provide staff support in the form of work and travel. However, this may not require in-person meetings and could use web-based meetings to complete.
Application and final product development	Make necessary adjustments to final products		NA	NA
Final review and feedback	Present information to the assessment steering committee and finalize products	Complete		Convene Steering Committee in person, once for all actions.

[a] Possible participants could include Glen Garwarkiewicz (WHOI- shelfbreak fronts and slope processes), David Townsend (U Maine- Influence of water masses on primary production in the gulf of Maine), Charles Stock (GFDL- Climate and ecosystem modelling), Vince Saba (NEFSC- Climate and ecosystem modelling), Kevin Friedland (NEFSC- Modelling of habitat based on oceanographic conditions), Jon Hare (NEFSC- Climate Vulnderability Assessment), Steven Lentz (WHOI- MAB Cold Pool), James Manning (NEFSC- Physical Oceanography, GLOBEC, Cooperative Research), Paula Fratantoni (NEFSC- Physcial Oceanography, Oceans and Climate Branch Chief), David Richardson (NEFSC- Ichthyoplankton), Harvey Walsh (NEFSC- ichthyoplankton, zooplankton, EcoMon program lead), Chris Melrose (NEFSC- Hydrographic monitoring program lead), Vince Guida (NEFSC- Habitat Ecology, Habitat modelling), Scott Large (NEFSC- Ecosystems Dynamics and Assessment Branch Chief).

Table 6. Habitat Data Visualization and Decision Support under Action 5.

Project Phase	Actions Needed	Timeline	Current efforts to be applied	Existing and New Resources Needed
Determine type of services needed	Based on the products being developed from Actions 1-4, determine the kind on online mapping application needed to share the products with endusers and the public.	Months 18-24	NA	This can be done with existing staff resource commitments. However, this may require some conference calls or web-based meetings to complete.
Examine existing mapping/visualization services available and integrate data into a visualization/Support Tool	Habitat staff from ASMFC, MAFMC, NEFMC and NOAA HCD, will discuss some of the mapping platforms that are currently available. Consideration will be given to whether this information should be housed on a NOAA site (which requires extensive clearances) or a non-federal site. Recommendations will be taken to the steering committee for input on approach to be taken.	Months 25-36	This could include existing services such as the Northeast or Mid-Atlantic Ocean Data Portals (which could display fish habitat data with other kinds of regional data), NMFS Habitat Data Geodatabase (which has geoprocessing, mapping, and spatial analysis/modeling services that allow data to be queried and accessed, as well as mapped), or other kinds of existing sites and services internal or external to NOAA.	Funds are available to complete this work ($70,000 available through MAFMC).
Finalize products	When final products become available, the information will be integrate into an approrpiate viisualization/Support tool and shared.	Complete	NA	Convene Steering Committee in person, once for all actions.

6.0 FOLLOW ON ACTIONS

Follow On Actions

The assessment will be used in a number of ways. These actions were identified by the workplan development teams as important next steps after the assessment actions have been completed.

1) EFH Review/Redo: High resolutions habitat maps that include both static and dynamic aspects of habitat should be used to improve essential fish habitat designations and descriptions.

2) Integration of habitat science into EAFM and broader IEA approaches: Information from the habitat assessment should be pulled into summary reports for the region and for individual species, including maps and metrics to track how much habitat we have (if known) and how that habitat is changing (in the inshore or offshore, annually, seasonal, and projected to change).

3) Habitat and stock assessments: High resolution habitat maps that include both static and dynamic aspects of habitat combined with geospatial statistical models have the potential to improve the indices of abundance that go into stock assessments as well as improve survey design. Methods to explicitly link habitat information with stock assessments should be explored.

7.0 ACKNOWLEDGEMENTS

We would like to thank all those that contributed as members of workplan development teams.

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