CORRESPONDENCE

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

January 14, 2021

Mr. William Kavanaugh
Project Manager
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Re: Hyannis Harbor FNP Breakwater repair and maintenance

Dear Mr. Kavanaugh:

We received your letter and Essential Fish Habitat (EFH) Assessment dated December 14, 2020, regarding proposed repair and maintenance of the Hyannis Harbor FNP Breakwater in Hyannis, MA. Originally constructed in the 1890's, the structure extends roughly 1,200 linear feet (LF) southeast off the end of the Commonwealth of Massachusetts-owned portion of the breakwater (approx. 2,000 LF long). The purpose for the proposed project is to restore full functionality of the FNP breakwater to meet its authorized purpose and to extend repairs made in the 1960's to enhance the durability of the structure using modern construction methods and practices. The most recent maintenance of the FNP breakwater at Hyannis Harbor was performed in the 1960's when approximately 800 feet of the originally constructed, parapet stone breakwater was adaptively reconstructed. This was accomplished by repurposing some of the original parapet stones and by adding new armor-stone to form a rubble mound configuration. The last 400 feet of the outer end of the FNP breakwater has not been repaired since its original construction in the 1890's.

The need for the proposed project is to address damages to the structure that have occurred since previous maintenance of the FNP breakwater. These damaged areas have resulted in decreased functionality of the authorized structure and in an overall loss of protection of the 15.5-foot deep, FNP anchorage area behind it. The proposed work would be accomplished within the scope of authority of the FNP's original authorizations and would not expand the crest height or length of the structure. The last 400 feet of the structure would be adaptively reconstructed by repurposing some of the parapet stones and by adding new armor stone, in a rounded, rubble-mound configuration that would dovetail into the 1960's repair area. Adding new 5 to 7-ton armor stone to the last 400 feet of the FNP breakwater is anticipated to result in an expansion of this portion of the structure's dimensions at the toe and at its seaward end, and result in a conversion of approximately 7,125 square feet (0.164 acres) of sandy, subtidal habitat to stone. The remaining length of the FNP breakwater (approximately 800 feet) would be repaired to its existing dimensions by adding

similarly sized stones and replacing stones that have been displaced from the structure. There will be no staging or equipment located on the beach adjacent to the breakwater.

The majority of the proposed repair work will occur within the subtidal zone, below mean lower low water (MLLW), as the toe of the structure is expanded by approximately 7,125 feet. No eelgrass or sensitive resources have been identified in the vicinity of the Hyannis Harbor breakwater repair project. All repairs for this project will be conducted from land-based equipment or by a floating barge. Eelgrass beds have been identified on the west side of the State owned Hyannis Harbor breakwater. No construction or access vessels will be permitted to anchor, spud, or transit within the eelgrass bed. All stone will be barged in, and placed with equipment from the top of the existing structure.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require federal agencies to consult with one another on projects such as this. Insofar as a project involves EFH, as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in the relevant consultation procedure. We offer the following comments and recommendations on this project pursuant to the above referenced regulatory process.

General Comments

Hyannis Harbor contains productive fishery habitats that support numerous important living marine resources including federally managed finfish including Atlantic cod, winter flounder, pollock, red hake, scup, butterfish, and bluefish. MassDEP has identified eelgrass beds in subtidal waters along the western side of the breakwater each year they have surveyed the area. The most recent eelgrass survey was completed in 2015-2017 and shows the edge of the eelgrass beds closer to the shallow portion of the breakwater, over 1500 feet from the proposed reconstruction work, which was confirmed through the ACOE side scan sonar and video survey investigation in July 2019. The U.S. Environmental Protection Agency has designated submerged aquatic vegetation, including eelgrass, as "special aquatic sites" under the Section 404(b)(1) of the federal Clean Water Act, due to its important role in the marine ecosystem for nesting, spawning, nursery cover and forage areas for fish and wildlife. Direct and indirect impacts to this critical habitat should be minimized to the greatest extent possible.

The project area also provides habitat for winter flounder spawning and juvenile development. Winter flounder eggs, once deposited on the substrate, are vulnerable to sedimentation effects in less than 1 mm of sediment. Decreased hatching success of winter flounder eggs is observed when covered in as little as 1 mm of sediment and burial in sediments greater than 2.5 mm may cause no hatch (Berry et al. 2011). Elevated turbidity can also impact fish species through greater utilization of energy, gill tissue damage and mortality. Egg and larval life stages may be more sensitive to suspended sediments, resulting in both lethal and sub-lethal impacts (Newcombe and Jensen 1996). To avoid such impacts, turbidity producing activities should be suspended during periods when these sensitive life stages are present.

Essential Fish Habitat

Hyannis Harbor is designated as EFH under the MSA for multiple managed fish species, including winter flounder, Atlantic cod, winter flounder, and pollock. In addition, this area is designated as a

Habitat Area of Particular Concern (HAPC) for juvenile Atlantic cod. As described above, the proposed Hyannis Harbor Breakwater repair project may adversely affect EFH by impacting nearby winter flounder habitat, eelgrass beds, complex rocky habitats, and shellfish habitat located within the project area. We recommend pursuant to Section 305(b)(4)(A) of the MSA that you adopt the following EFH conservation recommendations:

1. No turbidity producing repair or stone recovery activities below mean high water should occur from January 15 to May 31 to protect winter flounder early life stages.

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including a description of measures you adopt for avoiding, mitigating or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasons for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate or offset such effects pursuant to 50 CFR 600.920(k).

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(l) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations.

Endangered Species Act

Threatened and endangered species under our jurisdiction may be present in the action area. A consultation pursuant to section 7 of the Endangered Species Act of 1973 is required. Our Protected Resources Division has reviewed your determination that the proposed project is not likely to adversely affect any species listed by us as threatened or endangered under the ESA of 1973 and has concurred with your determination in a letter dated December 18, 2020. If you have any questions regarding the status of this consultation, please contact Roosevelt Mesa at 978-281-9186 or roosevelt.mesa@noaa.gov.

Conclusion

In summary, we recommend that no repair or stone recovery activities below mean high water should occur from January 15 and May 31 to protect winter flounder. If this time of year restriction is not feasible, work between January 15 and May 31 should take place behind turbidity controls. We look forward to your response to our EFH conservation recommendations, and continued coordination on this project. Please contact Kaitlyn Shaw at 978-282-8457 or kaitlyn.shaw@noaa.gov if you would like to discuss this further.

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
for Habitat Conservation

cc: Roosevelt Mesa, PRD
Tim Timmermann, USEPA
John Logan, MA DMF
Grace Moses, US ACOE
Tom Nies, NEFMC
Chris Moore, MAFMC
Lisa Havel, ASMFC

References

Berry, W.J., Rubentstein, N.I., Hinchey, E.K., Klein-Mac-Phee, G. and Clarke, D.G. 2011. Assessment of dredging-induced sedimentation effects on winter flounder (*Pseudopleuronectes americanus*) hatching success: results of laboratory investigations. Proceedings of the Western Dredging Association Technical Conference and Texas A&M Dredging Seminar. Nashville, TN June 5-8, 2011.

Newcombe, C.P. and Jenson, O.T. 1996. Channel suspended sediment and fisheries: a synthesis for quantitative assessment of risk and impact. *North American Journal of Fisheries Management* 16(4):693-7

The Commonwealth of Massachusetts
Division of Marine Fisheries
251 Causeway Street, Suite 400, Boston, MA 02114
p: (617) 626-1520 | f: (617) 626-1509
www.mass.gov/marinefisheries

January 13, 2021

NOAA Fisheries Service
Greater Atlantic Regional Fisheries Office
Attn: Mr. Kevin Madley
Regional Aquaculture Coordinator
55 Great Republic Drive
Gloucester, MA 01952
VIA email

Dear Mr. Madley:

The Division of Marine Fisheries (MA DMF) has reviewed the pre-application information for Blue Water Fisheries proposed net-pen offshore finfish aquaculture project. MA DMF attended a pre-application meeting hosted by NOAA regarding the project on December 10, 2020. Blue Water Fisheries is interested in developing an offshore aquaculture project that will grow 12,800 tons of steelhead trout per year. Their operational set-up includes the use of 40 InnovaSea net pens in two grids where the net pens are arranged in a 2x10 grid. The proposed system will be anchored by 66 1m^2 (33 per grid) ballast block anchors.

The proposed project was sited in federal waters off the mouth of the Merrimack River using a GIS-based spatial analysis to identify sites with relatively less suitability constraints in an Area of Interest (AOI) within 12 nautical miles of preferred ports (Newburyport, Hampton, Rye, and Portsmouth) in federal waters 52-90 meters deep. Eight proposed sites were identified and Blue Water Fisheries is seeking to permit two of the eight sites, occupying a total of 530 acres.

NOAA has requested pre-application review to identify major concerns with the project. MA DMF has the following comments:

No leasing provision

Under current permitting requirements, this project will need a U.S. Army Corps of Engineers permit and a U.S. EPA National Pollution Elimination System (NPDES) permit. There may be other permits from FDA and USFWS required. There is no leasing process for aquaculture in federal waters. MA DMF is very concerned with private corporations being allowed to exclusively occupy offshore waters, thereby preventing other uses in the area including energy development, fishing, or competing aquaculture projects. It would benefit future reviews to

have a description of the specific permitting process, including the roles of the individual federal agencies, and the project and permitting timeline.

Cod Spawning

The AOI overlaps with the Gulf of Maine (GOM) Cod Spawning Protection Area, commonly known as 'Whaleback" (Figure 1). Atlantic cod (*Gadus marhua*) spawning is known to be sensitive to disturbance (Dean et al. 2012). Even a relatively short duration disturbance (several hours locally) could critically impact cod spawning behavior and habitat. A preliminary literature review revealed studies that documented that spawning cod avoided areas where salmon aquaculture was initiated (Maurstad et al. 2007). There are very few areas remaining where cod spawn in the Gulf of Maine.

Cetaceans

The project has the potential to impact the North Atlantic Right Whale (NARW) (*Eubalaena glacialis*) and Humpback Whale (*Megaptera novaeangliae*) (Figure 2), both endangered species. The GOM is a feeding ground for these whales. The site assessment did not include these species since the data was not at a scale relevant for siting aquaculture. However, it is known that right whales use this area. There is no "whale-safe" aquaculture gear. The states and the federal government have been undertaking extensive efforts to address the use of vertical lines in the lobster fishery. Allowing a project that will introduce additional gear is contradictory to the goals of those efforts.

Commercial Fishing

This project is in direct conflict with wild fisheries. The site assessment presented indicated areas that were relatively more suitable, but the AOI as a whole is in an area with considerable commercial fishing by Massachusetts fishermen. While some areas within the AOI have less relative fishing activity, it is still very high from an absolute or regional perspective. We also note that the technical report does not adequately address the high amount of fixed gear, highly migratory species (e.g. bluefin tuna), and recreational fishing in the area since there is relatively poor mapping of such fisheries compared to the VMS fisheries. Additional information about the relative fisheries value of the area should be prepared and reference work such as NOAA's Fishing Footprints (https://apps-nefsc.fisheries.noaa.gov/read/socialsci/fishing-footprints.php) and Offshore Wind Socioeconomic assessments (https://www.fisheries.noaa.gov/resource/data/socioeconomic-impacts-atlantic-offshore-wind-development). Information regarding the compatibility of the proposed activities and these other uses and resources has not yet been provided, but it is certain that wild fishing cannot occur in or around the aquaculture sites.

Water and sediment quality

Downstream alterations to grain size, organic carbon content, and contaminants associated with disease and anti-fouling treatments could have unintended impacts. The coastal current would put downstream impacts in Massachusetts Bay and Cape Cod Bay. Recent fish kills due to depleted dissolved oxygen in Cape Cod Bay (Pugh 2020 and Xue et al 2014) suggest that the area may be more sensitive to eutrophication effects than it has been in the past.

Questions regarding this review may be directed to Kathryn Ford (kathryn.ford@mass.gov) or Kate Frew (kate.frew@mass.gov).

Sincerely,

Daniel J. McKiernan
Director

cc: Lisa Engler, Bob Boeri, Todd Callaghan, Mass CZM
Michelle Bachman, NEFMC
Lou Chiarella, Chris Schillaci, NOAA
Eric Nelson, Danielle Gaito, EPA
Dean, Griffin, McKiernan, Armstrong, Hoffman, Pugh, Glenn, Petitpas, Kennedy, Shields MA DMF
Scott Flood, Blue Water Fisheries

DM/KF/sd

References:

Dean, M.J., W.S. Hoffman, and M.P. Armstrong. 2012. Disruption of an Atlantic Cod Spawning Aggregation Resulting from the Opening of a Directed Gill-Net Fishery. North American Journal of Fisheries Management. 32:1, 124-134.

Maurstad, A., T. Dale, and P.A. Bjorn. 2007. You wouldn't spawn in a septic tank, would you? Human Ecology. 35: 601-610.

Jossart, J., L.C. Wickliffe, K.L. Riley, and J.A. Morris Jr. 2020. CASS Technical Report. Site Suitability Analysis: Blue Water Fisheries LLC, Northeastern Federal Waters.

Pugh, T. 2020 Cape Cod Bay dissolved oxygen monitoring summary. MA DMF Memorandum, November 18, 2020. See also: https://www.mass.gov/doc/121020-mfac-business-meeting-materials-2/download pages 101-136

Xue, P., C. Chen, J. Qi, R.C. Beardsley, R. Tian, L. Zhao, H. Lin. 2014. Mechanism studies of seasonal variability of dissolved oxygen in Mass Bay: A multi-scale FVCOM.UG-RCA application. Journal of Marine Systems. 131: 102-119.

Figures:

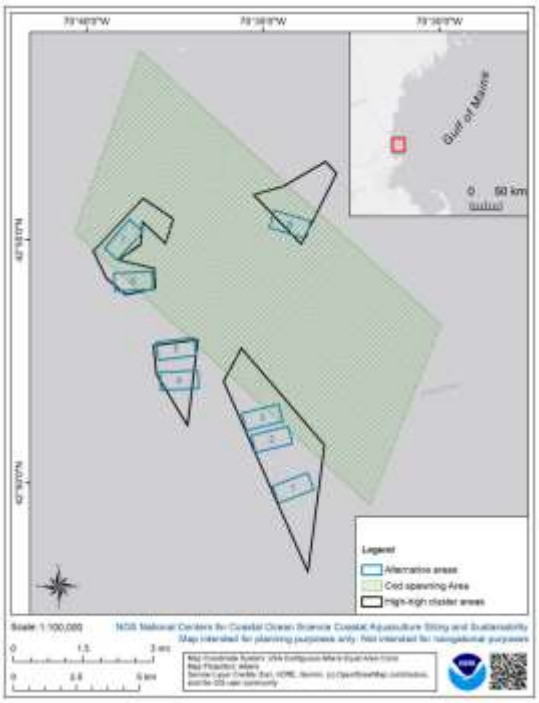


Figure 1. Cod Spawning Area. (Jossart et al. 2020. Figure A-6 (A), pg. 142/145.)

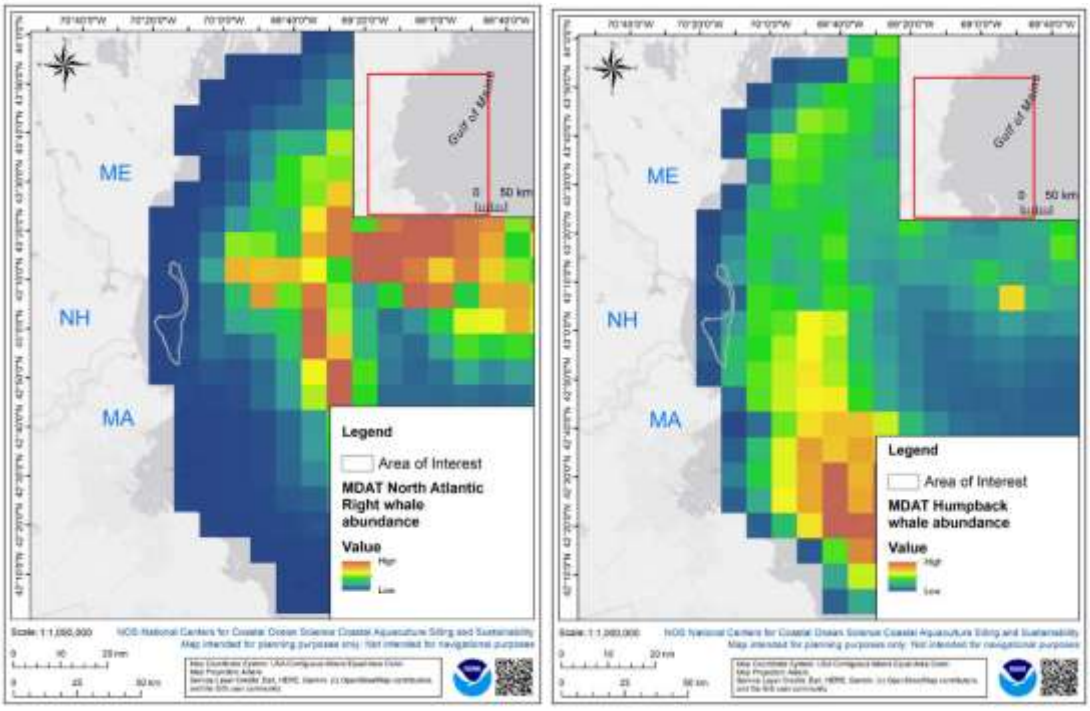


Figure 2. North Atlantic Right Whale and Humpack Whale abundance. (Jossart, et al. 2020. Figure A-5 (A),pg. 115/145 and Figure A-5 (D), pg. 118/145.)

The Commonwealth of Massachusetts
Division of Marine Fisheries

251 Causeway Street, Suite 400, Boston, MA 02114
p: (617) 626-1520 | f: (617) 626-1509
www.mass.gov/marinefisheries

CHARLES D. BAKER, Governor
KARYN E. POLITO, Lt. Governor
KATHLEEN A. THEOHARIDES, Secretary
RONALD S. AMIDON, Commissioner
DANIEL J. MCKIERNAN, Director

December 22, 2020

Kristy Beard
Via: Federal e-Rulemaking Portal

Dear Ms. Beard:

The Division of Marine Fisheries (MA DMF) has reviewed the Federal Register Notice, request for information for Aquaculture Opportunity Areas [RTID 0648-XA406] by NOAA. MA DMF viewed a webinar given to the Northeast Regional Ocean Council (NROC) regarding this project, as well. NOAA requests that interested parties provide relevant information on the identification of areas within Federal waters of the Gulf of Mexico and off Southern California, south of Point Conception, for the first two Aquaculture Opportunity Areas (AOA) and on what areas NOAA should consider nationally for future AOAs.

Federal waters of the Gulf of Mexico and Southern California, south of Point Conception, are being focused on first because there is existing spatial analysis data and current industry interest in developing sustainable aquaculture operations in these regions. MA DMF comments are focused on the questions posed in the request for information under the section, "Input Requested to Inform the Identification of Future AOAs, Nationally."

What regions of the country should be considered for future AOAs?

- The New England region is facing development pressure from offshore wind as well as offshore aquaculture. Furthermore, there is availability of existing spatial analysis data (which has already been used in the site selection for a finfish aquaculture site in the Gulf of Maine).
- There are many competing uses and resources in New England waters that are incompatible with offshore aquaculture development. Most notably, there is continuing pressure to reduce the use of vertical lines in offshore waters to protect the critically endangered North Atlantic Right Whale.
- Prior to the development of future AOAs, we recommend NOAA define the permitting process for aquaculture projects which should include leasing requirements.

If states express interest in developing offshore aquaculture, should we also consider state waters as areas for future AOAs?

- AOAs should not be defined in Massachusetts waters due to state jurisdiction over such projects.
- If spatial modeling efforts are pursued in New England, they can and should include state waters to understand the relative suitability of state waters compared to adjacent federal waters.
- AOA development should include the creation of a task force which includes state fishery representatives.

What resource use conflicts should we consider as we identify future AOAs?

- Understanding how much space is needed or anticipated to be needed is useful. A "start small" approach, was mentioned in the NROC webinar. However, what are the limits on buildout? NOAA should develop predicted aquaculture space usage over certain timeframes.
    - Economic analyses are needed that clearly identify how economically feasible aquaculture is in the North Atlantic region since the area already has a very productive wild fishery.
    - The types of aquaculture expected should be identified; AOAs may need to be species/gear type specific.
    - Mitigation for impact to wild fisheries should be clarified early in the process.
    - Specific social assessments of the effect of multiple fixed sites on nomadic wild fisheries in the area are needed.
- The footprint of the lobster fishery is poorly known, particularly at the scale relevant for siting aquaculture. This is a key data need that should be addressed if the types of aquaculture expected in the New England region are incompatible with fixed gear fishing. There are existing strategies working on addressing this data need that should be supported.
- Site assessment work needs to consider risk of harmful algal blooms (HABs) and other water quality components relevant to aquaculture.
- In New England, the co-location of offshore wind and aquaculture needs to be explored.
- Spawning protection areas should be avoided, including those areas identified for cod and herring spawning (1, 2). Other important sensitive seafloor areas, including spawning and early life history areas can be found in the New England Fishery Management Council's Omnibus Habitat Amendment documents (3).
- Hard and complex seafloor, particularly with deep sea corals, should be avoided.
    - The seafloor is relatively poorly mapped in the Gulf of Maine.
    - The Northeast Regional Ocean Council's Coastal and Ecosystem Health Committee is conducting a mapping initiative that should be reviewed for relevance to any spatial modeling exercise.
- The North Atlantic Right Whale is a primary consideration in the New England region. Information from the marine mammal stock assessments and the North Atlantic Take Reduction Team should be taken into consideration when planning for aquaculture (4, 5).

- There are several resource assessment surveys in the New England region, including for shrimp, scallop, and groundfish. These surveys may be significantly impacted by the placement of aquaculture by altering the space available for selection of stations.
- There is expansion of scallop biomass in very specific areas in the New England region. This information can be accessed through the Scallop Fishery Management Plan and Scallop Committee documents (6).
- The Gulf of Maine is warming more rapidly than other waterbodies on Earth (7). The impact of a rapidly changing ecosystem will make spatial predictions and future planning more uncertain. Modeling techniques that can address these uncertainties should be used.

Other recommendations:

- AOA development should have a clear process that includes a Request for Information period and a task force, similar to Wind Energy Area development.
- The spatial modeling used by NOAA to support the development of the Blue Water Fisheries aquaculture project in the Gulf of Maine used a 12 mile distance from shore due to access constraints. Future modeling efforts will need to more broadly understand access constraints for offshore aquaculture.
- All modeling assumptions need to be defined and model sensitivity to various inputs should be quantified.
- MA DMF recommends continued coordination with the Northeast Ocean Data Portal.
- MA DMF has a project which outlines the permitting steps for aquaculture in Massachusetts and an online mapper, both of which are available to the public (8, 9).
- Review and include relevant information from FMPs.

Questions regarding this review may be directed to Kathryn Ford (kathryn.ford@mass.gov.)

Sincerely,

Daniel J. McKiernan
Director

cc: Lisa Engler, Bob Boeri, Mass CZM
Michelle Bachman, NEFMC

DM/KF/sd

References

(1) https://www.fisheries.noaa.gov/new-england-mid-atlantic/commercial-fishing/northeast-multispecies-closed-area-regulations-gulf

(2) http://www.asmfc.org/uploads/file/5f64fc77AtlHerringSeason2DaysOutMeasures_WM_MANH_Closures_Sept2020.pdf

(3) https://www.nefmc.org/library/omnibus-habitat-amendment-2

(4) https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessments

(5) https://www.fisheries.noaa.gov/new-england-mid-atlantic/marine-mammal-protection/atlantic-large-whale-take-reduction-plan *and* https://repository.library.noaa.gov/view/noaa/3411

(6) https://www.nefmc.org/management-plans/scallops

(7) Saba, V. S., et al. (2016), Enhanced warming of the Northwest Atlantic Ocean under climate change, *J. Geophys. Res. Oceans*, 121, 118– 132, doi:10.1002/2015JC011346.

(8) https://www.massaquaculturepermitting.org/

(9) https://www.arcgis.com/apps/webappviewer/index.html?id=b6e90602c8804455917e654a018a1ba0

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

December 22, 2020

Lou Chiarella
Assistant Regional Administrator
NOAA Fisheries Greater Atlantic Regional Office
Habitat Conservation and Ecosystem Services Division
Via e-mail

Dear Lou,

Please accept these comments from the New England Fishery Management Council (Council) regarding Blue Water Fisheries aquaculture project in federal waters off Massachusetts and New Hampshire. As you know, the Council has primary management jurisdiction over 28 marine fishery species in federal waters and is composed of members from Connecticut to Maine. Many of the fisheries and species we manage occur in and around the identified project area.

We appreciate the opportunity to engage with staff from NOAA, the Environmental Protection Agency, the U.S. Army Corps of Engineers, and the developer on this project during the pre-application phase. Council staff reviewed the November 2020 siting analysis prepared by NOAA's National Centers for Coastal Ocean Science and attended the December 10 interagency pre-application meeting. Below, we provide some specific comments on this analysis. We are also enclosing the Council's new aquaculture policy, which was approved on December 1. We would be happy to discuss specific ideas for socializing the site amongst the fishing and fishery management community in more detail in the coming months, including at our own meetings.

Per our aquaculture policy, the Council has concerns about siting aquaculture operations in sensitive habitat types. The Council recommends that aquaculture development avoid areas of complex seafloor habitat when possible, complex meaning pebble, cobble, or boulder-sized sediments, especially those with attached epifauna. In terms of epifauna, we recommend avoiding deep-sea coral and sponge habitats in particular. These species do occur in the Gulf of Maine although not, to our knowledge, at this location. These recommendations seem consistent with the developer's desire to site the project on areas of soft bottom.

The challenge will be determining exactly where these complex habits occur. We know from our habitat conservation work that data on coarse grained sediments in offshore location can be somewhat sparse. It seems that that bathymetric data collected by the University of New Hampshire and evaluated in the siting report are detailed and will be useful for identifying seafloor features at relevant spatial scales, but we are concerned the U.S. Geological Survey (USGS) sediment texture and usSEABED databases may be missing areas of coarse sediment in the project area, given that these sources rely mostly on grab samples which are not well suited to identifying larger grain sizes. Looking briefly at the USGS data sets, there seem to be a relatively small number of observations from these sources in and around the eight candidate sites. We recommend that the environmental survey plan includes a detailed characterization of sedimentary features. We expect that acoustic methods would be used to characterize the site and

suggest that the developer should consider verifying acoustic data with seafloor imagery if possible.

Moving into the baseline environmental surveys phase, we suggest that GARFO habitat staff be included in conversations about seafloor mapping efforts to ensure that the data gathered are useful for evaluating potential impacts to essential fish habitat. As you are aware, in the context of offshore wind development, your office has developed habitat mapping recommendations that should allow us to understand seafloor characteristics in project areas in relation to the sorts of habitat features used by fishes. These recommendations (which we have shared via our offshore wind website) include suggested substrate classifications under the Coastal and Marine Ecological Classification Standard (CMECS) framework. Aquaculture projects are developed within smaller areas than offshore wind farms, so the wind-oriented recommendations may not map exactly to this issue in terms of spatial scale, but we expect many elements of those recommendations to be useful in an aquaculture context.

In addition to avoiding areas of complex benthic habitat, we are very concerned about potential intersections between the project area and spawning locations used by Atlantic cod. Gulf of Maine cod stock biomass is low, and the Council has enacted many restrictions on harvest, including catch limits and spatial and temporal fishery closures, to protect the resource. The Whaleback closure (formally known as the Gulf of Maine Cod Spawning Protection Area) was developed by the Council around ten years ago to minimize fishery interactions with spring spawning fish[1]. We know that cod are sensitive to physical and acoustic disturbance when aggregating to spawn[2]. We also know that they exhibit site fidelity, returning to specific seafloor features over multiple years[3]. While an aquaculture installation might have a relatively small footprint, it would nonetheless be problematic if one of the arrays were located on or close to one of these features. Maintenance of all inshore spawning components is important, in part because there is movement of fish between spawning sites (e.g., Whaleback) and within and among spawning grounds (e.g., Ipswich Bay, Massachusetts Bay) which allows for genetic exchange in the population.[4]

The Council's aquaculture policy also recommends caution around siting aquaculture projects in areas with substantial amounts of fishing activity or vessel transit that could be impeded by the presence of fish cages and mooring lines. In terms of characterizing fishing activity, we recommend using a combination of vessel trip report (VTR), vessel monitoring system (VMS), and automatic identification system (AIS) data, since each source has limitations and gaps. Desktop analyses should be combined with discussions with participants in potentially affected fisheries to understand patterns of activity in more detail. We have found that looking at both

---

[1] Armstrong, M. P., M. J. Dean, W. S. Hoffman, D. R. Zemeckis, T. A. Nies, D. E. Pierce, P. J. Diodati and D. J. McKiernan (2013). "The application of small scale fishery closures to protect Atlantic cod spawning aggregations in the inshore Gulf of Maine." Fisheries Research **141**: 62-69.

[2] Dean, M., W. Hoffman and M. Armstrong (2012). "Disruption of an Atlantic Cod Spawning Aggregation Resulting from the Opening of a Directed Gillnet Fishery." North American Journal of Fisheries Management **32**: 124-134.

[3] Zemeckis, D. R., W. S. Hoffman, M. J. Dean, M. P. Armstrong and S. X. Cadrin (2014). "Spawning site fidelity by Atlantic cod (*Gadus morhua*) in the Gulf of Maine: implications for population structure and rebuilding." ICES Journal of Marine Science **71**(6): 1356-1365.

[4] Zemeckis, D. R., C. Liu, G. W. Cowles, M. J. Dean, W. S. Hoffman, D. Martins, S. X. Cadrin and J. Watson (2017). "Seasonal movements and connectivity of an Atlantic cod (*Gadus morhua*) spawning component in the western Gulf of Maine." ICES Journal of Marine Science **74**(6): 1780-1796.

catch and revenue information is useful to provide a more complete perspective on activity, because some fisheries are higher volume and some are higher value.

VMS data are useful for showing where many types of fishing vessels are located, but do not cover all fleets. Relative to this site, activity of vessels targeting lobster and whiting will most likely be missing from VMS data, underscoring the importance of investigating activity using VTRs. Filtering VMS data for vessel speed can better indicate locations likely to represent fishing activity, and different filters are appropriate for different gear types. With the aquaculture gear generally below the surface, it may be that transiting vs. fishing near the net pens and mooring system would pose distinct concerns, which might vary by type of gear (fixed or mobile). If this is the case, it would be useful to distinguish transiting vs. fishing behavior as clearly as possible.

VTR data provide much more information including landings by species and are readily linked to dealer data to estimate ex-vessel revenues. GARFO and the Northeast Fisheries Science Center's fishing activity analysis tool uses the VTR- and observer-based 'fishing footprints' data products referenced on page 17 of the siting report. See here and here for more information. While the tool was developed for offshore wind siting analysis, it should be possible to evaluate fishing information for any set of coordinates, including Blue Water Fisheries' area of interest. We understand that Ben Galuardi and Doug Christel at GARFO are good contacts for providing products based on the fishing footprints data.

Below, we provide some additional information on fishing activity in fisheries that we manage, plus the lobster fishery, based on VTR data from 2014-2018, unless otherwise noted. We also looked at clam dredge data and note that this fishery does not appear to overlap the area of interest. Neither VTR nor VMS data provide information on private angler recreational fishing activity.

- **Groundfish:** Groundfish are caught commercially in bottom trawls, gillnets, longlines, and handlines. In terms of the commercial fleet, this location appears to be an important area for bottom trawl fishing (**Map 1**) for species including American plaice, witch flounder, and Atlantic cod. This activity is concentrated along the western/landward edge of the area of interest. Gillnet and longline fishing activities seem to occur outside of the area, to the east. In addition, the groundfish fishery includes a recreational hook and line component, which is active in this general location. Unfortunately, spatial data depicting recreational fishing activity, both in the for-hire fleet and among private anglers, is limited regardless of data source. During development of the Whaleback spawning closure, there were many comments that this general area is frequently used by private anglers who do not use VMS or AIS, and who do not submit VTRs. An effort should be made to contact these fishermen to determine areas that may be of particular interest to them.
- **Whiting:** Whiting are harvested with small mesh bottom trawls, which means that the fishery requires an exemption from broader regulated mesh areas to operate. All eight candidate areas are within the whiting exemption area referred to as Small Mesh Area I. This area is open to fishing between July 15 and November 15 and is one of a few locations in the Gulf of Maine where whiting can be targeted. Small mesh multispecies revenue appears to have a strong degree of overlap with the area of interest (**Map 2**; data are from 2013-2017). In this location, the spatial distribution of revenue associated with all bottom trawls (**Map 1**) is similar to revenue associated with just small mesh multispecies (**Map 2**), suggesting that the whiting fishery is a major contributor to bottom

trawl revenues in this location. The two maps diverge in other locations (see map insets for comparison)

- **Herring:** Purse seine fishing occurs to the northeast of the area of interest, and mid-water trawling occurs to the southeast (both sets of data are overlaid on **Map 3**). Thus, at least for the period 2014-2018, this specific location does not seem to be used by the herring fishery.
- **Sea Scallops:** We compared the plots in the siting report to recent estimates of activity based on VMS data prepared for our scallop fishery management plan. The data were filtered to represent vessel speeds between 2-5 kts and binned into three-minute squares. Grids indicating less than 20 hours annual fishing activity, or within state waters, were removed. This evaluation, for calendar years 2015, 2016, 2018, 2019, and 2020 (through mid-October; we did not have these data for 2017 on hand) suggested little overlap between scallop fishing and the general area of interest for the project. VTR data show similar patterns (both VMS and VTR data are shown on **Map 4**). Overall, the scallop fishery in Ipswich Bay appears to occur southwest of the project site. More information on the scallop resource in this region is available in a 2018 stock assessment workshop document, starting on page 199.
- **Lobster:** Based on VTR data (**Map 5**), there appears to be lobster pot activity in and around the sites, especially 1, 6, 7, and 8. Since not all lobster fishermen are required to submit VTRs, it is possible that other sites are fished as well. From our experience, many pot fishermen have very specific and consistent spatial patterns of activity.

We look forward to continued engagement on fisheries issues as this project moves forward. Please contact Michelle Bachman on my staff (mbachman@nefmc.org; 978-465-0492 x 120) if you need further information.

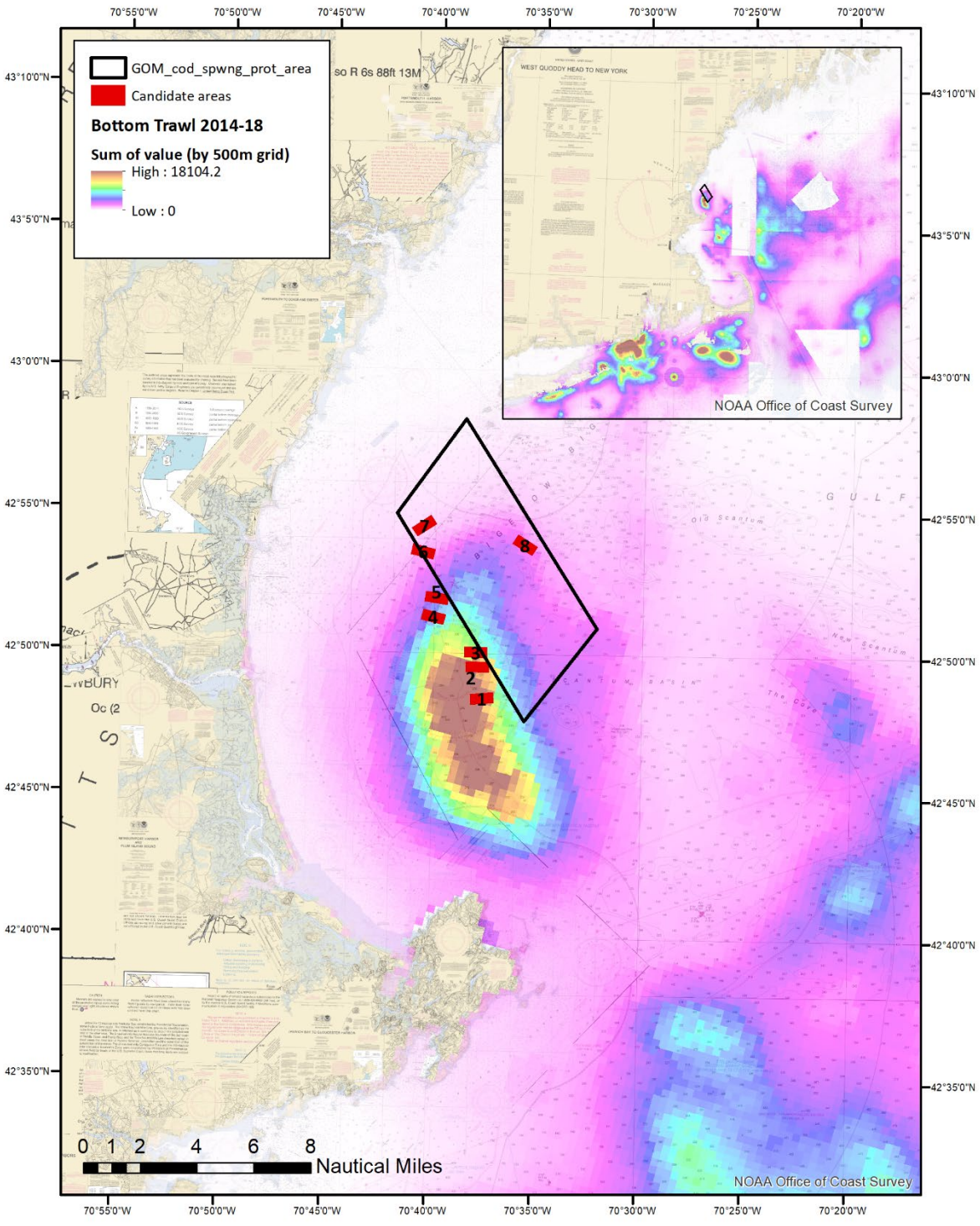
Sincerely,

Thomas A. Nies

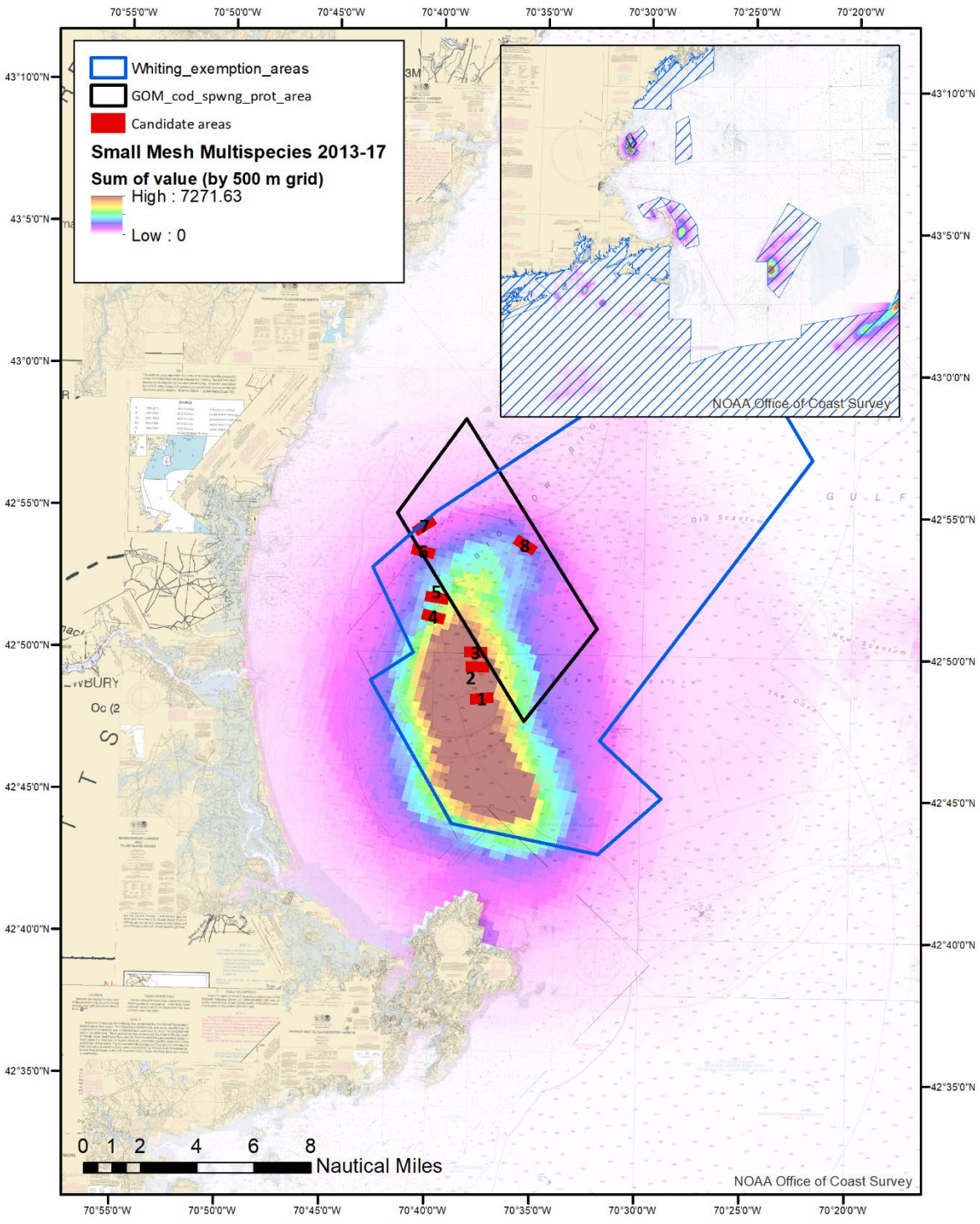
Thomas A. Nies
Executive Director

cc: Kevin Madley, Eric Nelson, Rick Kristoff, Chris Moore, Scott Flood
Enclosure: NEFMC Aquaculture Policy, approved December 1, 2020

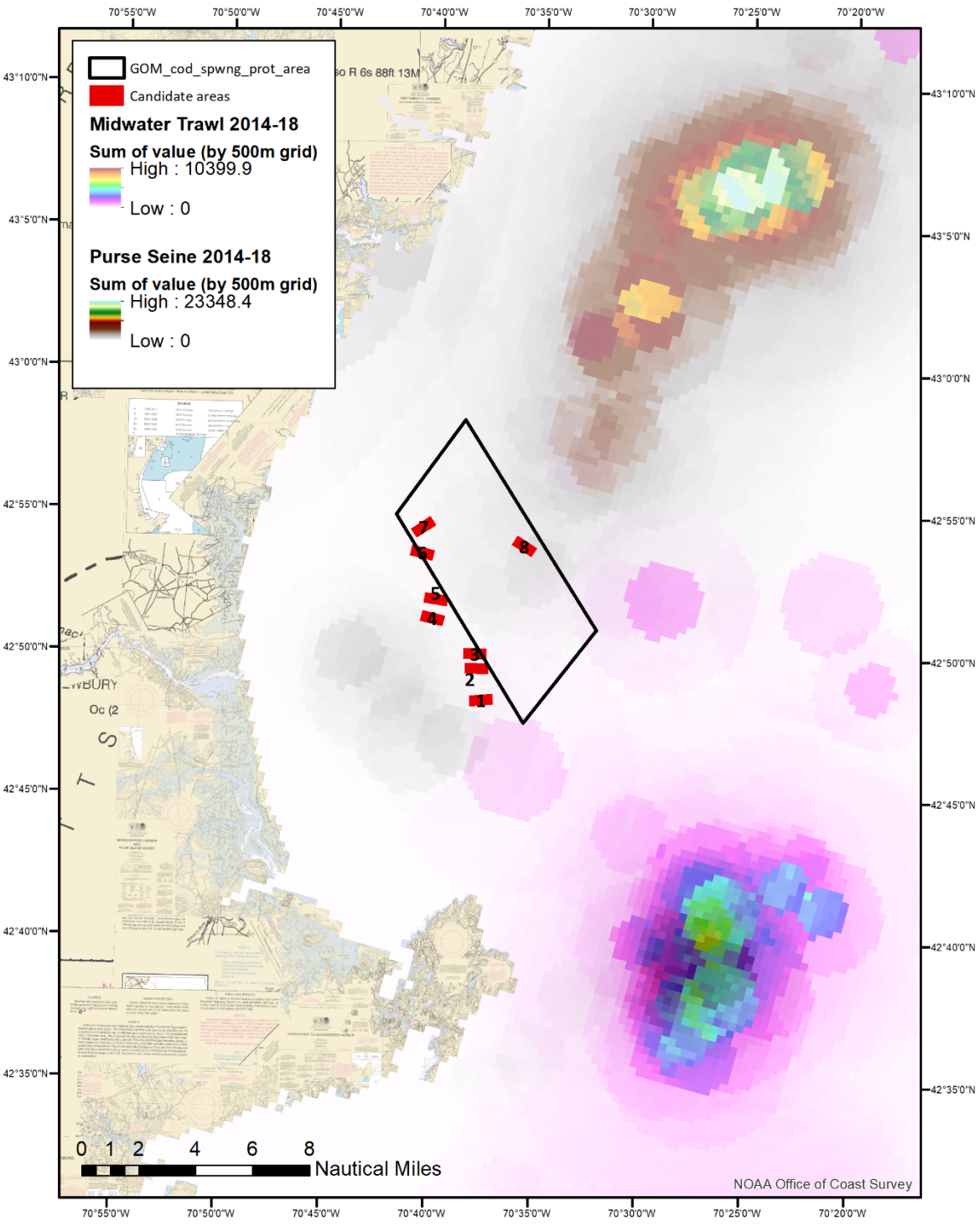
Map 1 – Bottom trawl revenue from VTR, sum of 2014-2018 data. Includes both large mesh (groundfish, and any other large mesh species) and small mesh (whiting, and any other small mesh species).



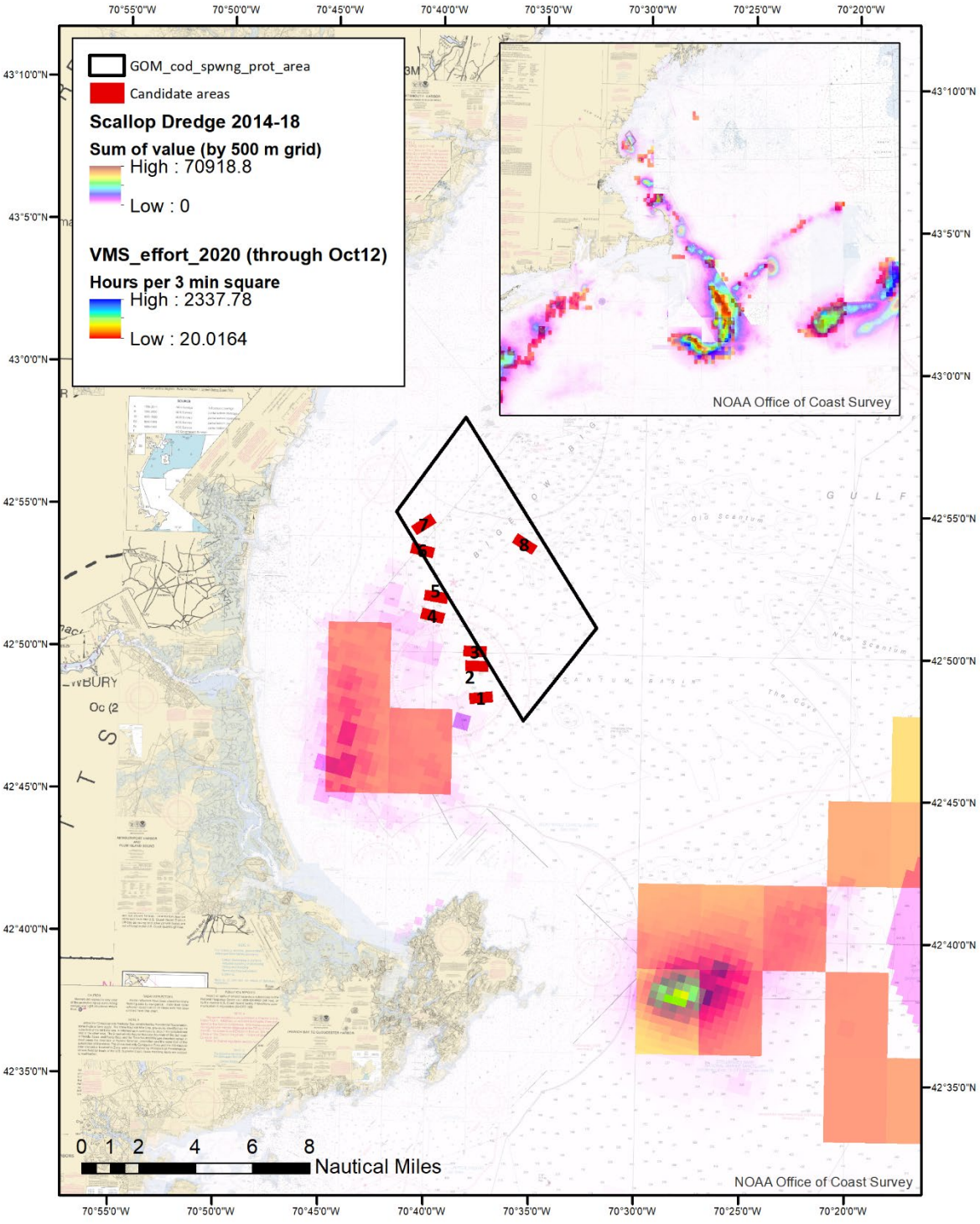
Map 2 – Small mesh multispecies revenue from VTR (mostly whiting, also referred to as silver hake; this data set also includes red and offshore hake). As shown in the inset, effort in this fishery is associated with specific exemption areas, outlined in blue.



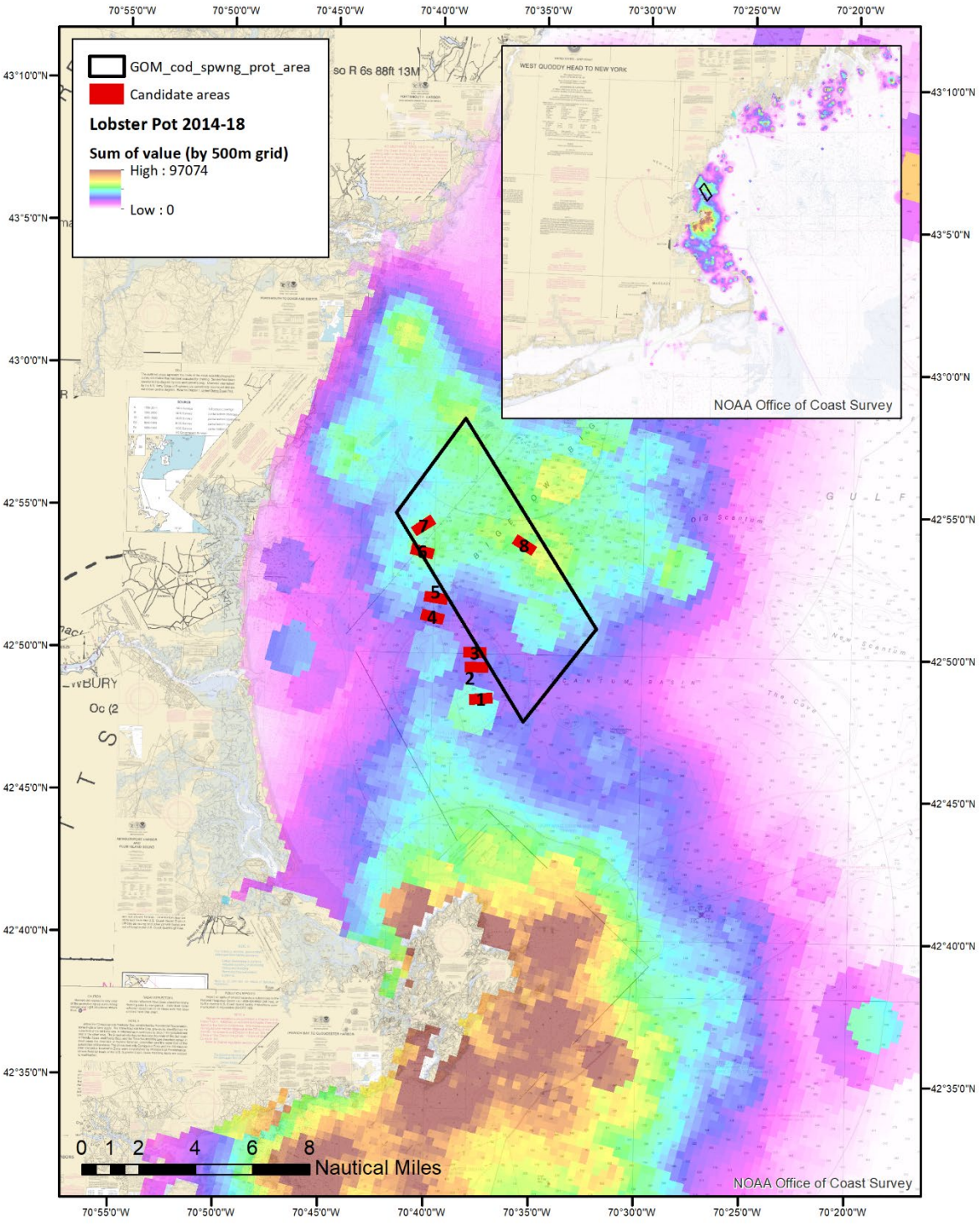
Map 3 – Purse seine (green/brown) and midwater trawl (pink/blue) revenue from VTR. These data sets are likely to represent the Atlantic herring fishery, although other species harvested by these gears would also be reflected in these data.



Map 4 – Scallop revenue (VTR, by 500 m grids) overlaid on hours of effort (VMS, by larger three-minute squares). These data suggest that scalloping occurs just south and west of the area of interest. There is also a state waters fishery for scallops off this part of Massachusetts (data not shown).



Map 5 – Lobster pot revenue based on VTR. Lobster vessels are not required to submit VTRs unless they hold another federal permit; our understanding is that data for the areas offshore MA and NH are fairly complete, but data off Maine are spotty.



New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

December 18, 2020

Kristy Beard
Policy Analyst
NOAA Fisheries Office of Aquaculture
Via email

Dear Ms. Beard:

The New England Fishery Management Council (Council) appreciates the opportunity to comment on NOAA Fisheries' Aquaculture Opportunity Areas (AOA) spatial planning process. We also appreciate being clearly identified as an entity with which NOAA plans to consult during the AOA identification process and will strive to be a productive partner in this endeavor. We have substantial expertise with spatial data on fish, fish habitats, and fishing activities, and look forward to working with you to evaluate which areas of the EEZ might have fewer conflicts with fish, fish habitats, and fishing.

The Council approved the enclosed aquaculture policy on December 1 (also available at this link). The purposes of this policy are to facilitate efficient and streamlined development of Council comments, related to both specific projects and regional-scale planning, and to communicate Council conservation priorities and concerns with federal and state agencies, aquaculture developers, and the public. Sections of the policy relate to aquaculture siting, which an important issue for the Council both in the context of avoiding impacts to sensitive fish habitats, and to reduce the potential for conflicts with wild capture fisheries operations.

The request for information poses four questions in relation to future AOAs. Our responses focus on the possibility of aquaculture development in offshore, federal waters, and we are not offering comments as to whether AOAs should be considered in state waters.

7. What regions of the country should be future AOAs?
8. Are there specific locations within those regions identified in response to #7 that should be considered for future AOAs?
9. Within those regions identified in response to #7, what resource use conflicts should we consider as we identify future AOAs? Please describe specific considerations that might make an area unfavorable, including ongoing or planned activities or ocean uses.
10. Is there ongoing environmental, economic, or social science research that would assist in the identification and implementation of future AOAs?

In response to question 7, the Council's recently adopted aquaculture policy recognizes that, 'like wild capture fisheries, aquaculture contributes to food production and food security, and that aquaculture is a valid and valuable use of the coastal zone and the EEZ'. This statement is neither an endorsement of nor a recommendation against identifying aquaculture opportunity areas in New England. In the context of other types of offshore development, specifically offshore wind, the Council has expressed interest in a deliberative, inclusive, and broad scale

planning process, in contrast to one where developers identify possible sites on a project-by-project basis. Thus, assuming there is industry interest in offshore aquaculture in our region, the Council would prefer the AOA process vs. one that is initiated due to developer interest. While we are pleased to be included in pre-application conversations around specific projects, we cannot as a single entity represent even a fraction of the feedback you might get from a wider scoping process that fishermen might directly participate in. We expect that the AOA process will allow for earlier identification of space use and other potential conflicts and provide opportunities for a broader array of interested parties to provide direct input. We recognize that the developer-driven process may continue to occur, regardless of whether AOAs are identified in New England.

From an operational perspective, aquaculture developers will understand their site requirements best, so we do not have a specific response to question 8. From what we have learned discussing two offshore projects in the pre-application phase, the preference seems to be for sites that are relatively close to shore, with moderate water depths and a gently sloping seabed, avoiding areas of complex bottom. We have ample experience evaluating seabed habitat data through our essential fish habitat work and would caution that additional survey effort will likely be required to identify and avoid complex features at a fine scale. At least some survey work might be needed to effectively locate AOAs, with additional site assessment work required as specific projects are proposed. Also, it would be helpful as part of the AOA process for participants who are not aquaculture experts to gain a better understanding of why certain site conditions are required or desired. For example, how far offshore is too far from an operational standpoint? What sorts of slopes or substrate types are not workable, vs. being less desirable? A broad understanding of these issues should facilitate an informed discussion of tradeoffs around siting.

To question 9, our aquaculture policy speaks to various concerns about use conflicts. From a fisheries perspective, these include important fishing grounds and sensitive habitats. In some cases, important habitat areas have been identified by the Council as either habitat or spawning closures; the latter are typically intended to protect certain species during particular months. Both Atlantic cod and Atlantic herring are species that spawn in areas relatively close to shore where aquaculture projects could be located. Spawning site fidelity has been documented for both species. In addition to areas that are actively fished, frequently transited corridors should also be avoided, especially if aquaculture installations cannot not be transited (we are not sure if this is the case). Overall, it would be useful for the AOA process to provide some clarity on which types of activities are or are not compatible with specific types of aquaculture operations.

Offshore renewable energy development is an emerging issue in New England. Substantial areas offshore Massachusetts and Rhode Island have been leased and projects are currently in the planning and permitting phases. In the Gulf of Maine, no lease areas have been identified yet, but early conversations about siting are already underway. It seems likely that aquaculture sites may be located inshore of wind energy areas, but this is not clear yet. Wind development, during the construction and operations phases, will alter existing patterns of vessel traffic, and this increased traffic could in turn affect the suitability of an area for aquaculture. The cumulative effects of a combination of aquaculture sites and wind farms (or other uses) should be part of the conversation.

In terms of available research (question 10) it is imperative that NOAA Fisheries Office of Aquaculture work with the regional office and science center to obtain fisheries data for use in siting analysis. We appreciate that the siting analyses developed to date by NOAA's National Centers for Coastal Ocean Science already include a wide range of data inputs and are easy to understand, but if the data incorporated in these analyses do not accurately reflect fisheries uses,

the results will be far less useful for assessing tradeoffs. We typically use a combination of VMS, VTR, and sometimes at-sea observer data in our own analyses to paint a fuller picture of fishing activity in an area. Consultation with the fishing industry is also extremely important, especially for activities that are not fully captured in fishery-dependent data sets (e.g., recreational fishing, lobster pot fishing). Relative to VMS data, VTR data provide much more information including landings by species and are readily linked to dealer data to estimate ex-vessel revenues. NOAA's GARFO and Northeast Fisheries Science Center recently collaborated on a fishing activity analysis tool. See here and here for more information. While their reports were developed for offshore wind siting analysis, it should be possible to evaluate fishing information for any set of coordinates, such as a potential AOA.

In addition to the spatial siting analyses including a more comprehensive array of data about fishing activity, we suggest convening a dialog up front about methods and model assumptions. To our point above about siting requirements and preferences, these parameters should be discussed by all participants in the AOA process. We assume that different types of offshore aquaculture projects that might be considered in the region would have different siting parameters, depending on the gear types used and species cultured. It would be informative to test the sensitivity of model outputs to different siting parameters. It would also be useful to examine various sets of suitability multipliers to determine how they affect the results.

We also recommend that other topics be discussed as part of the AOA process, including how aquaculture might need to interact with fishery management (for example, if there is a desire to culture a federally managed species), and how the permitting and regulatory process works. Questions around shared use of public trust resources and equity of access for multiple ocean users are also likely to arise. We recognize that aquaculture governance is complex and involves other federal or state agencies, but we have found that it is impossible to separate environmental, siting, and permitting issues when discussing aquaculture with the Council. It will also be important to consider the longevity of any AOAs identified. Is there a point at which they are retired if no projects are proposed? Is it appropriate to reconsider their suitability at intervals given changing ocean conditions and uses? What are the incentives to proposed projects inside AOAs, vs. in other areas?

Again, thank you for the opportunity to comment. We look forward to a continued partnership with NOAA Fisheries around aquaculture issues in New England. Please let us know if you have questions or need any additional information.

Sincerely,

Thomas A. Nies

Thomas A. Nies
Executive Director

cc: Lou Chiarella, Chris Moore
Enclosure: NEFMC Aquaculture Policy

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

December 14, 2020

Michelle Morin
Chief, Environmental Branch for Renewable Energy
Bureau of Ocean Energy Management
45600 Woodland Road, VAM-OREP
Sterling, Virginia 20166-4281

Dear Michelle,

We reviewed the Draft Essential Fish Habitat (EFH) Assessment, received October 13, 2020, for the proposed South Fork offshore wind energy project, which includes the construction, operation, maintenance, and decommissioning of a commercial scale offshore wind energy facility, known as the South Fork Wind Farm (SFWF), within Lease Area OCS-A-0517, located southeast of Block Island within the Rhode Island/Massachusetts Wind Energy Area. The SFWF project proposes construction of up to 15 wind turbine generators (WTGs) with a 6 to 12 MW generation capacity, and an offshore substation (OSS) with a submarine cable network connecting the WTGs and the OSS. The project also includes the construction and installation of the South Fork Export Cable (SFEC) using alternating current to export energy from the SFWF to a mainland electric grid in East Hampton, NY. In addition to the EFH assessment, we reviewed the supplemental information included with the assessment, the SFWF Construction and Operation Plan (COP), and the preliminary Draft Environmental Impact Statement for cooperating agency review.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and Fish and Wildlife Coordination Act require Federal agencies to consult with us on projects such as this. Because the project involves EFH, the consultation process is guided by the EFH regulatory requirements under 50 CFR 600.920, which mandates the preparation of EFH assessments and generally outlines your obligations.

At this time we do not have enough information to comment on the impacts of the proposed project on living marine resources nor recommendations to avoid, minimize and mitigate adverse effects on EFH and other marine resources. You have not yet provided a complete EFH assessment in accordance with the mandatory and additional information requirements for such assessments pursuant to 50 CFR 600.920(e). A completed EFH assessment is a prerequisite to begin the EFH consultation process as specified in 50 CFR 600.920(i)(2). This letter outlines additional information we require to consult on this project.

INFORMATION REQUESTED

Habitat Delineations within the Project Area

Your Draft EFH Assessment does not provide adequate characterization or delineation of habitats within the project area. We note that you are aware of this issue and have been working with us to address this deficiency. As we have discussed with your staff, the habitat information you provided is based upon data and methodologies that do not allow for the differentiation between coarse (i.e. sand) soft sediment substrates and small-grained hard bottom (i.e. pebble, cobble, boulder) substrates. We are working with your staff to determine the best path forward using the available data to accurately describe the extent and characteristics of the habitats within the project area. This will allow for the revised habitat information to be updated and accurately presented in the Final EFH assessment. We look forward to continued cooperation on this project to ensure that complex habitats within the project area are accurately characterized and delineated.

The updated characterization and delineations of habitat are necessary for your evaluation of project impacts in the EFH Assessment. You provided a breakdown of project impact areas by project component in Table 5 of the current assessment. However, the impact area calculations by habitat type are based upon the existing habitat delineations. The habitat type calculations will need to be updated based on the revised delineations to ensure the existing conditions are accurately reflected in the Final EFH assessment. Further, it is not clear what parameters the calculations in Table 5 are based upon, and the calculations are not consistent with those presented in Table 1 in the assessment, or those provided in the preliminary DEIS and COP. The specifications for each project component should be clearly described and presented in the text and/or table and the information should be consistent across the DEIS, COP, and EFH assessment, and within each document.

Evaluation of Impacts to Essential Fish Habitat

The EFH assessment states that you allow leasees to use a Project Design Envelope (PDE) in the preparation of their COP, and that the use of a PDE requires you to analyze the maximum impacts that would occur from the range of design parameters presented in the COP. As we have discussed in the past, while this type of analysis may be appropriate for your evaluation of the COP and for your NEPA analysis, such an approach to analyze project impacts to EFH is not consistent with the EFH regulations. Specifically, CFR 600.920(e) lays out the requirements for the preparation of an EFH assessment. You are required to include in your assessment an analysis of the potential adverse effects on designated EFH and the site-specific effects of the project. Further, CFR 600.920(d) requires that you use the best available scientific information in your assessment of the effects of an action on designated EFH and the measures that can be taken to avoid, minimize, or offset such effects. The use of the maximum impact analysis does not allow for an evaluation of potential adverse effects, nor measures that can be taken to avoid, minimize, or offset such effects, for the different design parameters that may actually be selected.

As we have discussed, for the EFH consultation, BOEM must assess the potential adverse impacts that would occur as a result of the range of design parameters under consideration. Without this assessment, it is not possible to provide appropriate EFH conservation

recommendations for the project. Further, any recommendations provided based on the analysis of a maximum impact design, may or may not ultimately be applicable to the final selected design parameters. This could lead to the reinitiation of consultation once the final design is determined. It would be most efficient for the process, and consistent with the EFH regulations, if the EFH assessment analyzed potential impacts from the range of proposed design parameters, rather than a maximum impact scenario. We would be happy to discuss this with you further, as it is an important issue that has implications for future projects as well as the South Fork Project.

The analysis of impacts to EFH must also be revised in the Final EFH Assessment. The current assessment and evaluation in both the Environmental Effects and Effects Analysis document sections use methods and criteria that are not appropriate, or applicable, in the analysis of project impacts to designated EFH. The assessments and determinations appear to be confusing how project impacts are evaluated under the National Environmental Policy Act (NEPA) process and how adverse impacts to EFH must be evaluated for an EFH assessment. Specifically, the document defines an "analysis area," and compares all the identified EFH impacts against this calculated "analysis area" rather than assessing the actual effect of the project impacts to designated EFH. Further, the effects analysis for EFH are qualified based on the amount of EFH available within the defined analysis area. For example, the loss of soft-sediment habitat for cable protection of over 179.3 acres was determined to be insignificant due to the availability of soft-sediment habitat within this defined "analysis area." This approach is not consistent with the EFH regulations and your responsibilities under these regulations. The EFH regulations require you to evaluate the site-specific project impacts to designated EFH and measures that would avoid, minimize, and offset identified potential adverse impacts. The existence of similar habitat within a defined geographic area surrounding or adjacent to, the project impact area does not diminish, reduce, or affect: 1) the analysis and evaluation of potential adverse effects a project will have on designated EFH; nor 2) the requirement to use the best scientific information available to determine what measures can be taken to avoid, minimize, or offset such effects. The analysis should be revised to be consistent with the requirements under the EFH regulations.

The approach taken for assessing adverse effects to EFH in the current document has resulted in a deficient EFH Assessment that should be modified prior to initiation of the EFH consultation. Of particular concern is a lack of evaluation of how each identified project impact will affect different habitat types. Similarly, in the evaluation of effects to EFH for each species there is no assessment of project effects by habitat type, nor by species life history stage. It appears that the EFH effects analysis for each species is based on the total calculated impact areas presented in Table 5 of the EFH assessment rather than designated EFH for the species within the project impact areas (i.e. the assessment does not appear to be refining mapped EFH by the habitat text descriptions). While we do not need the impacts to each species designated EFH to be individually calculated, we do need impacts to each habitat type to be quantified and fully assessed for each component of the project. For example, deposition of suspended sediments will occur as a result of cable laying activities. Soft and hard sediment habitats will be affected differently by the sediment deposition, and the differences between the effects should be quantified and fully evaluated. Without information on the extent and location of impacts by habitat types, it is not possible to evaluate avoidance or minimization measures that could be employed to reduce adverse impacts to EFH.

General Additional Information Needed

As discussed above, the approach to the EFH assessment and evaluation of potential adverse effects of the project to EFH needs to be revised to align with the EFH regulations. The EFH assessment should clearly present the extent of habitat types within the project area and evaluate all potential project impacts that could occur to such habitats. In summary, this assessment needs to include: 1) the location of where impacts will occur for each impact type; 2) the extent of each habitat type that will be impacted for each impact type; and 3) an evaluation of any potential avoidance and minimization measures to reduce the identified impacts, including an assessment of the extent of habitat impacts that would be avoided or minimized. As you develop the revised EFH assessment, please include citations of relevant and currently accepted literature to support your determinations and to inform the evaluation of identified avoidance and minimization measures that may reduce adverse impacts to EFH.

Specific Additional Information Needed

It also is not clear whether all potential adverse impacts to EFH have been identified and evaluated. Of particular concern is the absence of an assessment of the potential for construction and operation impacts to Atlantic cod EFH. Further, there is no discussion of the ongoing study you are funding to assess cod spawning activity in an overlapping area with the proposed project. The assessment should fully analyze and evaluate, using the best available information, how the project may affect Atlantic cod EFH, particularly spawning activity. The effects of habitat alterations and changes that may affect the suitability of the project area to support Atlantic cod, and the overlap with any confirmed and/or documented spawning aggregation areas should be fully assessed and described.

The current EFH assessment does not fully evaluate impacts to EFH from cable installation. The document does not evaluate the potential for habitat conversion that would occur from cable trenching within coarse sediment habitats. There is also no discussion on how obstructions (e.g. relocation of large boulders) to cable laying would be addressed. Specifically, it is not clear if any preparation of the cable corridor would occur, either prior to in conjunction with cable laying activities. The EFH assessment must identify and assess all potential adverse impacts that would occur as a result of the project.

Detailed Additional Information Needed

To facilitate continued coordination and avoid detailing all of our more limited scope comments in this letter, we will provide you with an annotated version of the Draft EFH assessment with additional comments for you to consider as you update and revise the EFH assessment. Below is a general list of additional information needs to assist you in revising the EFH assessment. We include additional details and clarifications in the list, where feasible.

List of information necessary for a complete EFH assessment:

- Mapping and Habitat Information:
    - Revised habitat delineations and calculations for the lease area and cable corridor. The EFH assessment should be revised to reflect the changes to the habitat classifications as appropriate. We will continue to work with you on this evaluation.
    - Areas consistent with HAPC designations should be clearly identified on the project plans.
    - A delineation of known shellfish beds located in the project area.

- Project Design and Construction Methodology
    - The scope and range of the PDE for each project component. The EFH assessment should evaluate the full range of the design parameters and assess the impacts to EFH for each project component.
    - Detailed information on the proposed turbine locations' proximity to complex habitats should be provided. Potential impacts to complex habitats from turbine, scour protection, and vessel anchoring should be fully assessed. Please include an analysis of the impacts that would occur from cable routing to and from the turbine location.
    - Detailed information on each method of cable installation proposed within SFWF and SFEC. If multiple methods are being considered, an assessment of impacts to EFH for each method should be included for all habitat types.
    - Specific information related to how the cable will be laid through any identified HAPC and an assessment of the anticipated impacts. The EFH assessment should also describe in detail how impacts to HAPC will be avoided and minimized.
    - Detailed information related to the proposed use of cable and scour protection within the SFWF and SFEC. Specifically, the extent of area to be covered by the protection, the type of protection to be used, a description of habitats to be impacted, and all locations where cable protection is anticipated to be necessary.
    - Information related to vessels proposed for construction and maintenance, including potential impacts to benthic habitat from vessel anchors or spuds. Proposed plans to avoid and minimize impacts to sensitive habitats from vessel anchoring should also be provided.
    - Information related to the proposed dredging for the project, including plans for material disposal and dredging associated with the O&M port facility and HDD activity.
    - Provide additional information summarizing the results of sediment dispersal modelling, including the grain sizes used for each modelling exercise, and how impacts from silt habitats were considered. Further analysis on the levels of TSS from project activities and associated impacts to EFH.
    - Information related to the project construction schedule, including a schedule for cable installation. The proposed timing for pile driving, including the months of proposed pile driving and the number of hours each day pile driving is anticipated.

- Pile Driving and Noise Impacts

- A summary of proposed pile driving activities for this project, including an acoustic analysis for each pile installation method, which evaluates the timing, duration, and spatial extent of underwater sound and particle motion during pile installation, and a threshold analysis which examines the thresholds of these impacts on physiological injury, mortality, and behavior for relevant life stages of EFH species (fish and invertebrates).
- A map with depth contours and habitat type with a delineation of the location, intensity, and areal extent of acoustic impacts (sound and particle motion) expected within and outside of the project area. This should include the radial distance from pile driving to threshold boundaries of physiological injury, mortality, and behavioral impacts for EFH species (fish and invertebrates). The cod spawning study area should also be overlain on the map and potential impacts of pile driving on cod spawning habitat should be evaluated.
- Detailed information on avoidance, minimization, and mitigation measures for pile driving impacts (for both sound and particle motion), and an adaptive monitoring plan to ensure target attenuation levels are met throughout the duration of the project.
- A schedule for the time of year proposed for pile driving activities and an analysis of the impacts of scheduled activities to relevant life stages of EFH species (fish and invertebrates). This should include a full review of the literature related to noise effects on Atlantic cod, and the best available information on the spatial and temporal distribution of cod aggregations within and adjacent to the project area.
- A summary of normal operational noise for one turbine and for the entire wind energy facility, including an acoustic analysis which evaluates the timing, duration, and spatial extent of underwater sound and particle motion, and a full threshold analysis which examines the thresholds of these impacts on physiological injury, mortality and behavior for relevant life stages of EFH species (fish and invertebrates).

Benthic Monitoring Plan

We received a revised copy of the benthic monitoring plan for this project, dated September 30, 2020. We will follow up with you in more detail, but wanted to provide some initial feedback. As currently proposed, we have significant concerns about the ability of the design to detect changes. Specifically, it is not clear that there is adequate sampling or replication to detect meaningful changes (i.e. the statistical power of the study to detect changes). The proposed lack of multi-year, and seasonal, pre-construction data collection will also place unnecessary constraints on the study's ability to distinguish between annual and seasonal variability and changes related to the project construction and operation. We will provide specific comments and questions on the plan to you in spreadsheet format by early January. Once you have reviewed our comments, we would recommend setting up a meeting to discuss our concerns so they can be addressed prior to commencement of the study.

Conclusion

In summary, we are requesting additional information related to the evaluation of adverse effects to EFH, the delineation and assessment of habitat within the project area, the project design parameters and construction methodology, and pile driving and acoustic impacts of the project. A completed

EFH assessment that incorporates this information is necessary for us to be able to provide appropriate EFH conservation recommendations, and complete our consultation with you for this project. Accordingly, we seek to extend the consultation process pursuant to 50 CFR 600.920(i)(5) so that you may provide us with better information for our evaluation of impacts and the development of EFH conservation recommendation. Upon receipt of a complete EFH assessment, our consultation can be initiated and we will require up to 60 days to review the assessment and develop EFH conservation recommendations. Consistent with the timeline under One Federal Decision, we must initiate consultation no later than 90 days from the date of the Notice of Availability of the DEIS. We hope the information provided will help inform and guide you as the lead federal agency to ensure we receive the necessary information to complete our consultations in a timely and effective manner. If you have any questions regarding the EFH consultation process, please contact Alison Verkade at 978-281-9266 or alison.verkade@noaa.gov.

Thank you for the opportunity to comment on this important project and we look forward to working collaboratively with you to address these information needs.

Sincerely,

Peter Burns
Ecosystem Management Branch Chief
Habitat and Ecosystem Services Division

Cc:

Brian Hooker, BOEM
Ursula Howson, BOEM
Thomas Nies, NEFMC
Christopher Moore, MAFMC
Lisa Havel, ASMFC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

December 11, 2020

James Bennett
Chief, Office of Renewable Energy Programs
Bureau of Ocean Energy Management
United States Department of the Interior
45600 Woodland Road VAM-OREP
Sterling, Virginia 20166

Dear Mr. Bennett:

We have reviewed your December 1, 2020 response to our June 27, 2019 letter regarding the essential fish habitat (EFH) conservation recommendations for the Vineyard Wind Project. I provide these comments to clarify our EFH conservation recommendations and also confirm our agencies' mutual understanding of these recommendations based on our October 22nd interagency discussion.

Prior to receipt of your December 1st response, your staff and our habitat team had a call to discuss our recommendations on October 22, 2020. We appreciate the opportunity to discuss these recommendations with you. Based, upon our review of your response to our recommendations, particularly your responses to recommendations #1, #10, and #11 involving habitat characterization and monitoring, we think it is important to clarify the intent of our conservation recommendations, and provide feedback on ways to improve our offices coordination on EFH issues.

Habitat Characterization

We appreciate BOEM requiring additional sampling along the Muskeget Channel area to better characterize benthic habitats, including the juvenile cod Habitat Area of Particular Concern (HAPC), that will be impacted by cable installation. However, as we discussed on October 22, 2020, it is not clear, based on the information you provided, the methodology that Vineyard Wind will use to collect, analyze, and interpret the additional data that will be collected in the channel. We also appreciate that you reference our Recommendations for Habitat Mapping. As we discussed, coordination with us will also be critical to ensure that the additional data characterizes habitat sufficiently to help minimize project impacts, including impacts associated with cable routing, dredge disposal, and anchoring. Although this topic was discussed on our October 22nd call, it does not appear that any coordination component was incorporated into your written response. Therefore, we recommend that the Term and Condition be revised to specify a coordination requirement to ensure our comments are addressed prior to additional sampling. This will not only ensure that our

concerns are addressed, but will also make the best use of project resources by providing for a more thorough result from Vineyard Wind's sampling efforts.

As we have discussed in the past, and as provided in our June 27, 2019 letter, we disagree with the portion of your December 1, 2020 response that suggests that the habitat data provided was adequate and the EFH Assessment represented the best available information. The maps provided in the EFH assessment were based on state definitions that are not appropriate for the federal consultation process, as they do not align with federal mandates and resource definitions. Further, these maps did not depict the extent of complex habitat evident in the benthic sampling and sidescan sonar frame grabs included in the project documents. The updated figure from your December 1st response demonstrates our concern. Based on the Coastal and Marine Ecological Classification Standard (CMECS) definitions illustrated in Figure 2, approximately half of the offshore export cable corridor (OECC) is hard bottom and/or coarse sediment, which is ten times the area considered in the EFH assessment. This is new information that could affect the basis of our EFH conservation recommendations.

Despite our concern with this new information provided in Figure 2 of your December 1st response, we are not requesting reinitiation of consultation at this time. You have agreed to include an additional provision to monitor and evaluate the effectiveness of natural and engineered stone placed as cable protection within juvenile cod HAPC to assess its value as mitigation, and we find that satisfactory. We appreciate that you have included a requirement for Vineyard Wind to coordinate and address our comments for this monitoring provision. We would like to see this requirement duplicated in your provision related to the selection of source material. As currently proposed, Vineyard Wind is only required to solicit our comments prior to their final selection of source material, and there is no requirement for them to address our comments. The requirement to use natural and engineered stone that provides complexity is intended to mitigate impacts to juvenile cod HAPC and comply with our CR #5; therefore, it is crucial to ensure that the final design and seafloor expression of materials is consistent with the HAPC designation. If particular types and sizes of materials that are inconsistent with the habitat needs of juvenile cod as described in the HAPC definition are needed for engineering purposes, further coordination will allow for the evaluation of potential alternatives (e.g. placing a layer of rounded mixed diameter pebble and cobble over the selected engineered stone). Due to the importance of this issue, we recommend that the Term and Condition for cable protection material selection be revised to include a provision for Vineyard Wind to solicit and address our comments.

We would also like to clarify our position on the evaluation of impacts for the EFH assessment and consultation. Based on your December 1st response, and our October 22nd discussion, there appears to be confusion related to how project impacts must be addressed for the purposes of assessing EFH impacts compared to the National Environmental Policy Act (NEPA) criteria. Your December 1st response assumes the entire OECC impact area (186 acres) is hard and complex habitat, consistent with the juvenile cod HAPC. This impact would only account for 0.12% of the available gravel and boulder habitat within your defined analysis area. While defining an analysis area for the NEPA process is standard, this approach is not consistent with the EFH regulations and your responsibilities under these regulations. Specifically, the EFH regulations require you to evaluate the site-specific project impacts to designated EFH and measures that would avoid, minimize, and offset identified potential adverse impacts. The existence of similar habitat within a defined geographic area surrounding or adjacent to, the project impact area does not diminish, reduce, or

affect: 1) the analysis and evaluation of potential adverse effects a project will have on designated EFH; nor 2) the requirement to use the best scientific information available to determine what measures can be taken to avoid, minimize, or offset such effects. This is the reasoning behind our June 27, 2019 CR#1, as accurate baseline data is not only necessary to adequately assess impacts to EFH, but also to assess any proposed avoidance and minimization measures.

Monitoring of Project Impacts

Trawl Survey

Our conservation recommendation for the development of a hypothesis driven, gradient design monitoring plan (CR#10) was intended to assess the localized effects (i.e. at the project level) of the project. Specifically, we were seeking an evaluation of the effects of habitat alteration to finfish and invertebrate communities along a gradient at increasing distances from the turbine sites within the Wind Development Area (WDA). Your response suggests that you are meeting our recommendation because a fishery monitoring trawl survey is already underway by Vineyard Wind within the WDA; however, these surveys do not address the study design considerations or include beam trawls as we recommended. We provided comments on this trawl survey on February 28, 2019 in a letter submitted by our Northeast Fisheries Science Center, however, these comments were never addressed nor did we receive a response to these comments from the applicant. In your December 1st response to our CR#10, you state that switching methodologies, or including additional sampling methods in the ongoing trawl survey would not be feasible. Without modification, it is not clear how the ongoing survey will provide useful information that would address our conservation recommendation. We want to clarify that the ongoing trawl survey was not a recommendation under CR#10.

Drop Camera Study

Your response also discusses a drop camera study that is included in the monitoring plan, and referenced in your letter and draft Terms and Conditions as addressing our CR#10. Unfortunately, we have not been consulted on this proposed drop camera monitoring plan. While we believe that it may provide some useful information on the distribution of habitats in the offshore WDA, it is not currently designed in a way that it could be used to assess benthic habitat changes resulting from the project at a meaningful scale. We would be happy to follow up with specific comments but this survey should not be considered as addressing part of our recommendation.

Benthic Monitoring Plan

We understand that you are choosing not to require additional fisheries sampling methods. However, we do think that the benthic monitoring plan could help partially address our recommendations (#10 and #11) if additional components are included and the monitoring plan is revised to allow for the assessment of changes to specific habitat types. The addition of other non-impact survey gear such as baited underwater video cameras to the benthic monitoring plan could allow for an assessment of changes in juvenile fish use of habitat and partially address this conservation recommendation.

We have reviewed the updated Benthic Monitoring Plan that you plan to use to address our CR #11. We have some significant concerns that, as designed, it is not likely to generate the data needed for hypothesis-driven comparisons pre- and post-construction. It is critical to ensure any monitoring plan is designed to collect adequate baseline information and to detect changes by habitat type that

can be attributed to project activities and not confounded by other factors (e.g., natural environmental changes). We appreciate that you have included a requirement for Vineyard Wind to coordinate with us and address our comments prior to finalizing the benthic monitoring plan. We will follow up shortly with additional comments on the proposed benthic monitoring plan and look forward to further coordination and discussion on this plan as it is developed.

Nantucket Monitoring Requirements

As we have previously stated and discussed with you on October 22, 2020, it is not clear why you do not plan to expand the Town of Nantucket monitoring requirements outside of Nantucket waters. The proposed monitoring requirements will provide data and information that would address questions that should be a component of benthic monitoring, but the use of these data will be severely limited if monitoring is not expanded beyond Nantucket waters. We recommend that you reconsider expansion of these monitoring measures to include the entire OECC within Muskeget Channel.

Provisions for Coordination

We appreciate that you have incorporated coordination with our agency into many of your recommended Terms and Conditions for the COP approval. Based on our discussion on October 22, 2020, we expected that the requirement for coordination would also include a corresponding provision to ensure that our comments are addressed prior to finalizing any reviewed document. As we discussed in October, without such a provision there is no assurance that our comments will be incorporated in a meaningful manner. Without a requirement to address our comments, there is the potential for our comments to be misunderstood, or incorporated in a manner that does not adequately address the basis for our comments. Therefore, we recommend this be added to the provisions for the identification and selection of dredge disposal locations and the anchoring plan.

Your response indicates that you have also included Vineyard Wind's post-construction cable monitoring reports as partially addressing our CR #2. While we do not agree that these reports will serve to address our CR, within Nantucket waters where pre-construction surveys are also required, they will allow for an evaluation of how effective the measures employed were in avoiding particular habitat types. Currently, your draft Term and Condition for this item does not require Vineyard Wind to provide us with a copy of these reports. We request that such a provision be included so that the reports are also submitted to our office for review.

Agency Coordination

In your letter you noted the coordination timeline for this consultation. To clarify, the EFH regulations under 50 CFR 600.920(k)(1) states that a federal action agency should provide a response to our recommendations within 30 days of receipt and that this response must be provided at least 10 days prior to final approval of the federal action if the response is inconsistent with our recommendations. While a response to our recommendations is technically due 10 days prior to the agency decision, we recommend that, going forward, the response and/or discussions occur much earlier in the process. We are extremely interested in a coordinated and collaborative approach to these projects to ensure that we can address any questions or implementation issues and concerns related to our EFH conservation recommendations early in the process. We encourage you to reach out to us for clarification related to any comments or recommendations that we provide. This will

allow for better collaboration on projects going forward and ensure there are no unexpected issues raised late in the project review timeline.

Conclusion

We appreciate your December 1, 2020 response to our EFH conservation recommendations for the Vineyard Wind Project and your willingness to discuss these issues in October. We hope this letter clarifies the points raised in your response letter and those discussed during the inter-agency call in October. Specifically, we want to ensure that the provisions put forward in BOEM's Terms and Conditions for the project include coordination and measures to incorporate our feedback related to the additional habitat data to be collected, the anchoring plan to be developed, the scour protection and subsequent monitoring to mitigate for impacts to juvenile cod HAPC, and evaluation of dredge disposal sites. We also want to clarify that the ongoing trawl survey was not intended to be part of our CR#10, but rather we were recommending a hypothesis-driven monitoring plan using different sampling techniques to evaluate the effects of site specific habitat alteration.

Should you have any questions, please feel free to contact Alison Verkade at alison.verkade@noaa.gov. We look forward to further coordination with you on this project and future offshore wind projects.

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
for Habitat Conservation

cc:
Brian Hooker, BOEM
Michelle Morin, BOEM
Jennifer Bucatari, BOEM
Thomas Nies, NEFMC
Christopher Moore, MAFMC
Lisa Havel, ASMC

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

December 11, 2020

Peter Weppler
Chief, Environmental Analyses Branch
Department of the Army
U.S. Army Corps of Engineers, New York District
Jacob K. Javits Federal Building
26 Federal Plaza
New York, New York, 10278-0090

RE: EFH Consultation for the New York-New Jersey Harbor Deepening Channel Improvement Study for Port Jersey Port Authority Marine Terminal, Elizabeth Port Authority Marine Terminal, and Port Newark, New Jersey.

Dear Mr. Weppler:

We have received your request for consultation and the accompanying essential fish habitat (EFH) assessment for the New York District (District), U.S. Army Corps of Engineers' New York-New Jersey Harbor Deepening Channel Improvement Study (HDCI). The HDCI involves deepening and widening the existing 50-foot deep (mean low water [MLW]) federal navigation channel to allow for the navigation of a Triple E Class vessel to transit from sea to Port Elizabeth and Port Jersey, New Jersey. The request for consultation was provided on November 9, 2020, following the issuance of a Public Notice of a Draft Finding of No Significant Impact (FONSI) and the Draft Integrated Feasibility Report and Environmental Assessment (Draft FR/EA). The Tentatively Selected Plan (TSP) identified in the draft FR/EA includes the dredging of 28,377,000 cubic yards (cy) of sediments to deepen a number of navigation channels in the study area including the Ambrose Channel, Anchorage Channel and Port Jersey Channel, the Kill Van Kull, Newark Bay Channel, South Elizabeth Channel and Elizabeth Channel by up to 5 feet. While not clearly stated, widening of these channels is also assumed to be included as part of the project based on some of the information in the EFH assessment.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with us on projects such as this which may adversely affect EFH and other aquatic resources. In turn, we must provide recommendations to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The Fish and Wildlife Coordination Act (FWCA) also requires federal agencies to consult with us on projects such as this that may result in the modification of a natural stream or body of water. The FWCA requires agencies to consider the effects that these projects would have on fish and wildlife and to provide for improvement of these resources. Under this authority, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as diadromous species, shellfish, and other commercially and recreationally important species that are not managed by the federal fishery management councils and therefore do not have designated EFH.

Magnuson Stevens Fishery Conservation and Management Act (MSA)

The project area has been designated as EFH under the MSA for winter flounder (*Pseudopleuronectes americanus)*, windowpane (*Scophthalmus aquosus)*, Atlantic sea herring (*Clupea harengus*), bluefish (*Pomatomus saltatrix*), Atlantic butterfish (*Peprilus triacanthus*), summer flounder (*Paralichthys dentatus*), Atlantic mackerel (*Scomber scombrus*), scup (*Stenotomus chrysops*), black sea bass (*Centropristis striata*), clearnose skate (*Raja eglanteria*), little skate (*Leucoraja erinacea*), winter skate (*Leucoraja ocellata*), red hake (*Urophycis chuss*), and others. EFH is defined as, "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." For the purpose of interpreting the definition of EFH:

- "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate;
- "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities;
- "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem;
- "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle.

The activities proposed in the TSP including the deepening and widening of the channels in the study area will have an adverse effect on EFH and consultation with us is required under the MSA. The EFH final rule published in the Federal Register on January 17, 2002 defines an adverse effect as "any impact which reduces the quality and/or quantity of EFH" and further states that:

> An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EFH final rule also states that the loss of prey may be an adverse effect on EFH and managed species. As a result, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be

considered adverse effects on EFH.

Our evaluation of this project has been complicated by the lack of detail in the EFH assessment and the FR/EA. The information provided is not sufficient for us to consider the EFH assessment complete. As a result, the EFH consultation cannot be initiated at this time. The assessment does not include a clear and detailed description of all of the construction activities proposed, the alternatives considered, a discussion of the avoidance or minimization measures adopted, a comprehensive evaluation of direct, indirect, individual, cumulative, and synergistic effects of all of the proposed activities on EFH, or provide compensatory mitigation for unavoidable impacts.

Due to the size and scope of the project and the potentially substantial adverse effects to NOAA Trust resources, expanded EFH consultation procedures are necessary for this project. An expanded EFH consultation allows the maximum opportunity for us to work together to review the project's impacts on EFH and to develop EFH conservation recommendations. For expanded consultations, you must submit your EFH assessment to us at least 90 days prior to a final decision on the action, and we in turn will respond within 60 days of submission of a full and complete EFH assessment.

To initiate the required EFH consultation with us, please provide a revised EFH assessment that fully evaluates all of the direct, indirect, individual and cumulative effects of the proposed project on EFH. The mandatory contents of an EFH assessment include:

- A full description of the action.
- An analysis of the potential adverse effects of the action on EFH and the managed species.
- The federal agency's conclusions regarding the effects of the action on EFH.
- Proposed mitigation, if applicable.

Additional information, such as the results of an on-site inspection to evaluate the habitat and the site-specific effects of the project, the views of recognized experts on the habitat or species that may be affected, a review of pertinent literature and related information, and an analysis of alternatives to the action including alternatives that could avoid or minimize adverse effects on EFH should also be provided as part of the expanded consultation.

Based upon the definition and description of adverse effect, the EFH assessment should also consider the full range of effects of the construction activities associated with the dredging, dredged material disposal, and mitigation. Additional information should also include an evaluation of the impacts of the proposed project including both temporary and permanent changes to the habitat such as the loss or conversion of aquatic habitat, water quality and flow changes, and impacts to prey species, as well as detailed plans for compensatory mitigation for the permanent loss of habitat. Also, while we appreciate the plethora of studies and documentation related to the original Harbor Deepening Project (HDP), references, when made to relevant materials, should be appropriately cited for a more efficient review.

We offer the following additional technical assistance comments to assist you in the development of the revised EFH assessment. As always, we are available to discuss this project

and the required EFH consultation with you or your staff if you have any questions or require clarification on our comments.

Project Description

As discussed in the EFH assessment, the TSP identified for this study includes deepening Ambrose Channel, Anchorage Channel and Port Jersey Channel, the Kill Van Kull, Newark Bay Channel, South Elizabeth Channel and Elizabeth Channel, by up to 5 feet to allow for the navigation of a Triple E Class vessel to transit from sea to Port Elizabeth and Port Jersey. A table is provided in the EFH assessment (Table 1) with the quantities and type of material to be dredged within each channel, which totals 28,377,000 cy. Widening is also assumed to be included as part of the project based on footnotes included in Table 1 and further mentioned throughout the EFH assessment. However, without a visual depiction of the proposed activities in comparison to existing conditions, it is unclear where the work is proposed, which areas will be widened and/or deepened, and the total area that will be disturbed. Additionally, Table 1 provides footnotes with undefined shorthand of what is assumed to be sub-areas of the channels, but it is difficult to understand what these footnotes are referencing.

The shallow habitat present within the project area is also discussed in the EFH assessment but the document lacks a visual depiction of where these areas exist and how the project will affect these areas. The limited figures provided are generalized and do not include cross sectional views and lack details to assist in the evaluation of effects. A revised EFH assessment should include site plans that can be:

- directly linked to Table 1 and the discussion of the HDCI Study Description (Section 3 of the EFH assessment),
- that are easily referenced,
- depict the project area,
- include existing versus proposed expansion areas with overlapping bathymetry; and
- include cross sections.

Additionally, the revised EFH assessment should provide a clear summary table which quantifies the total, permanent, and temporary impacts to the different water areas and habitats, including EFH for species with demersal life stages such as winter flounder, and that is consistent with the project plans. This information would assist in the evaluation of effects of this project on EFH and habitats used by NOAA trust species.

Of particular concern is the project details that appear to be missing by omission or lack of reference within the EFH assessment. The description of the HDCI within the EFH assessment fails to include any details on materials and methods, best management practices, and the final disposition of the 28,377,000 cy material to be dredged. It is also unclear from the EFH assessment how maintenance dredging and berth deepening (which is depicted on Figure 2 of the EFH assessment and captioned as “not to be deepened under the HDCI Project”), will be addressed. Without a clear project description, it is difficult to understand the full range of potential impacts and evaluate the effects of the proposed action on the aquatic environment and to NOAA trust resources.

Three impacts highlighted in the EFH assessment include:

- Physical disturbance and re-suspended sediments/re-deposition of suspended sediments (short-term direct and indirect impacts including potential burial and/or release of contaminants)
- Entrainment of early life stages (eggs and larvae) as a form of short-term direct impact due primarily due to hydraulic dredging and capture of eggs and possibly larvae in the dredge
- Loss of EFH function (i.e. loss of habitat) as a long-term indirect impact due to increased sedimentation and/or changes in depths, currents, substrate types, and/or in-water structures that reduce or eliminate the suitability of habitat for EFH-managed species.

However, as indicated in the EFH assessment, these impacts are based on 2017 conservation recommendations related to the original HDP. As stated in our February 7, 2017, those EFH conservation recommendations only apply to maintenance dredging within the channels identified in the HDP, and that any channel improvements proposed in the future would require additional consultation. Without a complete project description, it is unclear if the impacts discussed as part of the earlier consultation on the maintenance activities encompass the full suite of potential adverse effects that will result from further deepening and widening of the channels. Additionally, there is limited discussion as to where the impacts will occur and to what habitats, as well as an omission of potential effects due to erosion, sloughing of sidewalls, and resuspension of potentially contaminated materials.

According to the EFH assessment, it appears that some impacts to aquatic resources will be permanent, and include impacts to the shallow water habitat and EFH for winter flounder early life stages. Although the District recognizes that compensatory mitigation will be required for the shallow water impacts and states that a mitigation plan will incorporate benefits of the channel improvements, a mitigation plan has not yet been provided and the ecological benefits of the channel deepening and widening are unclear. Additionally, the EFH assessment discusses the District's involvement with several large-scale environmental programs in the NY/NJ Harbor that focus on improving shallow, aquatic habitat through the beneficial use of dredged material. While we recognize the work that has been done previously, including the list of past projects related to the original HDP related water quality improvements and enhancement of intertidal and subtidal habitat functions, and intentions to continue implementing such projects, the EFH assessment does not provide any detail on proposed plans to implement habitat enhancement or beneficial use of material related to the HDCI. The revised EFH assessment should clearly identify both the temporary and permanent impacts to all habitat types, explain measures taken to avoid and minimize those adverse effects, and provide a compensatory mitigation plan to offset any unavoidable losses. Additionally, if the District intends to provide habitat enhancement and beneficial use of material as part of the HDCI, those projects as well as their locations and details related to the work should be included in the revised EFH assessment.

We agree that some of the impacts of the dredging can be minimized through the use of implementing best management practices (BMPs) and seasonal work windows to protect sensitive life stages of federally managed species such as winter flounder and anadromous fish. However, the specific work windows referenced in the EFH assessment were developed for the

maintenance dredging of the channels identified in the HDP. As discussed in our February 7, 2017, letter, consultation with us is required for any future improvements that require new work dredging and the expansion of the width of some of the channels, or if blasting is proposed, and that additional EFH conservation recommendations may be provided.

Winter flounder

EFH for winter flounder has been designated in the project area. Winter flounder ingress into spawning areas within mid-Atlantic estuaries when water temperatures begin to decline in late fall. Tagging studies show that most return repeatedly to the same spawning grounds (Lobell 1939, Saila 1961, Grove 1982 in Collette and Klein-MacPhee 2002). Winter flounder typically spawn in the winter and early spring, although the exact timing is temperature dependent and thus varies with latitude (Able and Fahay 1998); however, movement into these spawning areas may occur earlier, generally from mid- to late November through December. Winter flounder have demersal eggs that sink and remain on the bottom until they hatch. After hatching, the larvae are initially planktonic, but following metamorphosis they assume an epibenthic existence. Winter flounder larvae are negatively buoyant (Pereira et al. 1999) and are typically more abundant near the bottom (Able and Fahay 1998). Young-of-the-year flounder tend to burrow in the sand rather than swim away from threats. Increased turbidity and the subsequent deposition of the suspended sediments can smother the winter flounder eggs and would adversely affect their EFH.

In your EFH assessment, you provide project minimization measures which specifically include seasonal restrictions protective of winter flounder early life stage (January 15 through May 31) for Port Jersey outer channel. We appreciate that the seasonal work windows have been incorporated into project planning based on previous maintenance dredging permits and coordination with us. However, for your planning purposes, should project activities widen the top dimensions of the channels beyond the boundaries originally identified as part of the HDP or impact areas less than 20 feet deep, sediment disturbing in-water work, such as dredging, should be avoided when winter flounder eggs and larvae may be present - between January 15 and May 31. This is consistent with the past discussions we have had with District staff regarding both the maintenance work as well as any proposed future improvements.

Anadromous Fishes

Alewife and blueback herring, collectively known as river herring, spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. Both species are believed to be repeat spawners, generally returning to their natal rivers (Collette and Klein-MacPhee 2002). Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-1960s, river herring have been designated as Species of Concern by NOAA. Species of Concern are those about which we have concerns regarding their status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act (ESA). We wish to draw proactive attention and conservation action to these species.

The project area serves as a migratory pathway to spawning and nursery habitat for these anadromous fish species. The activities associated with dredging can create undesirable turbidity and noise levels that can impede migration. Increases in turbidity due to the resuspension of sediments into the water column during construction can degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine-grained estuarine/marine sediments. Suspended sediment can also mask pheromones used by migratory fishes such as these to reach their spawning grounds and impede their migration and can smother immobile benthic organisms and demersal newly-settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Noise from the construction activities may also result in adverse effects. Effects may include (a) non-life threatening damage to body tissues, (b) physiological effects including changes in stress hormones or hearing capabilities, or (c) changes in behavior (Popper et al. 2004).

Additionally, juvenile river herring are a food source for several federally managed species. Buckel and Conover (1997) in Fahay et al. (1999) reports that diet items of juvenile bluefish include *Alosa* species such as these. Juvenile *Alosa* species have also been identified as prey species for windowpane flounder and summer flounder in Steimle et al. (2000). The EFH final rule states that the loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat and the definition of EFH includes waters and substrate necessary to fish for feeding. Therefore, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH. As a result, activities that adversely affect the spawning success and the quality for the nursery habitat of these anadromous fish can adversely affect the EFH for juvenile windowpane and summer flounder by reducing the availability of prey items.

In the EFH assessment, you provide project minimization measures which specifically include seasonal restrictions protective of migratory and spawning anadromous fish (March 1 through May 31) for the Kill Van Kull and Newark Bay. We appreciate that the seasonal work windows have been incorporated into project planning. However, because it appears that the scope of the HDCI exceeds that considered as part of the maintenance dredging operations, the revised EFH assessment should consider avoidance of in-water work from March 1 to June 30 during the upstream migration of anadromous fish to their spawning grounds to minimize the adverse effects of suspended sediment and noise throughout the study area.

Cumulative Impacts

The EFH assessment does not adequately evaluate the cumulative effects of the proposed project. There is some mention of other projects ongoing within the Harbor as part of the cumulative effects section of the EFH assessment, but there does not appear to be any meaningful discussion. Cumulative impacts analyses are not restricted to spatial and temporal overlap of projects. Several small, medium, and large past, present, and future actions have not been considered. For example, large dredging (new and maintenance) and port projects are underway or have been proposed in the region such as maintenance dredging and other activities at the various port facilities operated by the Port Authority of NY and NJ, the NY NJ Anchorages project, as well as various construction and maintenance projects along the Hudson River, Upper

Bay, Newark Bay, and the Kill van Kull.

A full assessment of the cumulative effects of the proposed project should be undertaken that includes the consideration of the cumulative effects of all past, present, and reasonably foreseeable future actions on aquatic resources. Some of the issues that should be addressed include the cumulative effects of the loss of aquatic water column and benthic habitat on NOAA trust resources, loss of prey species, ballast water withdrawals, water discharges, increased vessel traffic (i.e. tugs), vessel collisions, and new dredging (e.g. berths and other dredging) and future maintenance dredging needs.

Endangered Species Act

Federally listed species may be present in the project area. Consultation, pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, may be necessary. The District is responsible for determining whether the proposed action is likely to affect listed species. When project plans are complete, you should submit your determination of effects, along with justification for the determination, and a request for concurrence to nmfs.gar.esa.section7@noaa.gov. After reviewing this information, we would then be able to conduct a consultation under Section 7 of the ESA.

Conclusion

We hope that the information provided above will assist you in the development of a revised EFH assessment that evaluates fully all of the direct, indirect, individual and cumulative effects of the proposed project, provides a project schedule that minimizes impacts to EFH and other NOAA trust resources, and includes a mitigation plan for any unavoidable losses. We also look forward to working with you to pursue beneficial use options in the region. As always, please do not hesitate to contact Jessie Murray (Jessie.Murray@noaa.gov, 732-872-3116) in our Sandy Hook field office if you have any questions or need assistance.

Sincerely,

GREENE.KAREN.M.1365830785

Digitally signed by GREENE.KAREN.M.1365830785
Date: 2020.12.11 08:11:56 -05'00'

Karen M. Greene
Mid-Atlantic Field Offices Supervisor
Habitat Conservation Division

cc: GARFO PRD - E. Carson-Supino
New York District ACOE – J, Gallo, J. Miller, K. Baumert, C. Alcoba
NJDEP – S. Biggins, K. Davis
FWS – S. Mars, S. Papa
EPA Region II – M. Finocchiaro, L. Knutson
NEFMC – T. Nies
MAFMC – C. Moore
ASMFC – L. Havel

Literature Cited

Able, K.W. and M.P. Fahay. 1998. The First Year in the Life of Estuarine Fishes of the Middle Atlantic Bight. Rutgers University Press. New Brunswick, NJ

Auld, A.H., and J.R. Schubel. 1978. Effects of suspended sediments on fish eggs and larvae: a laboratory assessment. Estuar. Coast. Mar. Sci. 6: 153-164.

Breitburg, D.L. 1988. Effects of turbidity on prey consumption by striped bass larvae. Trans. Amer. Fish. Soc. 117: 72-77.

Buckel, J.A. and D.O. Conover. 1997. Movements, feeding periods, and daily ration of piscivorous young-of-the-year bluefish, *Pomatomus saltatrix*, in the Hudson River estuary. *Fish. Bull*. (U.S.) 95(4):665-679.

Burton, W.H. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Prepared for: Delaware Basin Fish and Wildlife Management Cooperative, by Versar Inc., Columbia MD.

Collette, B.B. and G. Klein-MacPhee. eds. 2002. Bigelow and Schroeder's Fishes of the Gulf of Maine. Smithsonian Institution. Washington, D.C.

Fahey, M.P., P.L. Berrien, D.L. Johnson and W.W. Morse. 1999. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix* life history and habitat characteristics. U.S. Dep. Commer., NOAA Technical Memorandum NMFS-NE-144.

Grove, C.A. 1982. Population biology of the winter flounder, *Pseudopleuronectes americanus*, in a New England estuary. M.S. thesis, University of Rhode Island, Kingston, 95 pp.

Lobell, M.J. 1939. A biological survey of the salt waters of Long Island. Report on certain fishes: Winter flounder (*Pseudopleuronectes americanus*). New York Conserv. Dept. 28th Ann. Rept. Suppl., Part I pp 63-96.

Nelson, D.A., and J.L. Wheeler. 1997. The influence of dredging-induced turbidity and associated contaminants upon hatching success and larval survival of winter flounder, *Pleuronectes americanus*, a laboratory study. Final report, Grant CWF #321-R, to Connecticut Department Environmental Protection, by National Marine Fisheries Service, Milford CT.

Newcombe, C.P., and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. N. Amer. J. Fish. Manag. 11: 72-82.

Pereira, J. J., R. Goldberg, J. J. Ziskowski, P.L. Berrien, W.W. Morse and D.L. Johnson. 1999. Essential Fish Habitat Source Document: Winter Flounder, *Pseudopleuronectes americanus,* life history and habitat characteristics. U.S. Dep. Commer., NOAA Technical Memorandum NMFS-NE-138.

Popper, A N., J. Fewtrell, M E. Smith, and R.D. McCauley. 2004. Anthropogenic sound: Effects on the behavior and physiology of fishes. MTS J. 37: 35-40.

Saila, S.B. 1961. The contribution of estuaries to the offshore winter flounder fishery in Rhode Island. *Proc. Gulf. Carib. Fish. Inst.* 14:95-109.

Steimle, F.W., R.A. Pikanowski, D.G. McMillan, C.A. Zetlin and S.J. Wilk. 2000. Demersal fish and American lobster diets in the Lower Hudson-Raritan Estuary. NOAA Technical Memorandum NMFS-NE-161. Woods Hole, MA. 106 p.

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
John F. Quinn, J.D., Ph.D., *Chairman* | Thomas A. Nies, *Executive Director*

December 8, 2020

Ms. Donna Lanzetta
CEO, Manna Fish Farms
Via email

Dear Ms. Lanzetta:

Please accept these comments from the New England Fishery Management Council (Council) regarding Manna Fish Farm's project in federal waters off New York. The Council has primary management jurisdiction over 28 marine fishery species in federal waters and is composed of members from Connecticut to Maine. More information about our management plans is available at www.nefmc.org. We appreciate the opportunity to engage with you during the pre-application phase and thank you for including our staff in the September 21 interagency pre-application meeting.

Council staff reviewed the July 2020 siting analysis prepared by NOAA's National Centers for Coastal Ocean Science, and we shared this report with the Council members in early December to solicit their feedback. Staff also reviewed the September 2020 Baseline Environmental Survey Plan. Below, we provide some specific comments related to the siting analysis and the survey plan. We are also enclosing the Council's new aquaculture policy, which was approved on December 1. Generally, the Council has concerns about siting aquaculture operations in sensitive habitat types, and in areas with substantial amounts of fishing activity or vessel transit that could be impeded by the presence of fish cages and mooring lines.

The Council recommends that aquaculture development avoid areas of complex seafloor habitat when possible, complex meaning pebble, cobble, or boulder-sized sediments, especially those with attached epifauna. This appears consistent with your intent to site the project in areas with finer grain sizes. We know from our habitat conservation work that data on coarse grained sediments in offshore location can be somewhat sparse, since grabs and other frequently used types of geophysical sampling are not especially useful for capturing larger classes of gravels. Given these data gaps, we are pleased to see that the environmental survey plan includes a detailed characterization of bathymetry and sedimentary features. We recommend that you consider verifying the acoustic data with seafloor imagery if possible.

In addition to the academic, survey, and agency partners already identified in the baseline survey plan, we suggest consulting with NOAA Fisheries Greater Atlantic Regional Office (GARFO) habitat staff on seafloor mapping efforts to ensure that the data gathered is useful for evaluating potential impacts to essential fish habitat. In the context of offshore wind development, NOAA GARFO staff have developed habitat mapping recommendations that will help them to understand seafloor characteristics in project areas in relation to the sorts of habitat features used by fishes. These recommendations include suggested substrate classifications under the Coastal and Marine Ecological Classification Standard (CMECS) framework. A May 2020 draft of the recommendations is available here. We understand that these recommendations should be consider a living document, so it would be prudent to check with NOAA staff for updates before survey plans are finalized.

In terms of characterizing fishing activity, we agree that using a combination of vessel trip report (VTR), vessel monitoring system (VMS), and automatic identification system (AIS) data is best,

since each source has limitations and gaps. Unfortunately, spatial data depicting recreational fishing activity, both in the for-hire fleet and among private anglers, is limited regardless of data source. Recreational fishing targets in this location likely include fluke, winter flounder, cod, red hake, striped bass, and highly migratory species. We suggest you reach out to the New York Recreational & For-Hire Fishing Alliance (https://nyrfhfa.com/) for more insight into patterns of recreational fishing at and transit through the potential sites.

VMS data are useful for showing where many types of fishing vessels are located and filtering these data for vessel speed can indicate locations likely to represent fishing activity. However, it is important to remember that the high/low values depicted in the data portal products are relative to each data set, and that high intensity in one fleet could represent a very different number of vessels or volume of landings as compared another fleet. VTR data provide much more information including landings and are readily linked to dealer data to estimate ex-vessel revenues. NOAA's GARFO and Northeast Fisheries Science Center recently collaborated on a fishing activity analysis tool, which uses the VTR- and observer-based data products referenced on page 17 of the siting report. See here and here for more information. While these reports were developed for offshore wind siting analysis, it should be possible to evaluate fishing information for any set of coordinates, including the Manna Fish Farm area of interest.

One fishery of interest to us in terms of possible overlap is the Atlantic sea scallop fishery. We looked at the plots in the siting report compared to recent estimates of activity based on VMS data prepared for our scallop fishery management plan. The data were filtered to represent vessel speeds between 2-5 kts and binned into three-minute squares. Grids indicating less than 20 hours annual fishing activity, or within state waters, were removed. This evaluation, for calendar years 2015, 2016, 2018, 2019, and 2020 (through mid-October) suggested little overlap between scallop fishing and the general area of interest for the project. Specifically, during 2016, 2018, 2019, and 2020 the fishery worked offshore of the potential project area, and there was no overlap. During 2015, a year when scallop fishing activity was less spatially concentrated across the entire resource, there appears to be some activity within the area of interest. Overall, this suggests some overlaps with the scallop resource and fishery, but not during all years.

Finally, we noted that the siting report identifies many fishery management areas that overlap the area of interest for the project. As noted in the report, these have a wide variety of measures associated with them. For those that pertain to our suite of fishery management plans, please feel free to reach out with any questions about the possible relevance of the areas to your project.

We look forward to continued engagement on fisheries issues as your project moves forward. Please contact Michelle Bachman on my staff (mbachman@nefmc.org; 978-465-0492 x 120) if you need further information.

Sincerely,

Thomas A. Nies

Thomas A. Nies
Executive Director

Enclosure: (1)

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

December 3, 2020

Lt. Colonel David Park
District Engineer
Philadelphia District
U.S. Army Corps of Engineers
Wanamaker Building
100 Penn Square East
Philadelphia, PA 19107-3390

RE: PSEG Nuclear LLC; Salem County, New Jersey Port Facility ("Hope Creek")
CENAP-OP-R-2019-01084-39

Dear Lt. Colonel Park:

With respect to the PSEG Nuclear LLC (PSEG) permit application noted above and for the reasons described below, at this time we must recommend that the Department of the Army (DA) not issue the permit for the Hope Creek Port Site project as currently proposed. We have reviewed the following information provided to us regarding PSEG's DA permit to construct a new port facility on the mainstem Delaware River adjacent to their Salem Nuclear Power Plant in Lower Alloways Creek Township, Salem County, New Jersey, to cater to the U.S. East Coast offshore wind industry:

- Public Notice (PN) No. CENAP-OP-R-2019-01084-39, dated October 5, 2020;
- Various applicant materials/package(s) submitted to the Philadelphia District, Corps of Engineers including, but not limited to, *Application for Department of the Army Permit* dated June 16, 2020 and *General Conformity Analysis* dated June 17, 2020;
- The New Jersey Wind Port – *Technical Information for Offshore Wind Developers and Component Manufacturer*s found on the NJ Wind Port website (nj.gov/windport/about/index);
- Various information pages and press releases on the New Jersey Economic Development Authority website (njeda.com).

Based on the information provided, as well as publicly available information, we have significant concerns about the proposed project, its impact to aquatic resources, the lack of comprehensive impact analyses, and a full and complete analysis of alternatives to avoid or minimize the adverse effects, and compensatory mitigation for unavoidable impacts. We are also concerned that the District and PSEG have not yet provided a complete essential fish habitat (EFH) assessment or Biological Assessment (BA) for review. We recommend that the DA permit for this project not be issued in accordance with Part IV, Paragraph 3(b) of the Clean Water Act

Section 404 Memorandum of Agreement (MOA) between our agencies because of the substantial and unacceptable impacts to aquatic resources of national importance that will result from this project, as well as the incomplete consultations, and the inadequacies of the Districts' analysis of effects as discussed in the attached document. These resources include: American shad (*Alosa sapidissima*); alewife (*Alosa pseudoharengus*); blueback herring (*Alosa aestivalis*); striped bass (*Morone saxatilis*); Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*); and shortnose sturgeon (*Acipenser brevirostrum*); as well as the potential permanent impacts to productive habitats for a number of commercially and recreationally important species.

We are concerned about the lack of comprehensive evaluation of direct, indirect, individual, cumulative, and synergistic effects in the project information provided and the lack of habitat or fisheries data. The applicant's Estuary Enhancement Program/Biological Monitoring Program has collected vast amounts of fisheries information within the Delaware Estuary for the past 25 years and should be used within the analysis. This is especially concerning since, during early coordination phone calls on March 9 and April 28, 2020, and through emails dated June 25 and September 11, 2020, our Habitat Conservation and Protected Resources Divisions provided the District and applicant with technical information regarding the consultations that would be required, various on-site surveys/inspections that should occur to evaluate the habitat and the site-specific effects of the project, aquatic resources under our purview, and site-specific resources and habitats. These early coordination efforts, including guidance for on-site surveys/inspections and habitat characterizations were also discussed in our October 14, 2020, letter requesting a 30-day extension to the public comment period. Furthermore, we are concerned with inconsistencies in the PN and materials provided by the applicant, as well as publicly available information that indicates the proposed project is much larger, and impacts more wide-ranging, than what is described in the PN.

Based upon the substantial impacts resulting from the construction and operation of the proposed project, and pursuant to the National Environmental Policy Act (NEPA), we also recommend the District prepare a comprehensive Environmental Assessment (EA) for the project that, when complete, is provided to the public, federal and state agencies, and regional experts for review and comment. If the EA determines that the environmental impacts of the proposed action will be significant, an Environmental Impact Statement should be prepared.

Magnuson Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal agencies to consult with one another on projects such as this that may adversely affect EFH. In turn, we must provide recommendations to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. To date, EFH consultation has not been initiated, as we have not been provided with a complete EFH assessment, per 50 CFR 600.920.

In the attached document, we discuss the inadequacies of the information provided for the

project, how the adverse impacts to EFH have not been adequately evaluated, and the information needed for the EFH assessment to be considered complete and sufficient to initiate consultation

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA), as amended in 1964, requires that all federal agencies consult with us when proposed actions might result in modifications to a natural stream or body of water. It also requires that they consider effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. From the information provided, the project will have substantial and unacceptable impacts to aquatic resources that we seek to conserve and enhance under the FWCA, particularly anadromous fish species such as alewife, blueback herring, American shad, and striped bass. In addition, the loss and degradation of important habitat for these species, the impacts to early life stages from the operation of the facility, and the lack of compensatory mitigation to offset the adverse effect do not support the FWCA's requirement to provide for the improvement of fish and wildlife resources (16 U.S.C. 662(a)).

Endangered Species Act

The Endangered Species Act (ESA) of 1973, as amended, requires federal agencies (in this case, the District) to ensure, in consultation with us, that any action authorized, funded, or carried out by them is not likely to jeopardize species listed under the ESA or destroy or adversely modify critical habitat. The federal agency shall review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. If it is determined that the proposed action may affect listed species, pursuant to section 7 of the ESA, then you would need to provide us with a written request to initiate consultation that includes a biological assessment, or other documents, with all the information described and required by the ESA implementing regulations [50 CFR 402.14(c)].

As stated in our October 14, 2020, request for an extension of the public comment period, the following protected species and critical habitat may be affected by the proposed project: Shortnose sturgeon; Atlantic sturgeon; Kemp's Ridley turtle (*Lepidochelys kempii*); Leatherback turtle (*Dermochelys coriacea*); Loggerhead turtle (*Caretta caretta*); Green turtle (*Chelonia mydas*); North Atlantic right whale (*Eubalaena glacialis*); and Fin whale (*Balaenoptera physalus*). In addition, critical habitat of Atlantic sturgeon has also been designated within the Delaware River.

Based on the information previously provided to us as well as information in the Public Notice, proposed project activities may affect all listed species present within the action area. We have not yet received a Biological Assessment but you have informed us that you, together with the applicant, are currently analyzing proposed project activities for their effects on listed species and are developing a biological assessment for the project. It is important to note that in the regulations implementing section 7(a)(2) of the ESA (interagency consultation), "effects of the

action" are all consequences to listed species or critical habitat that are caused by the proposed action, including the consequences of other activities that are caused by the proposed action. A consequence is caused by the proposed action if it would not occur but for the proposed action and it is reasonably certain to occur.

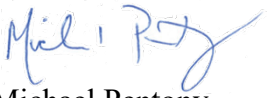
Conclusion

The construction of the proposed PSEG Nuclear LLC Wind (Hope Creek Port) Facility should not be authorized unless, through the preparation of a comprehensive EA or other publicly reviewed comprehensive NEPA document, as well as a comprehensive EFH Assessment and Biological Assessment, it can be demonstrated that:

- there is a justifiable project purpose and need;
- no practicable alternate sites are available;
- the impacts to aquatic resources have been avoided and minimized to the maximum extent practicable; and
- suitable compensatory mitigation can be provided that offsets fully all of the project's direct and indirect effects on aquatic resources and their habitats, including the effects on anadromous fishes and benthic and pelagic habitats.

As always, we hope that this issue can be resolved at the staff level and we welcome the opportunity to meet with you to discuss our comments and concerns. If you would like to discuss this matter further, please contact Keith Hanson at (410) 573-4559 or keith.hanson@noaa.gov with our Habitat Conservation Division and/or Peter Johnsen at (978) 281-9416 or peter.b.johnsen@noaa.gov with our Protected Resources Division.

Sincerely,



Michael Pentony
Regional Administrator

cc: USACE - L. Slavitter, M. Hayduk, T. Schaible, A. DiLorenzo,
NMFS GARFO - P. Johnsen; M. Murray-Brown
USFWS - S. Mars, E. Schrading, C. Guy, J. Thompson
EPA Region III - M. Finocchiaro, B. Montgomerie, L. Knutson
DNREC - M. Stangl, M. Greco
NJDEP- K. Davis, C. Keller, S. Biggins, B. Neilan
PFBC - D. Pierce, T. Grabowski, C. Good
MAFMC – C. Moore
NEFMC -T. Nies
ASFMC - L. Havel

ATTACHMENT – NOAA FISHERIES Comments
PSEG Nuclear LLC (Hope Creek); CENAP-OP-R-2019-01084-39

Introduction

We have significant concerns about the proposed project, its impact to aquatic resources, the adequacy of the project purpose and need documentation, and the lack of a full and complete analysis of project impacts, alternatives to avoid or minimize the adverse effects, and compensatory mitigation for unavoidable impacts. In addition, we have not been provided a complete EFH assessment or Biological Assessment for review. As a result, we must recommend that Department of the Army permit for this project not be issued at this time in accordance with Part IV, Paragraph 3(b) of the Clean Water Act Section 404 Memorandum of Agreement (MOA) between our agencies due to the substantial and unacceptable impacts that this project will have on aquatic resources of national importance including American shad (*Alosa sapidissima*), alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*) and striped bass (*Morone saxatilis*), Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*), and shortnose sturgeon (*Acipenser brevirostrum*). We also recommend the District prepare a comprehensive Environmental Assessment (EA) for the project that, when complete, is provided to the public, federal and state agencies, and regional experts for review and comment. Furthermore, if the EA determines that the environmental impacts of the proposed action will be significant, an Environmental Impact Statement should then be prepared.

Project Description

According to the Public Notice (PN), PSEG is seeking authorization for new dredging of approximately 86 acres of the Delaware River to a depth of -35.5 ft. mean lower low water with ± 1.5 ft. overdraft removing approximately 1,960,000 cubic yards (cy) of material described as primarily silt covering sand. Approximately 1.98-acres adjacent to the shoreline would be dredged using an on-shore dragline (mechanical dredging) while the remaining 84 acres would be dredged using a hydraulic cutter head dredge. Dredged material is proposed to be transported via scows (mechanical dredging) or pumped via pipeline (hydraulic dredging) into the confined disposal facility (CDF) adjacent to the project site. However, there appears to be some inconsistencies with the District's PN and application materials provided by the applicant regarding dredging. For example, in documents such as the *General Conformity Analysis*, the applicant describes 1,960,000 cubic yards of hydraulic dredging for the approach channel and turning basin, with an additional 170,000 cy of mechanical dredging for the berthing slope. This same document also indicates hydraulic dredging would occur for approximately 112 days evenly divided over two years (56 days per year); while there appears to be no discussion of the duration of mechanical dredging. The PN also describes proposed maintenance dredging for a period of 10 years after the initial dredging cycle using the same methods for material removal and disposal. However, the estimated acreages, volumes, frequency, and duration of maintenance dredging activities remains unknown.

PSEG also proposes to install 1,080 linear feet (lf) hot rolled interlocking sheet bulkhead immediately adjacent to an existing timber bulkhead using a vibratory hammer. Approximately 1.86 acres of 4-feet thick rock riprap would be installed in the waterway along the bulkhead at a

3:1 slope. Additionally, PSEG proposes the construction of 1,080 lf cast-in-place "low deck" concrete docking structure extending approximately 57 feet waterward of the mean high water (MHW) line (approximately 1.41 acres over water) supported with 1,056 thirty-inch square pre-cast concrete piles installed via impact hammer below the MHW line. These piles will permanently impact approximately 0.15 acre of aquatic habitat. Based on the plans, the bottom of the concrete deck structure is located at the mean higher high water (MHHW) line.

The application materials also describe approximately 2.15 acres of wetlands and intertidal mudflat that are currently east of the existing timber bulkhead that will be excavated to create an open water area beneath the overhanging wharf. It is unclear from their description if the term "east" means landward or waterward of the proposed bulkhead since east of the existing bulkhead would be landward of this bulkhead and more likely would be filled for the port development, not excavated. Due to the inconsistencies between PN and the application materials, it is difficult to determine what habitats exist along the shoreline - mudflat, wetlands, and unvegetated intertidal shallows - and how much of each will be impacted. In total, based on information from the application materials and PN, which are unclear at times, it appears between 2.15 acres and 3.65 acres of areas described by the applicant as intertidal shallows and unvegetated mudflats will be covered by overhanging platform below the mean higher high water line. Furthermore, an approximately 2.57-acre area of river bottom will also be covered in gravel for a proposed gravel mat. This area will be overdredged and then filled with crushed gravel to remain level with the adjacent dredged river bottom.

In addition to the low deck concrete docking structure, a 250 ft. by 450 ft. (2.58 acre) concrete pad waterward of the delivery section of the dock, two 19 ft. by 39 ft. mooring dolphins and one 29 ft. by 39 ft. breasting dolphin supported with 29 piles of unknown size or composition, and three steel walkways (33 ft., 50 ft., and 55 ft.) between the dolphins for pedestrian access are also proposed. Project documents and the PN also describe the construction of an approximately 296 lf in-water wall perpendicular to the shoreline at the southernmost portion of the site to protect existing subsea cables as part of the proposed project, though little else is known about the wall, its impacts, required maintenance, or other elements. Furthermore, the PN describes that approximately 30 acres of on-shore work is proposed to take place within an existing active CDF, which appears to be dominated by wetlands.

Although the District does not state in the PN whether or not compensatory mitigation will be required, the PN states that the applicant has avoided/minimized impacts to the aquatic environment by incorporating engineering/construction procedures into the process that will substantially reduce impacts to aquatic resources although those measures are not described in the PN. Additionally, the applicant states they have redesigned the channel leading to the proposed dock to minimize dredging required in the waterway and that no regulated wetlands will be filled as a result of the project. However, it has not been confirmed that the wetlands within the CDF are not regulated by the District and there is some confusion over the existence of wetlands east of the timber bulkhead.

Other Project Elements/Phases

We are concerned that the currently proposed project as described above is only a portion of a

larger project planned for this site. Publicly available information on two New Jersey State websites (https://nj.gov/windport/about/index.shtml; https://www.njeda.com/Press-Room/News-Articles/Press-Releases/N-Offshore-Wind-Port) describe additional phases of this proposed port project slated for construction in 2024 – 2026. No mention of these additional phases is included in the PN or appear to be included in the application materials provided to us. Additionally, this public information describes additional impacts of up to 150-acres for expanded marshalling, berthing, and manufacturing at the Hope Creek site. Furthermore, we are aware from the past proposal by PSEG to add an additional nuclear reactor to the site of the potential need for a future roadway to facilitate transportation and access to/from the site. There is no mention of a roadway in the application materials provided, but if the additional development described in the NJ State websites is planned, we would expect additional landside access to the site would be needed as well. As a result, it appears that additional activities in the aquatic environment are planned in these additional phases though no specifics were provided on the State's website or the Corps' PN.

We also understand, based on information from the U.S. Fish and Wildlife Service, New Jersey Field Office, that dredged material from the project site may not be disposed of in CDFs, and may be placed in the aquatic environment (i.e., beneficial use), which would further change the scope of the proposed action and resulting analysis of potential impacts. This information is critical to understanding the proposed single and complete project and the total direct, indirect, individual, cumulative, and synergistic effects of the project at the site and in the region. Therefore, we recommend the District and applicant provide a complete description of the proposed project, specifically discussing all phases of the proposed project. This information should be provided to the public as well as all the relevant agencies. Any comprehensive project description and PN should include all impacts, including those occurring in Waters of the U.S.

For the purpose of the Endangered Species Act (ESA) consultation, you will need to evaluate consequences of other activities that are caused by activities that would not occur but for the proposed action and that are reasonably certain to occur. Therefore, it is necessary to evaluate effects from activities related to the operation of the facility once construction is completed. At this time, we have received incomplete information about the additional activities.

Early Coordination/Permitting Process/Project History

As discussed above and in our Oct 14, 2020, extension request letter, we have had various phone calls and email exchanges with the applicant, their consultant, and the District Regulatory Branch staff regarding the proposed project, information requirements, analyses, and other items necessary to conduct the required consultations with us. During a phone call with the applicant on March 9, 2020, staff from the Habitat Conservation Division detailed site-specific surveys/inspections that should be undertaken to characterize and delineate aquatic habitats, identify aquatic resources present in the project area and adjacent areas, and the analyses that should occur to evaluate the potential adverse effects of the action on EFH, federally managed species, their prey, and other resources under our purview. We recommend those elements be included in a complete EFH assessment. These items, along with additional information regarding ESA consultations, were also discussed by our staff during a larger, interagency call on April 28, 2020.

Our Habitat Division has also relayed information regarding habitat characterization and requirements of EFH assessments through emails dated June 25, 2020, and September 11, 2020. An EFH Worksheet was prepared and forwarded to us by the District on September 11, 2020, via email, however, our EFH Worksheet was designed for use on small projects, typically requiring an Abbreviated Consultation pursuant to 50 CFR 600.920, not large, complex projects such as this where an Expanded Consultation is warranted. We responded to this email on the same day (Sept. 11, 2020) informing the District that the EFH Worksheet was inappropriate for this project and a comprehensive EFH assessment document should be prepared. Our September 11, 2020, email reiterated a number of items in our June 25, 2020, email, specifically that site-specific surveys/inspections, including benthic habitat mapping would be necessary for the EFH assessment. We further reiterated that for the purposes of the EFH consultation, all benthic habitat types throughout the project area should be accurately mapped through the use of acoustic data (e.g., multibeam bathymetry and backscatter; side scan sonar), sediment grain size analysis (grabs, not vibracores), and visual imagery. We also discussed the importance of benthic fauna survey data and stated that this information could be obtained with the same grab samples that are used for sediment grain size analysis.

Although the public notice has now been issued, we have not yet seen the results of any site-specific surveys/inspections or received any of the information we requested during our early coordination discussions with the District and the applicant. The information provided to us so far includes only limited information on the resources present at the site and does not include detailed analyses of the individual, cumulative and synergistic short-, medium- and long-term temporary and permanent/chronic impacts of the proposed project on aquatic resources.

Authorities

As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, we offer the following comments on resources of concern to us in the study area pursuant to the authorities of the Magnuson Stevens Fishery Conservation and Management Act (MSA), Fish and Wildlife Coordination Act (FWCA), and ESA

Magnuson Stevens Fishery Conservation and Management Act

The MSA requires federal agencies to consult with one another on projects such as this that may adversely affect EFH. In turn, we must provide recommendations to conserve EFH. These recommendations may include measures to avoid, minimize, mitigate, or otherwise offset adverse effects on EFH resulting from actions or proposed actions authorized, funded, or undertaken by that agency. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments (50 CFR 600.920) and generally outlines each agency's obligations in this consultation procedure.

EFH is defined as, "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The term "waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and aquatic areas historically used by fish, where appropriate while "substrate" includes sediment, hard bottom, structures underlying

waters and associated biological communities.

The EFH final rule published in the Federal Register on January 17, 2002, defines an adverse effect as: "any impact which reduces the quality and/or quantity of EFH." The rule further states that:

> An adverse effect may include direct or indirect physical, chemical or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual cumulative, or synergistic consequences of actions.

To date, we have not received a complete and comprehensive EFH assessment. As discussed above and explained to District Regulatory staff, it is not appropriate to use our EFH Worksheet for large, complex projects such as this one that require an expanded consultation to fully evaluate the adverse effects on EFH. The PN or other documents also do not describe or discuss proactive avoidance and minimization measures typical of projects of this type in this section of the Delaware River, such as prohibitions on in-water work (i.e., March 1 to June 30 of any given year to protect fish migrations and spawning activities) or using various noise-reducing measures to install piles. As proposed, the project would result in substantial, significant, and unacceptable impacts to aquatic resources under our purview, including aquatic resources of national importance. Additionally, and in absence of a complete EFH assessment, the information provided fails to fully evaluate the individual, cumulative, and synergistic direct and indirect effects of the project on EFH, and we must consider the information to be incomplete and insufficient to initiate the required EFH consultation.

Fish and Wildlife Coordination Act

The FWCA, as amended in 1964, requires that all federal agencies consult with us when proposed actions might result in modifications to a natural stream or body of water. It also requires that they consider effects that these projects would have on fish and wildlife and must also provide for improvement of these resources. Under this authority, we work to protect, conserve and enhance species and habitats for a wide range of aquatic resources such as shellfish, diadromous species, and other commercially and recreationally important species that are not managed by the federal fishery management councils and do not have designated EFH.

Based upon the information provided, the project will have substantial and unacceptable impacts to aquatic resources that we seek to conserve and enhance under the FWCA, particularly anadromous species such as alewife, blueback herring, American shad, and striped bass. In addition, the loss and degradation of important habitat for these species, the impacts to early life stages from the operation of the facility, and the lack of any compensatory mitigation to offset the adverse effect do not support the FWCA's requirement to provide for the improvement of fish and wildlife resources (16 U.S.C. 662(a)).

Endangered Species Act

The ESA requires federal agencies (in this case, the District) to ensure, in consultation with us, that any action authorized, funded, or carried out by them is not likely to jeopardize species listed under the ESA or destroy or adversely modify critical habitat. As such, the federal agency shall review its actions at the earliest possible time to determine whether any action may affect listed species or critical habitat. If such a determination is made, a biological assessment shall be prepared to evaluate the potential effects of the action on listed species and designated critical habitat to determine whether any such species or habitat are likely to be adversely affected by the action. If such a determination is made, the federal agency shall submit to us a written request to initiate formal consultation that includes all the information required by the regulations for implementing the ESA [50 CFR 402.14(c)]. The federal agency need not initiate a formal consultation with us if we concur with the determination by the federal agency that the proposed action is not likely to adversely affect the listed species or designated critical habitat.

The federal agency requesting formal consultation shall provide us with the best scientific and commercial data available or which can be obtained during the consultation for an adequate review of the effects that an action may have upon listed species or critical habitat. This information may include the results of studies or surveys conducted by the federal agency. The federal agency shall provide any applicant with the opportunity to submit information for consideration during the consultation.

The proposed construction will affect foraging habitat for sturgeon in an area known for sturgeon aggregation and vessel traffic during operation of the facility may result in vessel strikes of listed species. To date we have not received a request and necessary information to initiate consultation. As mentioned above, the PN or other documents do not describe or discuss proactive avoidance and minimization measures typical of projects of this type in this section of the Delaware River. Additionally, documents reviewed by us and discussions during meetings have not provided us with information about serviced lease sites, expected port activity, and vessel traffic to evaluate effects to listed species from operations of the facility.

National Environmental Policy Act (NEPA)

Project Purpose and Need

The PSEG's stated project purpose is to "create a deep water marine terminal that can accommodate vessels that would marshal wind turbine components and then allow these components to be shipped to the offshore wind farms." In the application materials/package, PSEG states that the construction of the marine terminal is in response to demonstrated need to service the offshore wind industry. Additionally, the applicant makes a number of general references to "several detailed assessments… highlighted the need for new, fit-for-purpose port facilities to meet the offshore wind industry's needs," but does not provide specific citations for such documents or include the documents themselves in the application package. Nevertheless, the statements in the application appear to base the purpose and need on a small geographic area and do not consider the broader context of numerous port facilities and existing and potential offshore wind port capacity (via retrofits, repurposing, etc.) in the Delaware River including the 11 other port facilities on the river (Philadelphia, Camden, Paulsboro, Marcus Hook, Gloucester

Marine Terminals, Penn Terminals and others) or the Northeast U.S. more broadly (e.g., Port of Virginia-Norfolk area, Maryland Port Authority-Baltimore, New York-New Jersey Harbor). Moreover, it is our understanding that the Port of Paulsboro (Paulsboro Marine Terminal), has been developed (or will be expanded) specifically to service the offshore wind industry, though this was not described in any of PSEG's application materials. Generally, many of the statements regarding project need in the application materials are not supported by references or documentation and are overly broad. Additionally, the purpose and need statements do not address the expected intermittent/infrequent nature of use of this wind marshalling port during wind farm construction and, more prominently, once wind farms are established and operational, as the lifespan for wind turbines is about 20 years (various sources, including the U.S. Department of Energy's National Renewable Energy Laboratory, Energy Analysis page [accessed November 2020]). Due to the location and lack of supporting landside infrastructure it is unlikely that the proposed port facility can be used for more traditional import/export operations, so the long-term practicability of the proposed port is questionable and has not been discussed or evaluated.

Alternatives

PSEG's purpose and need statement appears narrow and unnecessarily limits the evaluation of alternatives to the Marine Terminal at the Hope Creek Site. This precludes the consideration of other practicable alternate locations that may be less environmentally damaging than this new port development. There are numerous other port facilities on the Delaware River and within the Mid-Atlantic region that are potential practical alternatives to PSEG's proposal, but they do not appear to have been considered. A more robust alternatives analysis is needed before any conclusion regarding the lack of practical alternatives to the proposal should be made. This analysis should consider potential alternate locations within the Delaware River and larger Mid-Atlantic region and include information on the criteria developed to select and to evaluate alternatives, alternate sites considered and the rationale for the rejection of alternate sites. Rehabilitation, retrofits, repurposing, or upgrades to existing facilities, as well as increases in efficiencies (i.e., modernization) at existing facilities should also be considered and fully analyzed. This more thorough analysis of alternatives which could avoid or minimize adverse effects to aquatic resources is consistent with the requirements of NEPA, the Clean Water Act (CWA) Section 404 (b)(1) Guidelines and aquatic resource conservation mandates under the FWCA and MSA. As we have discussed above, should this project move forward in the DA permitting process, we recommend that the District require the preparation of a complete and comprehensive EA to allow for a full and complete evaluation of the effects of the project, as well as alternatives including the "no action" alternative.

Aquatic Resources

The mainstem Delaware River has been designated EFH for a variety of fish managed by the New England Fishery Management Council and Mid-Atlantic Fishery Management Council because these areas provide feeding, resting, nursery, and staging habitat for a variety of commercially, recreationally, and ecologically important species. Various life stages of species for which EFH has been designated in the area of the proposed project include, but are not limited to bluefish (*Pomatomus saltatrix*), black sea bass (*Centropristis striata*), summer flounder (*Paralichthys dentatus*), winter skate (*Leucoraja ocellata*), and windowpane flounder

(*Scophthalmus aquosus*). The Delaware River, including the areas in and around the proposed project site, also serves as important migratory, nursery, resting, foraging, and potentially spawning habitat for anadromous fish such as alewife, blueback herring, American shad, and striped bass. Other aquatic resources and their forage which are of concern to us include, but are not limited to, blue crab (*Callinectes sapidus*), Atlantic menhaden (*Brevoortia tyrannus*), American eel (*Anguilla rostrata*), bay anchovy (*Anchoa mitchilli*), hickory shad (*Alosa mediocris*), Atlantic croaker (*Micropogonias undulatus*), weakfish (*Cynoscion regalis*), and other assorted baitfishes and shrimps, which can be found in the Delaware River and vicinity of the project area. Recent studies have also confirmed that the federally listed Atlantic sturgeon and shortnose sturgeon use the lower tidal river extensively.

River Herring and American Shad

The Delaware River is one of the most important river systems for alewife, blueback herring, and American shad on the East Coast, due in part to its landscape position, large associated estuary and bay with marshes, creeks and tidal flats, lack of significant obstructions/dams, and history of effective multi-state fisheries management. These *Alosa* species have complex lifecycles where individuals spend most of their lives at sea then migrate great distances to return to freshwater rivers to spawn. American shad (stocks north of Cape Hatteras, N.C.), alewife, and blueback herring are believed to be repeat spawners, generally returning to their natal rivers to spawn (Collette and Klein-MacPhee 2002).

American shad, blueback herring, and alewife formerly supported the largest and most important commercial and recreational fisheries throughout their range. However, commercial landings for these species have declined dramatically from historic highs (ASMFC 2018; 2020) and recreational fishing is currently closed for alewife and blueback herring and severely limited for American shad in the Delaware River and Estuary. The most recent benchmark stock assessment and peer review completed in 2020 indicate American shad remains depleted coastwide. The "depleted" determination is used instead of "overfished" to indicate factors besides fishing have contributed to the species decline, such as channelization of rivers, water withdrawals (and resulting impingement and entrainment of larval American shad), habitat degradation, and pollution. Coastwide adult mortality is unknown, but was determined to be unsustainable for some system-specific stocks, indicating the continued need for management action to reduce adult mortality. Specifically, adult mortality was determined to be unsustainable in the Delaware River system (ASMFC 2020).

The 2020 benchmark stock assessment continued work from the 2007 coastwide stock assessment for American shad, which also identified stocks as highly depressed from historical levels. The 2007 assessment concluded that new protection and restoration actions needed to be identified and applied, which led to the development of Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad Management). Amendment 3 identified significant threats to American shad, including spawning and nursery habitat degradation or blocked access to habitat, resulting from dam construction, increased erosion and sedimentation, and losses of wetland buffers (ASMFC 2007). Protecting, restoring and enhancing American shad habitat, including spawning, nursery, rearing, production, and migration areas, are necessary for preventing further declines in American shad abundance, and

restoring healthy, self-sustaining, robust, and productive American shad stocks to levels that will support the desired ecological, social, and economic functions and values of a restored Atlantic Coast American shad population (ASMFC 2010). The 2020 benchmark stock assessment also recognized predation by non-native predators like flathead catfish and northern snakehead as an important stressor that, when combined with anthropogenic habitat alterations and exploitation by fisheries, likely has a significant cumulative and synergistic adverse impact on the species (ASMFC 2020). A number of long-term surveys, some of which are discussed below, have documented the use of the proposed project site by American shad, as well as alewife and blueback herring.

In the Mid-Atlantic, landings of alewife and blueback herring, collectively known as river herring, have declined dramatically since the mid-1960s and have remained very low in recent years (ASMFC 2017). The 2012 river herring benchmark stock assessment found that of the 52 stocks of alewife and blueback herring assessed, 23 were depleted relative to historic levels, one was increasing, and the status of 28 stocks could not be determined because the time-series of available data was too short (ASMFC 2012a). The 2017 stock assessment update indicates that river herring remain depleted at near historic lows on a coast wide basis. The "depleted" determination was used in 2012 and 2017 instead of "overfished" to indicate factors besides fishing have contributed to the decline, including habitat loss, habitat degradation and modification (including decreased water quality), and climate change (ASMFC 2017).

Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-1960s, river herring have been designated as Species of Concern by NOAA. Species of Concern are those about which we have concerns regarding their status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA. We strive to draw proactive attention and conservation action to these species.

These Alosine fishes are important forage for several federally managed species and provide trophic linkages between inshore and offshore systems. Buckel and Conover (1997) in Fahay et al. (1999) reports that diet items of juvenile bluefish include these species. Additionally, juvenile *Alosa* species have all been identified as prey species for summer flounder, winter skate, and windowpane flounder, in Steimle et al. (2000). The EFH final rule states that prey species are an important component of EFH and that loss of prey may be an adverse effect on EFH and managed species. As a result, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat may also be considered adverse effects on EFH.

Striped Bass

The project area is also regionally and nationally significant for striped bass because of its importance as migration, spawning, nursery, foraging, and resting habitat. Atlantic striped bass have formed the basis of one of the most important and valuable commercial and recreational fisheries on the Atlantic coast for centuries; the fishery is also strongly tied to the cultural heritage of the eastern U.S (ASMFC 1981). The spawning population of the Delaware River system contributes significantly to the coastal migratory stock (ASMFC 2003). However, overfishing and poor environmental conditions lead to the collapse of the fishery in the 1970s

and 80s and development of the Striped Bass Fishery Management Plan (FMP) in 1981 (ASMFC 2003). After years of increasing numbers following implementation of the FMP, commercial and recreational landings of striped bass as well as female spawning stock biomass and recruitment, have declined since their peak in the early- to mid-2000s (ASMFC 2019). Most recently, the 2018 Atlantic Striped Bass Benchmark Stock Assessment found the resource overfished and that overfishing is occurring (ASMFC 2019). The 2018 benchmark assessment, which used updated recreational catch estimates, found the stock to have been overfished since 2013 and experiencing overfishing, and as a result, initiated efforts to end overfishing including catch and size limits. Additionally, female spawning stock biomass (SSB) in 2017 was estimated to be nearly 50 million pounds below the SSB threshold of 202 million pounds and nearly 100 million pounds below the SSB target (ASMFC 2019). Accelerated declines in striped bass populations may result from the cumulative and synergistic effects of overfishing and non-fishing related activities that impact reproduction, recruitment and survival.

Mature female striped bass (age six and older) produce large quantities of eggs, which are fertilized by mature males (age two and older) as they are released into riverine spawning areas, including the Delaware River. While developing, the fertilized eggs drift with the downstream currents and eventually hatch into larvae (ASMFC 1981). Late larvae and early juveniles favor shallower water with slower currents, and likely reside in nearshore areas for increased feeding opportunities and reduced predation risk. Boynton et al. (1981) reported that approximately five times as many juvenile striped bass were collected in the nearshore habitat of the Potomac River Estuary than in the offshore habitat, which also suggests that the former habitat is preferred, as appears to be the case in other estuaries (Chadwick 1964; Setzler et al. 1980). Juveniles overwinter in the lower Delaware River and upper Delaware Bay (Weisberg et al. 1996). Juvenile striped bass remain in coastal nursery estuarine and riverine habitat for two to four years and then join the coastal migratory population in the Atlantic Ocean. In the ocean, fish tend to move north during the summer and south during the winter. Important wintering grounds for the mixed stocks are located from offshore New Jersey to North Carolina. With warming water temperatures in the spring, resident and coastal contingents move upriver to the freshwater reaches of coastal rivers, including the Delaware and its tributaries, to complete their life cycle.

American Eel

The area of the proposed project is also migration, spawning, nursery, and foraging habitat for the American eel. Catadromous American eels spawn in the Sargasso Sea and transit the Delaware River up to the freshwater reaches of the main stem and its tributaries as part of their migration. They inhabit these upstream freshwater areas until they return to the sea as adults. According to the 2012 benchmark stock assessment, the American eel population is depleted in U.S. waters. The stock is at or near historically low levels due to a combination of historical overfishing, habitat loss, food web alterations, predation, turbine mortality, environmental changes, exposure to toxins and contaminants, and disease (ASMFC 2012b). Actions being considered as part of the proposed project may impede the movements of these species between important freshwater habitats and the Atlantic Ocean in a number of ways including altering hydrologic conditions such as velocity and flow patterns, as well as changing water quality.

Threatened and Endangered Species

As stated in our October 14, 2020, letter, Atlantic sturgeon and shortnose sturgeon are known to be present year-round within the reach of the Delaware River where the construction and operation of a new terminal will occur. The river is also designated as critical habitat for the New York Bight distinct population segment of the Atlantic sturgeon. The reach provides important habitat and environmental conditions for juvenile Atlantic sturgeon foraging and physiological development, especially as it relates to juveniles' oceanward migration. Future vessels visiting the terminal will cross waters where federally listed sea turtles and whales including the Kemp's Ridley turtle (*Lepidochelys kempii*), Leatherback turtle (*Dermochelys coriacea*), Loggerhead turtle (*Caretta caretta*), Green turtle (*Chelonia mydas*), North Atlantic Right whale (*Eubalaena glacialis*), Fin whale (*Balaenoptera physalus*) as well as sturgeon may be present.

Existing Fisheries Studies

The New Jersey Department of Environmental Protection (NJDEP) Division of Fish and Wildlife conducts several surveys each year to study the status of species populations within the Delaware River and Estuary. The Delaware River Seine Survey, which has been conducted in portions of the river near the project area since 1980. It is currently the Bureau of Marine Fisheries' longest running fishery-independent survey and the data provides an annual abundance index for striped bass. Results have been corroborated by other independent surveys, such as the Delaware Division of Fish & Wildlife's (DFW) striped bass spawning stock survey and other Delaware state surveys. Additionally, NJDEP conducts its own striped bass stock survey and juvenile finfish 16-foot otter trawl survey, both of which have been conducted since 1991. These NJDEP long-term surveys document the use of this section of the river by a wide variety of species including striped bass, blueback herring, alewife, American shad, American eel, Atlantic herring, Atlantic menhaden, bay anchovy, gizzard shad (*Dorosoma cepedianum*), hogchoker (*Trinectes maculatus*), yellow perch (*Perca flavescens*), white perch (*Morone americana*), Atlantic silverside (*Menidia menidia*), and many others (NJDEP 2020). These data provide support that the area of the proposed project is important habitat for a diverse assemblage of finfish and shellfish.

Additionally, Weisberg et al. (1996) captured more than 25 different species near the area of the proposed project in the Delaware River including yellow perch, hickory shad, hogchoker, banded killifish (*Fundulus diaphanus*) and mummichog (*Fundulus heteroclitus*). Impingement studies done at the Eddystone Generating Station, located on the Pennsylvania side of the Delaware River near the project site, identified 53 species of fish in this section of the river including alewife, American eel, American shad, Atlantic menhaden, bay anchovy, blueback herring, gizzard shad, hogchoker, spot (*Leiostomus xanthurus*), striped bass and white perch (Waterfield et al. 2008).

Delaware Division of Fish and Wildlife has also conducted a 16-foot trawl survey in the area of the proposed project, which shows that a diverse fish community exists in the area of the proposed project. This survey, which has been consistently conducted since 1980, is primarily

used to monitor juvenile fish abundance and is conducted monthly from April through October at 39 fixed stations in the Delaware Estuary. Various trawl survey stations near the site of the proposed project provide insight into the species using the area, specifically juveniles; the time-series data from these trawl surveys have contributed to our understanding that the Delaware Bay, Estuary, and River is an important, productive, and highly valued area for commercially, recreationally, and ecologically important species.

DFW trawl survey data near the site of the proposed project indicate that a strong juvenile fish community consisting of alewife, American eel, American shad, Atlantic croaker, Atlantic herring (*Clupea harengus*), Atlantic menhaden, Atlantic sturgeon, bay anchovy, black drum (*Pogonias cromis*), black sea bass, blue crab, blueback herring, bluefish, bluegill (*Lepomis macrochirus*), brown bullhead (*Ameiurus nebulosus*), carp (*Cyprinus carpio*), channel catfish (*Ictalurus punctatus*), crevalle jack (*Caranx hippos*), eastern silvery minnow (*Hybognathus regius*), gizzard shad, hickory shad, hogchoker, naked goby (*Gobiosoma bosci*), northern hog sucker (*Hypentelium nigricans*), northern kingfish (*Menticirrhus saxatilis*), northern pipefish (*Syngnathus fuscus*), pumpkinseed (*Lepomis gibbosus*), shortnose sturgeon, silver perch (*Bairdiella chrysoura*), spot, spottail shiner (*Notropis hudsonius*), spotted hake (*Urophycis regia*), striped anchovy (*Anchoa hepsetus*), striped bass, striped searobin (*Prionotus evolans*), summer flounder, tessellated darter (*Etheostoma olmstedi*), weakfish, white catfish (*Ameiurus catus*), white perch, yellow bullhead (*Ameiurus natalis*), and yellow perch exists at the site. Alewife, American eel, Atlantic croaker, bay anchovy, blue crab, channel catfish, hogchoker, striped bass, weakfish, and white perch dominated DFWs captures. Moderate numbers of American shad, Atlantic menhaden, blueback herring, and spot were also encountered (DFW 2020). Striped bass, alewife, blueback herring, American shad, and American eel all appeared regularly in large numbers during the time-series, with the frequency of encounters varying between species; striped bass and American eel were encountered in high numbers every month (April - October) of the survey (DFW 2020).

As is clear above, numerous fisheries sampling programs exist in the area of the proposed project. However, the applicant's own Estuary Enhancement Program's Biological Monitoring Program (BMP) also provides valuable insights into the area. Although the BMP includes numerous sampling methodologies, locations, and purposes, the impingement and entrainment abundance monitoring at the Salem Generating Station, the bottom trawl program and the baywide beach seine program are most relevant to the proposed project. Together, these elements of the BMP, which were initiated in 1995 (and are conducted annually), support other multi-decadal time-series data from NJDEP and DFW that the area is important habitat for various commercially, recreationally, and ecologically important species such as striped bass, blue crabs, American shad, alewife, weakfish, and others (most recent BMP report available to NMFS: PSEG 2014).

Project Impacts

Although some of the project elements need to be clarified, and the project as a whole may be much larger than what is described in the PN, we have concluded the currently proposed project will have substantial and unacceptable impacts on aquatic resources of national importance including the many species identified at the site. These adverse effects will result from fill, pile

placement, wharf construction, dredging, vessel traffic and propeller wash, and ballast water intake associated with this project. Should this application continue to move forward in the permitting process, a full and complete analysis of all of the direct, indirect, individual, cumulative, and synergist effects of the construction and operation of the proposed port should be undertaken and a complete EFH assessment should be provided to allow for an expanded EFH consultation. This analysis should be based upon detailed habitat mapping of the project site and the biological information found in the many available sources including those discussed above and the available literature. It should also include information of the nature and scope of any contamination and the potential for contaminant release and aquatic resource exposure.

The direct and indirect physical, chemical, and biological alterations of the waters and substrate, and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions should be comprehensively addressed by the District and applicant. Actions should be broken down into their components and subcomponents and related directly to the stressors generated from each, exposure of habitats and species to the stressors, and resulting responses, or effects (known as the stressor-exposure-response framework). From there, the effects to habitats and species should be identified, described, and analyzed in the context of short-, medium-, and long-term temporary and permanent/chronic impacts at the site, river, and regional level. Analysis of individual, synergistic, and cumulative effects should also be undertaken.

Habitat Loss and Conversion

It is unclear whether the placement of the proposed bulkhead on the existing shoreline will result in the permanent loss of Delaware River habitat including shallow areas important for juvenile fishes and bait fishes. As noted above, this should be more thoroughly described to us in an updated project description. However, the proposed new vertical wall structure will be placed in the aquatic environment, which will permanently and completely disconnect the aquatic environment from any natural shoreline. This will adversely impact system wide primary and secondary production and overall energy flow-food web support, nutrient cycling, and other ecosystem processes. Additionally, the placement of the vertical man-made wall structures will lead to a cascade of permanent and chronic adverse impacts, including increased wave energy, scour, turbidity, and sedimentation, degradation and elimination of benthic habitat, decreased benthic faunal diversity, beach steepening, and others (USACE 1981; NOAA 2015; Gittman & Scyphers 2017; Dugan et al. 2018; and others). Some of these impacts will be exacerbated by the proposed placement of 4-feet thick rock riprap over 1.86 acres of the river bottom along the bulkhead and an additional 2.57-acre area of the river to be covered in gravel for a proposed gravel mat, which also represent conversions of shoreline and unvegetated flat habitat.

The construction of the wharf structure and the associated piles and decking will also result in the permanent loss of between 2.15 acres and 3.65 acres of aquatic habitat within the Delaware River. The exact number is unclear from the information provided and should be clarified in the EFH assessment and Biological Assessment provided to us. The proposed wharf will be supported by 1,056 thirty-inch square pre-cast concrete piles. Due to the number and close placement of the pilings, we consider the wharf construction to be a loss of aquatic habitat. As

stated in 33 CFR § 232.3(c)(1) (Discharge requiring permits -Pilings):

> Placement of pilings in waters of the United States constitutes a discharge of fill material and requires a section 404 permit when such placement has or would have the effect of a discharge of fill material. Examples of such activities that have the effect of a discharge of fill material include, but are not limited to, the following: Projects where the pilings are so closely spaced that sedimentation rates would be increased; projects in which the pilings themselves effectively would replace the bottom of a waterbody; projects involving the placement of pilings that would reduce the reach or impair the flow or circulation of waters of the United States; and projects involving the placement of pilings which would result in the adverse alteration or elimination of aquatic functions.

There are many studies that demonstrate that large pile supported structures degrade fish habitat. For example, studies on the effects of large pile-supported structures (Able et al. 1995) found that fishery habitat quality is poor under large pile-supported structures as compared to pile fields (piles with no deck or overwater component) and interpier areas. Also, diversity, abundance and growth rates of juvenile fishes were lower under large pile-supported structures than in pile fields and interpier areas (Able et al. 1998, Duffy-Anderson and Able 1999). It is likely that the adverse conditions begin at the point where the low light levels under the pier begin to impair the success of sight feeding fish including species such as yellow perch (Granqvist and Mattila 2004) and blueback herring (Janssen 1982 in Collette and Klein-MacPhee 2002). In addition to severely decreased light penetration, the area under the pier may also be subjected to increased turbidity and reduced water circulation. The decrease in water circulation can also adversely affect striped bass survival as strong current is needed to keep the eggs suspended in the water column and prevent them from being smothered by silt (Bigelow and Schroeder 1953).

Shading from over-water structures, including the proposed wharf, will also adversely affect EFH, federally managed species, their prey, and other aquatic resources under our purview by degrading habitat quality in, and near, the shadow cast by the structure and by altering behavior and predator-prey interactions (Nightingale and Simenstad 2001; Hanson et al. 2003). Under-structure light levels can fall below the threshold for photosynthesis for many primary producers, adversely affecting photosynthetic organisms, habitat complexity, and overall net primary production, and for large projects, adversely impact secondary and tertiary production (Kenworthy and Haunert 1991; Haas et al. 2002; Struck et al. 2004). In the aquatic environment, floating and emergent vegetation are adversely impacted by shading, as well as less conspicuous primary producers, such as benthic microalgae. Benthic microalgae are an important trophic resource, and aid in the stabilization of sediments, controlling scour and resuspension of bottom sediments (Wolfstein and Stal 2002). Furthermore, benthic microalgae are important components of nutrient cycling and exchange in the water column, and contribute significantly to the overall primary production of ecosystems (Stutes et al. 2006). Communities in shaded areas are generally less productive than unshaded areas; light limitation is detrimental to benthic microalgae primary production, sediment primary production and metabolism (e.g., soil respiration) (Whitney and Darley 1983; Meyercordt and Meyer-Reil 1999; Stutes et al. 2006). Shading impacts are considered permanent due to the long-term placement of structures (Hanson et al. 2003; Struck et al. 2004; Johnson et al. 2008).

Many aquatic species, primarily fish, rely on visual cues for spatial orientation, predator-prey interactions (e.g., prey capture and predator avoidance), migration, and other essential behaviors. Early life history stages of fish are primarily visual feeders that are highly susceptible to starvation - a primary cause of larval mortality in marine fish populations (May 1974; Hunter 1976). Juvenile and larval fish survival is likely a critical determining factor for recruitment, with survival linked to the ability to locate and capture prey, and to avoid predation (Seitz et al. 2006). The reduced-light conditions found under overwater structures limit the ability of fishes, especially juveniles and larvae, to perform these essential prey capture and predator avoidance activities. Total abundances of fish can be substantially reduced in areas shaded by piers (Southard et al. 2006; Able, Grothues & Kemp 2013; Munsch et al. 2017). Overall, it appears that overwater structures that create dark environments can reduce localized habitat value by impairing visual tasks (e.g., feeding, predator vigilance) and reducing prey availability and habitat connectivity by constraining movements (Munsch et al. 2017).

Reductions in sub- and intertidal benthic and primary productivity, may in turn adversely affect patterns of invertebrate abundance, diversity, and species composition (Nightingale and Simenstad 200l). Structures that attenuate light may also adversely affect food webs by reducing micro- and macro-phyte growth, soil organic carbon and by altering the density, diversity, and composition of benthic invertebrates that are prey for numerous fishery species (Alexander and Robinson 2006; Whitcraft and Levin 2007). Prey resource limitations affect movement patterns and the survival of many juvenile fish species (Seitz et al. 2006; Johnson et al. 2008). The shadow cast by a structure may also increase predation on species by creating a light-dark interface that allows ambush predators to remain in darkened areas and wait for prey to swim by against a bright background, resulting in high contrast and high visibility (Helfman 1981). Prey species moving around the structure may be unable to see predators in the dark area under the structure or have decreased predator reaction distances and times, thus making them more susceptible to predation (Helfman 1981; Bash et al. 2001). Decreased predator avoidance (and increased mortality from predation) may be particularly important at the site of the proposed project for shad and river herring as the Northern snakehead (*Channa argus*), a sit-and-wait invasive piscivore, now occurs in Delaware River system (USGS Nonindigenous Aquatic Species clustered specimen observation records). Northern snakeheads are voracious fish predators, representing a significant threat to shad and river herring through predation and to striped bass through competition for prey (Saylor et al. 2012; Philadelphia Water Department and DNREC personal communication 2019 and 2020).

American shad and river herring appear to be particularly susceptible to the shadow cast by overwater structures (Moser and Terra 1999). American shad tend to be diurnal in their migratory habits and tend to migrate primarily during the day, while falling back to lower-velocity zones at night; adults and juveniles use side-channel and shallower areas near shorelines at day and night (Fisher 1997; Haro and Kynard 1997; Theiss 1997; Sullivan 2004). American shad are reluctant to immediately pass under darkened areas of channels, specifically under low bridges or strong shadows, or where there is a strong light transition (Haro and Castro-Santos 2012). American shad school as both juveniles and adults and have a low likelihood of separating from a school in order to pass a structure or its shadow (Larinier and Travade 2002). River herring require light to form schools and are most active during the day and have difficulty avoiding obstacles at night (Blaxter and Parrish 1965; Blaxter and Batty 1985). Similarly,

laboratory observations of alewives indicated that both juveniles and adults are most active during the day (Richkus and Winn 1979). Moser and Terra (1999) performed a field study to investigate low light as an impediment to river herring migrations and found significantly higher numbers of herring passed through unshaded treatments, as compared to shaded treatments. Fish often require visual cues for orientation and exhibit faster swimming speeds at increased light levels (Pavlov et al. 1972, Katz 1978).

The proposed dredging will result in the permanent conversion of shallow water habitat in the project area to deepwater habitat resulting in the loss of habitat for juvenile anadromous fish species. As stated above, Boynton et al. (1981) reported that approximately five times as many juvenile striped bass were collected in the nearshore habitat of the Potomac River Estuary than in the deeper, offshore habitat, highlighting the importance of shallow nearshore habitat. Other studies in other estuaries also support Boynton's result including Chadwick (1964) and Setzler et al. (1980). In addition, white perch are also ordinarily found in shallow water, usually not deeper than four meters (Beck 1995, Collette and Klein-MacPhee 2002.). Dredging also removes benthic organisms that many species rely on for prey; frequent repeated maintenance dredging events will likely prevent recolonization of the benthos by invertebrates and reduce site-wide productivity (Van Dolah et al. 1984; Wilber and Clarke 2001; 2010).

Turbidity and Sedimentation

Anthropogenic-induced elevated levels of turbidity and sedimentation, above background (e.g., natural) levels can lead to various adverse impacts on fish and their habitats. These increased levels can be caused by construction activities such as the dredging, pile driving, bulkhead installation, and filling proposed by PSEG, as well as the operation of the facility including vessel movements, changes in hydrodynamics due to the alteration of the river bottom from dredging, the pile installation and changes in shoreline alignment due to bulkheading.

Increases in turbidity due to the suspension or resuspension of sediments into the water column during activities such as dredging can degrade water quality, lower dissolved oxygen levels, and potentially release chemical contaminants bound to the fine- grained sediments (Johnson et al. 2008). Suspended sediment can also mask pheromones used by migratory fishes to reach their spawning grounds and impede their migration and can smother immobile benthic organisms and demersal newly-settle juvenile fish (Auld and Schubel 1978; Breitburg 1988; Newcombe and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Additionally, other effects from suspended sediments may include (a) lethal and non-lethal damage to body tissues, (b) physiological effects including changes in stress hormones or respiration, or (c) changes in behavior, reduced predator avoidance, and others (Wilber and Clarke 2001; Kjelland et al. 2015). Increases in turbidity will also adversely affect the ability of some species, such as larval striped bass, to locate and capture prey and evade predation, leading to decreased survivorship (Fay et al. 1983 in Able and Fahay 1998). Species with low foraging plasticity have been shown to experience high mortality compared with other species during acute elevated turbidity conditions (Sullivan and Watzin 2010). Turbidity can also decrease photosynthesis and primary production, resulting in reduced oxygen levels.

Elevated rates of sedimentation can lead to numerous negative effects to aquatic systems. These

can include loss of habitat heterogeneity and reduction in organic matter retention and stable substrate (Allan 2004). Furthermore, the sedimentation (burying/covering) of individual organisms and habitats and changes in benthic environments via alteration to sediment quality, quantity, and changes in grain size can reduce species diversity and decrease overall ecosystem function (Thrush and Dayton 2002). The smothering of benthic prey organisms and chronic elevated sedimentation can prevent recolonization, which reduces the quality of the habitat by making it unsuitable for foraging (Wilber and Clarke 2001). Additionally, particle size is one of the main drivers of benthic faunal biodiversity and community composition; therefore, changes to sediment composition from sedimentation will affect the benthic prey resources of various species, including NOAA-trust resources (Wood and Armitage 1997; Wilber and Clarke 2001).

Noise

Noise from the construction activities, such as wharf and bulkhead construction, may also result in adverse effects to various fish species. Our concerns about noise effects come from an increased awareness that high-intensity sounds have the potential to adversely impact aquatic vertebrates (Fletcher and Busnel 1978; Kryter 1985; Popper 2003; Popper et al. 2004). Effects may include (a) lethal and non-lethal damage to body tissues including hearing/sensory structures, (b) physiological effects including changes in stress hormones, hearing capabilities, or sensing and navigation abilities, or (c) changes in behavior (Popper et al. 2004). More specifically, adverse non-lethal impacts of hearing loss in fish relate to reduced fitness through disrupted communication, reduced predation and feeding success, reduced prey detection, and/or inability to assess the environment or inability to move and migrate in desired or appropriate directions (Pooper et al. 2004). Additionally, anthropogenically generated sound may also lead to the masking of other biologically relevant sounds species use to carry out essential life functions, which could combine with hearing loss and other impacts to have additive effects on species and populations (Popper et al. 2004).

Impingement and Entrainment

Dredging

Impacts on benthic communities from dredging have been well-documented in numerous studies (e.g., Van Dolah et al. 1984; Clarke et al. 1993; Wilber and Clarke 2001; Wilber and Clarke 2010). However, dredging can also result in the impingement and entrainment of eggs, larvae and free swimming organisms, including diadromous fish, which can lead to injury and mortality (Thrush and Dayton 2002). This direct impact may be significant for various life stages of certain species: impingement and entrainment risk is generally low for juvenile and adult fish and higher for eggs and larvae. Impingement and entrainment mortality is specifically identified as a significant impact to young-of-year American shad in the Delaware River and is viewed as a significant barrier to species recovery (ASMFC 2020). This pattern is not consistent in shellfish species such as crabs and shrimp, where all life stages are susceptible to impingement and entrainment; for example, egg-bearing female blue crabs are at high risk for impingement and entrainment when buried in sediments during winter months and are too lethargic to avoid dredges (Reine and Clarke 1998; Wilber and Clarke 2001; Thrush and Dayton 2002). Impacts from impingement and entrainment to important prey species can reduce overall habitat quality by reducing availability of prey. For example, sand shrimp (*Crangon spp*), are important prey

for many estuarine organisms in the Delaware River system, including various life stages of species found in the project area. Armstrong et al. (1982) found sand shrimp were the most numerically abundant organism entrained by dredges during dredging studies in the Pacific Northwest. This study estimated entrainment rates for sand shrimp as high as 3.4 shrimp per cubic yard of material, and based on an annual shrimp population of 80 million, estimated that total loss to the population through entrainment during the course of a "typical" dredging project could range from 960,000 to 5,200,000 individuals, or 1.2% to 6.5% (Armstrong et al. 1982).

Ballast Water

It is unclear if the types of vessels mooring at the facility will require the intake and discharge of ballast water as cargo (turbine components) are unloaded and loaded. However, the intake of any ballast water will entrain fish eggs, larvae and other early life stages of aquatic organisms. We are particularly concerned about the impacts to the early life stages of river herring, American shad and striped bass. As discussed above, numerous life stages of species, including young-of-year, occur within the proposed project area. Ballast capacity can range from several cubic meters in sailing boats and fishing boats to hundreds of thousands of cubic meters in large cargo carriers. Large tankers can carry in excess of 200,000 m3 of ballast with container vessels holding tens of thousands of cubic meters of ballast water (NAP 1996). Ballasting intake rates can be as high as 15,000 to 20,000 m3/h (NAP 1996). The project documents lack any mention of this potentially significant effect on aquatic resources, nor is there any discussion of discharges into the Delaware River from the vessels mooring at the proposed facility.

Vessel Traffic

Atlantic sturgeon is a long lived iteroparous species with late maturation, high fecundity, and low survival of early life stages but high survival of the large older individuals. As such, mortality of older individuals can significantly impact population growth, and vessel strike mortality has been identified as a major threat to the Delaware River Atlantic sturgeon population (Brown and Murphy 2010). Recent and ongoing unpublished studies show that subadult and adult Atlantic sturgeon congregate at the mouth of the Delaware River and within Delaware Bay. These areas generally overlap with the shipping lanes into the Delaware Bay and the navigation channel within the Delaware Bay and River. In addition, Atlantic sturgeon swim higher in the water column and may actively follow the navigation channel during spawning migrations, which increases the risk of mature adult sturgeon interacting with vessels and their propellers (Fisher 2011). At last, the construction and existence of an access channel will further reduce Atlantic sturgeon up- and downstream movements unrestricted by vessel traffic. Based on these considerations, it is possible that operation of the terminal will increase the risk of adult and subadult Atlantic sturgeon vessel strike by adding additional vessels to the existing baseline traffic and reducing the cross-section of the river that is free of vessel activity.

Cumulative Effects

The EFH assessment and other application materials do not adequately evaluate the cumulative effects of the proposed project. There is some mention of some projects proposed, underway, or completed within the Delaware River, but there does not appear to be any meaningful analysis or discussion. Cumulative impacts analyses are important for any project and are not restricted to

spatial and temporal "overlap" of projects. Furthermore, several small, medium, and large past, present, and future actions have not been considered. For example, large dredging (new and maintenance) and port projects are underway or have been proposed in the region such as those in/at the Navy Pier 4, Sunoco Refinery, Delaware City Refinery, Delaware River Federal Navigation Channel, Delaware River Partners Gibbstown Facilities, Edgemoor Port, and several smaller port development projects are also proposed, underway, or completed in Philadelphia, Camden and Paulsboro areas.

Also concerning is the lack of cumulative effects discussion or analyses of the applicant's Salem and Hope Creek Nuclear Generating Stations located on the same property and along the same shoreline as the proposed project. These existing facilities conduct maintenance dredging activities and have existing water intakes, both of which adversely impact aquatic organisms. While the Hope Creek Unit employs closed cycle cooling, the Salem Unit has a once-through cooling system that draws in billions of gallons of water from the Delaware River each day. PSEG's BMP has extensive impingement and entrainment data, collected annually since 1995, allowing for quantitative and qualitative impacts analyses. For example, the 2014 BMP Report showed that juvenile striped bass dominated entrainment abundance surveys with 45,479 individuals encountered, while blue crab and weakfish dominated impingement abundance surveys with 24,004 and 21,270 encounters, respectively. Cumulatively, and in some cases such as the Edgemoor Port Site, these projects will have a substantial adverse effect on the aquatic environments of the Delaware River, Estuary, and Bay as well as NOAA-trust resources. A full assessment of the cumulative effects of the proposed project should be undertaken that includes the consideration of the cumulative effects of all past, present, and reasonably foreseeable future actions on aquatic resources. Some of the issues that should be addressed include the cumulative effects of the loss of aquatic water column/pelagic and benthic habitat on NOAA trust resources, loss of prey species, ballast water withdrawals, water discharges, vessel collisions and new dredging and future maintenance dredging needs.

Compensatory Mitigation

The *Final Rule on Compensatory Mitigation for the Losses of Aquatic Resources* (33 CFR 325 and 332 and 40 CFR 230) published in the Federal Register on April 10, 2008, does not limit compensatory mitigation only to impacts to wetlands and special aquatic sites, as some of the application materials suggest. The rule refers to "waters of the United States." As stated in Part 332.1 (a)(1) of the rule, "the purpose of this part is to establish standards and criteria for the use of all types of compensatory mitigation, including on-site and off-site permittee-responsible mitigation, mitigation banks, and in-lieu fee mitigation to offset unavoidable impacts to waters of the United States authorized through the issuance of DA permits pursuant to section 404 of the Clean Water Act (33 U.S.C. 1344) and/or sections 9 or 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 401, 403)." These standards do not only apply to wetlands and special aquatic sites. They apply to all regulated waters of the U.S. including the Delaware River. In addition, because compensatory mitigation is intended to offset unavoidable impacts, it must first be demonstrated that the less damaging alternatives are not practicable and the impacts are unavoidable.

The Clean Water Act section 404(b)(1) guidelines outline the sequence to be followed prior to

considering compensatory mitigation including the demonstration that potential impacts have been avoided and minimized to the maximum extent practicable. Due to the lack of adequate purpose and need, robust alternatives analysis, and comprehensive analyses of the effects, it is not possible to evaluate the appropriateness of current avoidance and minimization measures. As a result, we cannot agree that avoidance and minimization has taken place and the remaining impacts are unavoidable.

Lastly, the area of the proposed project is habitat for a wide variety of aquatic resources including those of national importance. Should this project move forward in the permitting process, compensatory mitigation for all unavoidable impacts to waters of the US should be provided. Additionally, because of the potential for significant adverse impacts to important species such as striped bass, river herring, and American shad, mitigation for losses in recruitment and overall production should be required. We recommend the District and PSEG engage with us and other federal agencies to discuss relevant mitigation.

EFH Conservation Recommendations

A complete and comprehensive EFH Assessment has not been provided to us for the proposed project. Therefore, we are unable to initiate consultation or provide EFH conservation recommendations.

Due to the lack of information provided to us we recommend that the construction of the proposed PSEG Nuclear LLC Wind (Hope Creek Port) Facility should not be authorized unless, through the preparation of a comprehensive EA or other publicly reviewed comprehensive NEPA document, as well as a comprehensive EFH Assessment and Biological Assessment, it can be demonstrated that:

- there is justifiable project purpose and need;
- no practicable alternate sites are available within the region;
- the impacts to aquatic resources have been avoided and minimized to the maximum extent practicable; and
- suitable compensatory mitigation can be provided that offsets fully all of the project's direct and indirect effects on aquatic resources and their habitats, including the effects on anadromous fishes and benthic and pelagic habitats.

Conclusion

As currently proposed, this project will have a substantial and unacceptable impact on aquatic resources of national importance pursuant to Part IV, Paragraph 3(b) of the MOA between our agencies due to the loss, alteration and degradation of important aquatic habitats in the Delaware River used by striped bass, American shad, alewife, blueback herring and other aquatic resources of national importance. We also note that the project document provided to us lacks a clearly defined purpose and need, a full and complete evaluation of alternatives, and does not address fully the individual, cumulative, direct and indirect effects of the construction and operation of the proposed project. Lastly, the lack of proposed compensatory mitigation is not only inadequate, but concerning for a project of this size and scale. Consequently, we must

recommend that the permit for this project be denied in accordance with the MOA between our agencies.

References

Able, K.W., A.L. Studholme and J.P. Manderson. 1995. Habitat Quality in the New York/New Jersey Harbor Estuary: An Evaluation of Pier Effects on Fishes. Final Report. Hudson River Foundation. New York.

Able, K.W., J.P. Manderson and A.L. Studholme. 1998. The distribution of shallow water juvenile fishes in an urban estuary: the effects of manmade structures in the lower Hudson River. Estuaries 21:731-744.

Able, K.W. and M.P. Fahay. 1998. The first year in the life of estuarine fishes in the Middle Atlantic Bight. Rutgers University Press, New Brunswick, New Jersey. 342 pp.

Able, K.W., T.M. Grothues & I.M. Kemp. 2013. Fine-scale distribution of pelagic fishes relative to a large urban pier. Marine Ecology Progress Series, 476, 185–198.

Alexander, C. R. and Robinson, H.M. 2006. Quantifying the Ecological Significance of Marsh Shading: The Impact of Private Recreational Docks in Coastal Georgia. Final Report prepared for Coastal Resources Division, Georgia Department of Natural Resources. 47 p.

Allan, J.D. 2004. Landscapes and riverscapes: the influence of land use on stream ecosystems. *Annual Review of Ecology, Evolution, and Systematics* 35:257-284.

Angermeier, P.L. and Smogor, R.A., 1995. Estimating number of species and relative abundances in stream-fish communities: effects of sampling effort and discontinuous spatial distributions. Canadian Journal of Fisheries and Aquatic Sciences, 52(5), pp.936-949.

Armstrong, D.A., Stevens, B.G. and Hoeman, J.C., 1982. Distribution and abundance of Dungeness crab and Crangon shrimp, and dredging-related mortality of invertebrates and fish in Grays Harbor, Washington. Technical report. School of Fisheries, Unv. of Washington, Wash Dept of Fisheries, and U.S. Army Corps of Engineers District, Seattle.

Atlantic States Marine Fisheries Commission (ASMFC). 1981. Interstate Fishery Management Plan for the Striped Bass. Management Report No. 1. Washington, DC. 329 p.

ASMFC. 2003. Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass. Fishery Management Report No. 41. Washington, DC. 81 p.

ASMFC. 2007. Stock Assessment Report No. 07-01 (Supplement) of the Atlantic States Marine Fisheries Commission - American Shad Stock Assessment Report for Peer Review Volume I. Washington, DC. 238 p.

ASMFC. 2010. Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (American Shad Management). Washington, DC. 169 p.

ASMFC. 2012a. River Herring Benchmark Stock Assessment Volume II. Stock Assessment Report No. 12-02. Washington, DC. 710 p.

ASMFC. 2012b. American Eel Benchmark Stock Assessment. Stock Assessment Report No. 12-01. Washington, DC. 29 p.

ASMFC. 2017. River Herring Stock Assessment Update Volume I: Coastwide Summary. Washington, DC. 193 p.

ASMFC. 2018. Review of the ASMFC Fishery Management Plan for Shad and River Herring (Alosa spp.) for the 2017 Fishing Year. Washington, DC. 19 p.

ASMFC. 2019. Atlantic Striped Bass Stock Assessment Overview. Washington, DC. 6 p.

ASMFC. 2020. 2020 American Shad Benchmark Stock Assessment and Peer Review Report. Accepted for Mgmt Use by the Shad and River Herring Management Board. Washington, DC. 1188 p.

Auld, A.H. and J.R. Schubel. 1978. Effects of suspended sediments on fish eggs and larvae: a laboratory assessment. Estuar. Coast. Mar. Sci. 6:153-164.

Bash, J., Berman, C., and Bolton, S. 2001. Effects of turbidity and suspended solids on salmonids. Washington State Transportation Center (TRAC) Report No. WA-RD 526.1. Olympia, WA. 92 p.

Beck, S. 1995. White perch. In L.E. Dove and R.M. Nyman, eds., Living Resources of the Delaware Estuary. The Delaware Estuary Program. Pages 235-243.

Bigelow, H.B. and Schroeder. 1953. Fishes of the Gulf of Maine. U.S. Fish and Wild. Serv. Fish. Bull. 74:1-517.

Blaxter, J.H.S. and B.B. Parrish. 1965. The importance of light in shoaling, avoidance of nets and vertical migration by herring. J. Cons. perm. int. Explor. Mer. 30:40-57.

Blaxter, J.H.S. and R.S. Batty. 1985. Herring behaviour in the dark: responses to stationary and continuously vibrating obstacles. J. mar. biol. Assoc. U.K. 65:1031-1049.

Boesch, D.F., 1972. Species diversity of marine macrobenthos in the Virginia area. Chesapeake Science, 13(3), pp.206-211.

Boynton, W.R., T.T. Polgar and H.H. Zion. 1981. Importance of juvenile striped bass food habits in the Potomac estuary. Trans. Am. Fish. Soc. 110:56-63

Breitburg, D.L. 1988. Effects of turbidity on prey consumption by striped bass larvae. Trans. Amer. Fish. Soc. 117: 72-77.

Brown, J. J. and G. W. Murphy. 2010. Atlantic sturgeon vessel-strike mortalities in the Delaware Estuary. Fisheries **35**(2): 72-83

Buckel, J.A and D.O. Conover. 1997. Movements, feeding periods, and daily ration of

piscivorous young-of-the-year bluefish, *Pomatomus saltatrix*, in the Hudson River estuary. Fish. Bull. (U.S.) 95(4):665-679.

Burton, W.H. 1993. Effects of bucket dredging on water quality in the Delaware River and the potential for effects on fisheries resources. Prepared for: Delaware Basin Fish and Wildlife Management Cooperative, by Versar Inc, Columbia MD.

Chadwick, H.K. 1964. Annual abundance of young striped bass, Roccus saxatilis, in Sacramento-San Joaquin Delta, California. Calif. Fish. Game. 50:69-99.

Clarke, D. G., G. L. Ray, and R. J. Bass. 1993. Benthic recovery on experimental dredged material disposal mounds in Galveston Bay, Texas. Pages 191–197 *in* R. W. Jensen, R. W. Kiesling, and F. S. Shipley, editors. The second state of the bay symposium. Galveston Bay National Estuary Program, Publication GBNEP-23, Galveston, Texas.

Collette, B.B. and G. Klein-MacPhee. eds. 2002. Bigelow and Schroeder's fishes of the Gulf of Maine. Smithsonian Institution. Washington, D.C.

Delaware Division of Fish and Wildlife (DFW). 2020. Coastal Finfish Assessment Survey Interim Performance Report. F18AF00378 (F-42-R-30). Prepared by M. Greco. Delaware Division of Fish and Wildlife, Dover, DE.

Duffy-Anderson, J.T. and K.W. Able. 1999. Effects of municipal piers on the growth of juvenile fishes in the Hudson River estuary: a study across a pier edge. Marine Biology 133:409-418.

Dugan, J.E., K.A. Emery, M. Alber, C.R. Alexander, J.E. Byers, A.M. Gehman, N. McLenaghan, and S.E. Sojka. 2018. Generalizing Ecological Effects of Shoreline Armoring Across Soft Sediment Environments. Estuaries and Coasts 41:180-196.

Fahay, M.P., P.L. Berrien, D.L. Johnson and W.W. Morse. 1999. Essential Fish Habitat Source Document: Bluefish, *Pomatomus saltatrix* life history and habitat characteristics. U.S. Dep. Commer. NOAA Technical Memorandum NMFS-NE-144.

Fay, C.W., R.J. Neves and G.B. Pardue. 1983. Striped bass. Species profiles: life histories and environmental requirements of coastal fish and invertebrates (Mid-Atlantic). National Coastal Ecosystem Team. U.S. Fish and Wildlife Service. Washington, DC.

Fisher, M. T. 1997. Temporal and spatial patterns of anadromous fish passage at Boshers Dam vertical-slot fishway on the James River, Richmond, Virginia. Master's thesis. Virginia Commonwealth University, Richmond.

Fisher, M. 2011. Atlantic Sturgeon Final Report. Period October 1, 2006 to October 15, 2010. Delaware Division of Fish and Wildlife, Department of Natural Resources and Environmental Control, Smyrna, Delaware. Report No. T-4-1.

Fletcher, J. L. and R. G. Busnel. 1978. Effects of Noise on Wildlife. Academic Press, New York.

Gittman, R.K. and S.B. Scyphers. 2017. The cost of coastal protection: A comparison of shore stabilization approaches. Shore and Beach 85:19-24.

Granqvist, M. and J. Mattila. 2004. The effects of turbidity and light intensity on the consumption of mysids by juvenile perch (*Perca fluviatilis L.*) Hydrobiologia 514:93-101.

Haas, M.A., Simenstad, C.A., Cordell, J.R., Beauchamp, D.A. and Miller, B.S. 2002. Effects of large overwater structures on epibenthic juvenile salmon prey assemblages in Puget Sound, WA. Washington State Transportation Center (TRAC), University of Washington, WSDOT. Final Research Report WA-RD 550.

Hanson, J., Helvey, M., Strach, R., editors. 2003. Non-fishing impacts to essential fish habitat and recommended conservation measures. Long Beach (CA): National Marine Fisheries Service (NOAA Fisheries) Southwest Region. Version 1. 75p.

Haro, A., and B. Kynard. 1997. Video evaluation of passage efficiency of American shad and sea lamprey in a modified Ice Harbor fishway. North American Journal of Fisheries Management 17:981–987.

Haro, A., and Castro-Santos, T. 2012. Passage of American Shad: Paradigms and Realities. Marine and Coastal Fisheries, 4(1), 252-261. doi:10.1080/19425120.2012.675975

Helfman, G.S. 1981. Twilight Activities and Temporal Structure in a Freshwater Fish Community Canadian Journal of Fisheries and Aquatic Sciences 38(11): 1405-1420.

Hunter, J.R., 1976. Culture and growth of northern anchovy, Engraulis mordax, larvae. *Fishery Bulletin*, *74*(1), pp.81-88.

Janssen, J. 1982. Comparison searching behavior for zooplankton in an obligate planktivore, blueback herring *Alosa aestivalis* and a facultative planktivore, bluegill *Lepomis macrochirus*. Can J. Fish. Aquat.Sci. 39:1649-1654.

Johnson, M.R., Boelke C., Chiarella L.A., Colosi P.D., Greene K., Lellis K., Ludemann H., Ludwig M., McDermott S., Ortiz J., et al. 2008. Impacts to marine fisheries habitat from nonfishing activities in the Northeastern United States. NOAA Tech. Memo. NMFS-NE-209.

Katz, H.M. 1978. Circadian rhythms in juvenile American shad, Alosa sapidissima. J. Fish Biol. 12:609-614.

Kenworthy, W.J. and Haunert, D.E. 1991. Light requirements of seagrasses: proceedings of a workshop to examine the capability of water quality criteria, standards and monitoring programs to protect seagrasses. NOAA, Tech. Memo NMFS-SEFC-287. Beaufort, N.C. 181 pp.

Kjelland, M.E., Woodley, C.M., Swannack, T.M., and Smith, D.L. 2015. A review of the potential effects of suspended sediment on fishes: potential dredging-related physiological, behavioral, and transgenerational implications. Environment Systems and Decisions 35:334-350.

Kryter, K D. 1985. The Handbook of Hearing and the Effects of Noise (2nd ed.). Academic Press, Orlando, Florida.

Larinier, M., Travade, F. and Porcher, J.P., 2002. Fishways: biological basis, design criteria and monitoring. *Bulletin Francais de la Peche et de la Pisciculture*, (364, spécial milieux tropicaux), p.208.

Limburg, K.E., C.C. Harwell, and S.A. Levin. 1984. Principles of estuarine impact assessment: lessons learned from the Hudson River and other estuarine experiences. Prepared by the Ecosystems Research Center, Cornell University for the U.S. Environmental Protection Agency.

May, R.C. 1974. Larval mortality in marine fishes and the critical period concept. In J.H.S. Blaxter, ed. The early life history of fish. Pp 3-15. Springer-Verlag Press, NY.

Meyercordt, J. and Meyer-Reil, L.A. 1999. Primary production of benthic microalgae in two shallow coastal lagoons of different trophic status in the southern Baltic Sea. Marine Ecology Progress Series 178:179-191.

Moser, M.L. and M.E. Terra. 1999. Low light as an impediment to river herring migration. Final Report to North Carolina Department of Transportation, Raleigh, NC, 112 pp.

Munsch, S. H., Cordell, J. R., & Toft, J. D. 2017. Effects of shoreline armouring and overwater structures on coastal and estuarine fish: Opportunities for habitat improvement. Journal of Applied Ecology, 54(5), 1373-1384. doi:10.1111/1365-2664.12906.

National Academy Press (NAP) - National Research Council. 1996. Stemming the Tide: Controlling Introductions of Nonindigenous Species by Ships' Ballast Water. Washington, DC: The National Academies Press. https://doi.org/10.17226/5294.

National Oceanic and Atmospheric Administration (NOAA). 2015. Guidance for Considering the Use of Living Shorelines. National Oceanic and Atmospheric Administration.

Nelson, D.A., and J.L. Wheeler. 1997. The influence of dredging-induced turbidity and associated contaminants upon hatching success and larval survival of winter flounder, *Pleuronectes americanus,* a laboratory study. Final report, Grant CWF #321-R, to Connecticut Department Environmental Protection, by National Marine Fisheries Service, Milford CT.

Nightingale, B., and Simenstad, C.A. 200l. Overwater Structures: Marine Issues. White Paper Research Project Tl 803, Task 35. WSDOT.

New Jersey Department of Environmental Protection (NJDEP). 2020. Delaware River Seine Survey; Striped Bass Stock Survey; Juvenile Finfish Survey. Division of Fish and Wildlife.

Trenton, NJ.

Newcombe, C.P., and D.D. MacDonald. 1991. Effects of suspended sediments on aquatic ecosystems. N. Amer. J. Fish. Manag. 11: 72-82.

Pavlov, D.S., Y.N. Sbikin, A.Y. Vashinniov and A.D. Mochek. 1972. The effect of light intensity and water temperature on the current velocities critical to fish. J. Ichthyol.12 :703-711.

Popper, A.N. 2003. Effects of anthropogenic sound on fishes. Fisheries 28:24-31.

Popper, AN., J. Fewtrell, ME. Smith, and R.D. McCauley. 2004. Anthropogenic sound: Effects on the behavior and physiology of fishes. MTS J. 37: 35-40.

Public Service Enterprise Group (PSEG). 2014. Estuary Enhancement Program Biological Monitoring Program 2014 Annual Report. Public Service Enterprise Group, Newark, NJ.

Reine, K. J. and D. G. Clarke. 1998. Entrainment by hydraulic dredges—A review of potential impacts. Dredging Operations and Environmental Research Technical Note Series DOER-E1. U.S. Army Engineer Research and Development Center, Vicksburg, MS. 14 pp.

Richkus, W.A. and H.E. Winn. 1979. Activity cycles of adult and juvenile alewives recorded by two methods. Trans. Am. Fish. Soc. 108: 358-365.

Saylor, R.K., N.W.R. Lapointe, and P.L. Angermeier. 2012. Diet of non-native northern snakehead (Channa argus) compared to three co-occurring predators in the lower Potomac River, USA. Ecology of Freshwater Fish 21:443-452.

Seitz, R.D., Lipcius, R.N., Olmstead, N.H., Seebo, M.S. and Lambert, D.M. 2006. Influence of shallow-water habitats and shorelines development on abundance, biomass, and diversity of benthic prey and predators in Chesapeake Bay. Marine Ecology Progress Series 326:11-27.

Setzler, E.M., W.R. Boynton, K.V. Woods, H.H. Zion, L. Lubbers, N.K. Mountford, P. Frere, L. Tucker and J.A. Mihursky. 1980. Synopsis of Biological Data on Striped Bass, Morone saxatilis (Walbaum). U.S. Dep. Commer. NOAA Technical Report NMFS Circular 443.

Southard, S.L., R.M. Thom, G.D. Williams, J.D. Toft, C.W. May, G.A. McMichael, J.A. Vucelick, J.T. Newell & J.A. Southard. 2006. Impacts of ferry terminals on juvenile salmon movement along Puget Sound shorelines. PNWD-3647, prepared for the Washington State Department of Transportation, Olympia, Washington, by Battelle-Pacific Northwest Division, Battelle Marine Sciences Laboratory, Sequim, Washington, DC, USA.

Steimle, F.W., R.A. Pikanowski, D.G. McMillan, C.A. Zetlin, and S.J. Wilk. 2000. Demersal fish and American lobster diets in the Lower Hudson-Raritan Estuary. NOAA Technical Memorandum NMFS-NE-161. Woods Hole, MA. 106 p.

Struck, S.D., Craft, C.B., Broome, S.W. and Sanclements, M.D. 2004. Effects of bridge shading

on estuarine marsh benthic invertebrate community structure and function. Environmental Management 34:99-111.

Stutes, A.L., Cebrian, J. and Corcoran, A.A. 2006. Effects of nutrient enrichment and shading on sediment primary production and metabolism in eutrophic estuaries. Marine Ecology Progress Series 312:29-43.

Sullivan, T. 2004. Evaluation of the Turners Falls fishway complex and potential improvements for passing adult American shad. Master's thesis. University of Massachusetts, Amherst.

Sullivan, S.M.P. and Watzin, M.C. 2010. Towards a functional understanding of the effects of sediment aggradation on stream fish condition. River Research and Applications 26:1298-1314.

Theiss, E. J. 1997. Effect of illumination intensity on the water velocity preference of three Alosa species. Master's thesis. University of Massachusetts, Amherst.

Thrush, S.F., and Dayton, P.K. 2002. Disturbance to marine benthic habitats by trawling and dredging: implications for marine biodiversity. Annual Review of Ecology and Systematics 33:449-473.

Ugland, K.I., Gray, J.S. and Ellingsen, K.E., 2013. The species–accumulation curve and estimation of species richness. *Journal of Animal Ecology*, *72*(5), pp.888-897.

U.S. Department of Transportation (USDOT). 2018. Port Performance Statistics Program - Glossary. U.S. Department of Transportation. Bureau of Freight Statistics. 10p.

Uwadiae, R.E. 2009. Response of Benthic Macroinvertebrate Community to Salinity Gradient in a Sandwiched Coastal Lagoon. Benthic Ecology Unity, Department of Marine Sciences, University of Lagos.

Van Dolah, R. F., D. R. Calder, and D. M. Knott. 1984. Effects of dredging and open-water disposal on benthic macroinvertebrates in a South Carolina estuary. Estuaries 7:28–37.

U.S. Army Corps of Engineers (USACE) Philadelphia District. 1981. Low cost shore protection. 36 p.

U.S. Environmental Protection Agency (EPA). 1977. Guidance for evaluating the adverse impacts of cooling water intake structures on the aquatic environment. U.S. EPA, Office of Water Enforcement Permits Division, Industrial Permits Branch. Washington, D.C.

Versar, Inc. 1993. Methods for monitoring impingement and entrainment and assessing impacts at Delmarva Power's Edge Moor Power Plant. Prepared for the Delaware Department of Natural Resources and Environmental Control. Dover, DE.

Wainright, S.C., Fuller, C.M., Michener, R.H. and Richards, R.A., 1996. Spatial variation of trophic position and growth rate of juvenile striped bass (Morone saxatilis) in the Delaware

River. Canadian Journal of Fisheries and Aquatic Sciences, 53(4), pp.685-692.

Waterfield, G.B., B.W. Lees and R.W. Blye, Jr., 2008. Historical Impingement and Entrainment: Comparisons for Eddystone Generating Station. Prepared for Exelon Generation Company, LLC. Normandeau Associates, Inc.

Weisberg, S.B., P. Himchak, T. Baum, H.T. Wilson and R. Allen. 1996. Temporal Trends in Abundance of Fish in the Tidal Delaware River. Estuaries 19(3):723-729.

Whitcraft, C.R. and Levin, L.A. 2007. Regulation of benthic algal and animal communities by salt marsh plants: Impact of shading. Ecology 88:904-917.

Whitney, D. and Darley, W. 1983. Effects of light intensity upon salt marsh benthic microalgal photosynthesis. Marine Biology 75:249-252.

Wilber, D.H. and Clarke, D.G. 2001. Biological effects of suspended sediments: a review of suspended sediment impacts on fish and shellfish with relation to dredging activities in estuaries. *North American Journal of Fisheries Management* 21:855-75.

Wilber, D.H. and Clarke, D.G. 2010. Dredging activities and the potential impacts of sediment resuspension and sedimentation on oyster reefs. Proceedings of the Western Dredging Association Thirtieth Technical Conference. San Juan, Puerto Rico p 61-69.

Wolfstein, K. and Stal, L.J. 2002. Production of extracellular polymeric substances (EPS) by benthic diatoms: effect of irradiance and temperature. Marine Ecology Progress Series 236:13-22.

Wood, P.J., and Armitage, P.D. 1997. Biological effects of fine sediment in the lotic environment. Environmental Management 21:203-217.