#59

ADDITIONAL CORRESPONDENCE

New England
Fishery Management
Council

MID-ATLANTIC
FISHERY MANAGEMENT COUNCIL

January 22, 2019

Program Manager
Office of Renewable Energy
Bureau of Ocean Energy Management
45600 Woodland Road
Sterling, Virginia 20166

Dear Sir/Madam,

Please accept these comments from the New England Fishery Management Council (New England Council) and the Mid-Atlantic Fishery Management Council (Mid-Atlantic Council) on the Draft Environmental Impact Statement (DEIS) for the Vineyard Wind project proposed offshore of Massachusetts.

The New England Council has primary management jurisdiction over 28 marine fishery species under nine FMPs in federal waters and is composed of members from Connecticut to Maine. The Mid-Atlantic Council manages more than 64 marine species with seven fishery management plans (FMPs) in federal waters and is composed of members from the coastal states of New York to North Carolina (including Pennsylvania). Fourteen species are managed with specific FMPs, and over 50 forage species are managed as "ecosystem components" within the Mid-Atlantic Council's FMPs. In addition to managing these primary fisheries, both Councils have enacted measures to identify and conserve essential fish habitats, protect deep sea corals, and manage forage fisheries sustainably. The Councils support policies for U.S. wind energy development and operations that will sustain the health of marine ecosystems and fisheries resources. While the Councils recognize the importance of domestic energy development to U.S. economic security, we note that the marine fisheries in Southern New England are profoundly important to the social and economic well-being of communities in the Northeast US and provide numerous benefits to the nation, including domestic food security.

The National Marine Fisheries Service (NMFS) is providing detailed comments and analytical products that describe our fisheries, essential fish habitats, endangered and protected resources, and other important considerations related to the marine environment for the project. Please note for the record that the Councils support and concur with NMFS' comments and concerns. In this letter, we have focused on aspects of the DEIS that are most relevant to our fisheries resources, habitats, and stakeholders.

General comments about the DEIS

Within the DEIS, impacts are identified as negligible, minor, moderate, and major, and either negative or beneficial. The direction of impacts provided throughout the analysis appears to be left unstated in most or all cases when impacts are negative; it is unclear why this might be, but the approach creates ambiguity. Both the direction and magnitude of impacts should be denoted for each conclusion drawn. The expected cumulative effects are also described resource by resource, which makes it challenging to

interpret important conclusions about how the proposed wind farm will affect all the related resources. BOEM should consider a comprehensive single discussion of cumulative effects rather than a resource-by-resource approach.

Alternatives Including the Proposed Action (Chapter 2)

Impacts of the Proposed Action and Alternatives are only considered 'major' for three of the affected resources: Environmental Justice, Fishing, and Navigation, with the comments under Environmental Justice related specifically to fishing issues (Tables 2.4-1 and 2.4-2). All other affected resources are analyzed as having only negligible, minor, or moderate impacts. These findings of the DEIS suggest that BOEM should view fishery stakeholders as amongst their highest priority participants in this process, and that their comments and viewpoints should be carefully considered as the DEIS is revised. Table 2.4-2 presents BOEM's finding that with mitigation measures, analyzed impacts decrease from major to moderate for both Environmental Justice and Fishing. This suggests that BOEM should do everything possible to ensure that Vineyard Wind utilizes these mitigation measures during construction and operations, perhaps requiring them as a condition of the permit. While we are not providing specific comments on the Navigation section of the DEIS, we note that fisheries stakeholders have expressed significant concerns around their ability to safely navigate within wind farms. Concerns we have heard are related specifically to the possibility of radar interference, the ability to safely fish and transit during severe weather, and the possibility that large number of in-water structures could make search and rescue operations more difficult. We encourage BOEM to collaborate with the United States Coast Guard and the fishing industry to mitigate these concerns.

In terms of the alternatives themselves, it is unclear why one-mile spacing and east-west layout are combined as two sub-options under a single alternative, except that both of these alternatives are linked by the need for relatively extensive additional site assessment work should they be selected (this is compared to Alternative C, which would require more limited additional site assessment).

The Councils are not recommending a specific set of alternatives as preferred, but we are aware of significant concerns on the part of the fishing industry regarding turbine orientation and spacing, including the desire for wider turbine spacing in designated transit lanes. We encourage BOEM to seek the maximum level of consensus possible among developers and the fishing industry on the layout of the Vineyard Wind project. Further, although the Construction and Operations Plan (COP) and DEIS use a design envelope approach with a range of potential wind turbine generator (WTG) sizes and associated spacing requirements, our understanding from Vineyard Wind's public communication is that they intend to use 9.5 MW WTGs for the project. If this parameter has been clearly determined, the analysis in the DEIS could be made more specific to reflect the impacts of using 9.5 MW WTGs.

Finfish, Invertebrates, and Essential Fish Habitat (Chapter 3, Section 3.3.6)

BOEM suggests there is plenty of similar surrounding habitat around the project site as justification for assessing various impacts as negligible, minor, and moderate. Is this a reasonable assessment at the present time? Will this statement remain true if all potential sites attractive for offshore wind energy and currently leased offshore Massachusetts and Rhode Island are developed in 30-year project operation window? We suggest that BOEM should think critically about the availability of similar suitable habitats considering the plausible cumulative development of large areas of the continental shelf for wind power.

Related specifically to the assessment of cumulative impacts (section 3.3.6.10), the assessment of impacts as 'moderate' for installation and 'minor' for operations are not well justified in the text especially given the likelihood of additional wind projects. It seems plausible that both WTG underwater noise and electromagnetic frequency emissions (EMF) from cables could have ongoing impacts on benthic and demersal species beyond what is currently known, especially because this is the first major project planned for the Northeast U.S. This would argue for a larger range of potential impacts of operations, i.e. minor to moderate, vs. just minor. Further, the list of projects considered to be reasonably foreseeable (Appendix C, table C.1-3) is extremely narrow. It is evident that energy companies have made significant financial investments in developing these areas, even considering areas that have only been leased (Tier 5, leases OCS-A 0520, 0521, and 0522), given that the December 2018 leases commanded record prices at auction. It seems overly conservative to place only projects with approved or submitted permits and plans into the reasonably foreseeable category.

In addition, increased noise from WTG and EMF are long-term effects, even if the impacts are reasonably evaluated as minor. Under the heading "Aspects of Resource Potentially Affected" (p. 3-74) it is stated that "increased turbidity, noise, sediment deposition, water withdrawal, and EMF are likely to temporarily alter the behavior of finfish and invertebrate species within the wind development area (WDA) and offshore export cable corridor (OECC)". While turbidity, construction noise, and sediment and water withdrawal may all be considered temporary, operations noise and EMF cannot reasonably be considered as such since the project is expected to operate for 30 years.

Additional specific comments:

1) None of the 'relevant design parameters' listed on page 3-74 are related to ongoing operations. For example, are there limits on operations during certain wind conditions that would affect the ongoing impacts of the project?
2) In 'Construction and Installation of Offshore Components', there is a comment that "BOEM could further reduce potential impacts as a condition of COP approval, requiring Vineyard Wind to conduct long-term monitoring to document the changes to the ecological communities on, around, and between WTG foundations and other benthic areas disturbed". We agree that long-term monitoring is critical and should be a condition of COP approval but fail to see how monitoring will reduce impacts, because it will not change the way the windfarm is constructed. However, monitoring would allow Vineyard Wind and BOEM to better understand the effects of wind farm construction and operations on living resources and habitats and could inform decisions about mitigation and the overall management of these resources.
3) In 'Construction and Installation of Offshore Components', the discussion of pile driving noise impacts is confusing, and Table 3.3.6-1 is not sufficiently explained. We suggest moving this table to an appendix and rewriting this section to more clearly articulate in narrative form what the radial distance and total areal impact of noise damage to species is expected to be. The first paragraph in this section suggests that fish can be physiologically injured by the pile driving noise up to 5.7 miles away, but impacts are assessed as only minor, owing to the impact area being small relative to "overall habitat available". This conclusion should be thoughtfully evaluated and better justified if it is valid based on available data.
4) Given that turbines will be operated for 30 years and the way sound travels underwater, there could be more detailed discussion of impacts in the section on 'Vessel Activity/Noise'

(Operations and Maintenance of Offshore Components section, page 3-79). The DEIS states "no study has shown any behavioral impact of sound during the operational phase of wind energy facilities ..." but does not clarify whether studies have been done at all, and impacts have not been identified, or is there simply a lack of research on this topic. If there is a lack of research on this issue, it should be added to the list of topics for which information is 'incomplete or unavailable', in section 3.3.6.11 (page 3-86). The effects of cable EMF on marine organisms could also be added to this list of topics.

5) In the Operations and Maintenance section, is light flicker a potential concern? It is not addressed as an impact but has been identified as an issue of concern for land-based wind energy projects. The DEIS should note if this is not an operational concern for marine projects, and why not, or alternatively, should address this issue if there are potential effects on marine organisms.

6) In the Operations and Maintenance section, reef effects are assessed as 'moderate' beneficial impacts. This seems generous based on the lack of information. The DEIS only cites two studies, and one of these indicates that monopoles (which are planned for use for part of the project) are not expected to have much of an effect. Given the studies referenced, perhaps an assessment of 'minor' benefit is more appropriate.

Commercial Fisheries and For Hire Recreational Fishing (Chapter 3, Section 3.4.5)

BOEM focuses on relatively direct effects that could impact fishing operations, including reduced access to fishing grounds, competition over alternate fishing locations, the potential for allisions with structures and cables, etc. There is limited discussion of how fisheries might be indirectly affected if fish populations decline or shift as a result of wind farm construction or operations. These population-level effects are difficult to estimate and will be difficult to attribute to any specific wind farm project, but this issue should be discussed in the EIS to the extent possible.

A major question facing the fishing industry is how effort may shift as a result of the windfarm. The DEIS does not reference any studies or experience from other regions on whether or how well fishing operations may be able to continue within offshore wind project areas. The DEIS should reference any lessons learned from the Block Island Wind Farm, as well as from wind farms in Europe. It would be helpful to include this type of information to support the conclusion that displacement will have a moderate impact. Related to this, the possibility of 'Disruption to Fishing' doesn't include any consideration of whether fishermen's insurance policies would constrain their ability to fish within WDA. These concerns have been raised to the Councils by fishery stakeholders. We suggest that the EIS acknowledge this issue and provide an assessment of whether this is a valid concern.

Additional specific comments:

1) In the Regional Setting section (3.4.5.1), conclusions about the magnitude of different types of fishing in either the Wind Energy Area (WEA) or WDA are uncertain, and vessel trip report and vessel monitoring system data each have important limitations. These uncertainties should be referenced in the DEIS. Section 3.4.5.12 on page 3-194 describes these caveats very briefly, but this paragraph would be more useful in the section where the fisheries data are presented and could be expanded upon.

2) Pages 3-179 through 3-181 discuss potential disruption of fishing associated with construction. The DEIS concludes that compensation will help to offset impacts to fisheries,

but also notes on page 3-181 that the Construction and Operations Plan provides insufficient detail to determine the effectiveness of these compensation programs. The reliance on compensation programs to mitigate impacts despite a lack of clarity about how they would operate is concerning.

3) On page 3-182 the section heading 'Navigation – Port Impacts' seems inaccurate, since this section includes impacts of navigation constraints on fishing activities, not just on ports.
4) Pages 3-182 through 3-184 discuss potential disruption of fishing associated with construction. As mentioned in general comments above, the lack of any references to experience with other wind farms is problematic.
5) On page 3-183, there is a lengthy discussion of trip costs, but then these data aren't used to project increased costs associated with potential effort displacement and changes in transiting behavior. We suggest that these trip cost data could be better utilized to estimate impacts, and to justify why this is a moderate vs. major impact, since fuel costs are a key element of trip costs.
6) On page 3-184 in reference to fishing vessel displacement issues, it says that "BOEM expects that disruptions to access or unavailability of fish as a result of the Proposed Action during operations and maintenance may be limited to pelagic fisheries and highly migratory species". Based on previous comments in this section of the DEIS and on our own knowledge, a variety of fishing vessel types may be impacted by displacement, and availability of other species, particularly sessile species, may be reduced. This sentence should be reworked if the meaning is not as intended.
7) In the following paragraph on page 3-184, effects of hanging up on project infrastructure are described as moderate for mobile and for-hire recreational gears, but minor for fixed gear fishermen. It is counter-intuitive that for-hire recreational fishing with hook and line would be as likely as mobile bottom-tending gear fishing to have moderate negative impacts due to interactions with infrastructure, particularly with respect to cables.
8) In the fourth paragraph on page 3-184, BOEM refers to pelagic resources as especially interannually variable, but the description of the affected environment for the commercial and for hire fishery component describes variability across many fisheries, including those for demersal species. The focus here on pelagic species seems inconsistent with the earlier discussion. The comments from item 2 above about compensation being relied on to reduce impacts from moderate/major to minor/moderate apply here as well; without a clear sense about how the compensation program will work, and that it will be effective, it is difficult to reach a conclusion about the resulting reduction in impacts.
9) Tables 3.4.5-10 and 3.4.5-11 that summarize the impacts of each alternative considered across the different aspects of commercial and for-hire fisheries are not very effective, because the impacts are the same across all the alternatives, except for Alternative F. It would be much more useful to discuss the additive impacts of a range of plausible combinations of Alternatives B-F in addition to the impacts of Alternative A.
10) In the cumulative impacts on page 3-193, there are a very large number of potential WTGs (232) that are considered Tier 3 and therefore not reasonably foreseeable, which again, seems an overly conservative estimate of foreseeable future projects. Understanding the overlaps in fisheries uses between the Tier 1, 2, and 3 projects would provide a more realistic sense of how wind farm development might affect fisheries in the coming years, even if these projects are less certain. The discussion about affected fisheries the South Fork Wind Farm project area (last paragraph on page 3-193) is very useful. Including these

additional projects could increase impacts from moderate to major to major.

11) Section 3.4.5.12 describes 'Incomplete or Unavailable information'. Not mentioned in this section is the substantial uncertainty surrounding whether or how well it will work for fishing operations to take place in and around WTG and the cables. This seems like a huge gap in available information that is fundamental to estimating the magnitude of impacts to commercial and for-hire fisheries.

Consultation and Coordination (Chapter 4)

Section 4.2.5 describes consultation with the NMFS on development of the EIS. It would be useful for this section to summarize coordination with NMFS on non-EFH aspects of the analysis. It would also be useful to include the draft EFH assessment as part of the DEIS for review by the public.

Conclusion

We appreciate the opportunity to provide comments, along with our partners at NMFS, to ensure this DEIS provides a comprehensive and effective evaluation of expected impacts from this Vineyard Wind project. The Councils look forward to working with Bureau of Ocean Energy Management to ensure that any wind development in our region minimizes impacts on the marine environment and can be developed in a manner that ensures coexistence of our fisheries with future wind development activities.

Please contact us if you have any questions.

Sincerely,

Thomas A. Nies

Mr. Thomas A. Nies
Executive Director, New England Fishery Management Council

C M Moore

Dr. Christopher M. Moore
Executive Director, Mid-Atlantic Fishery Management Council

cc: M. Bachman, J. Bennett, J. Coakley, W. Cruickshank, W. Elliott, D. Grout; M. Luisi, C. Oliver, J. Quinn, T. Stockwell

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January 21, 2018

Walter D. Cruickshank
Acting Director, Bureau of Ocean Energy
Management U.S. Department of the Interior
381 Elden Street, HM 1328

Dear Director Cruickshank:

On behalf of the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and its energy and environmental agencies, I am pleased to offer the following comments to the Bureau of Ocean Energy Management (BOEM) with respect to the Vineyard Wind project (Lease Number OCS-A 0501).

Since 2009, with the formation of the Massachusetts Intergovernmental Task Force on Renewable Energy, we have worked closely with BOEM to ensure that the Commonwealth's interests have been reflected in the federal offshore wind process on the Outer Continental Shelf. BOEM continues to engage in dialogue with our agencies and stakeholders, to be receptive to input, and to partner in ongoing marine wildlife surveys and related efforts to ensure the responsible development of offshore wind energy. We would like to extend our sincere appreciation for these efforts.

Massachusetts is committed to advancing the procurement of 1,600 megawatts (MW) of cost-effective offshore wind energy by 2027 as part of the 2016 Energy Diversity Act. Part of this procurement is the Vineyard Wind project which is now undergoing permitting. On December 7th, BOEM issued its Notice of Availability for the Draft Environmental Impact Statement (DEIS) for the Construction and Operations Plan (COP) submitted by Vineyard Wind LLC for an 800 MW wind energy facility offshore. Massachusetts strongly supports the project, and these comments are intended to further minimize its impact on natural resources and our commercial and recreational fisheries. For the purposes of protecting resources within Lewis Bay that would

potentially be impacted by cable installation, we also strongly support Covell's Beach cable landfall route as the preferred alternative to the New Hampshire Avenue landfall.

Thank you for the opportunity to comment. The Commonwealth is committed to the responsible development of cost-effective offshore wind energy to meet our greenhouse gas reduction commitments and to bring online an indigenous source of renewable energy while ensuring the sustainability of our commercial and recreational fishing and the integrity and endurance of our marine ecosystems. We look forward continuing our constructive engagement with BOEM as the federal and state processes progress. Please consider the comments below as an effort to further improve the project while not materially affecting the project's proposed timeline.

Sincerely,

Matthew A. Beaton

cc:
Edward LeBlanc, Coast Guard Sector Southeastern New England
Michael Pentony, NOAA Fisheries Greater Atlantic Regional Fisheries Office
John Quinn, Chair, New England Fishery Management Council
MA Congressional Delegation

Avian Endangered Species Impacts and Mitigation
Massachusetts is a globally significant nesting, feeding, staging and overwintering area for numerous migratory birds, from common waterfowl to ESA- and MESA-listed bird species. Listed species include but are not limited to the Roseate Tern (*Sterna dougallii*; ESA- & MESA-Endangered), Piping Plover (*Charadrius melodus*; ESA- & MESA-Threatened), Common Tern (*Sterna hirundo*; MESA-Special Concern) and Least Tern (*Sternula antillarum*; MESA-Special Concern).

Massachusetts' tern populations declined severely in the late-1800s and mid-1900s, resulting in significantly reduced populations. The Massachusetts and U.S. Roseate Tern populations declined rapidly during 2000 – 2013 but have increased somewhat since then, although the causes of these population fluctuations are unknown. Since 1985, Common Tern populations have been increasing; however, since 2003 the rate of population growth has slowed. Least Tern populations have increased overall since 1985, although there is considerable volatility in the annual population estimates. Currently, Massachusetts supports approximately 50% (about 2,200 pairs) of the entire U.S. (and North American) population of Roseate Terns; 99% of these birds occur on three islands actively managed by the Division. Approximately 30% of Massachusetts' nesting Common Terns (about 6,000 pairs of about 18,000 pairs total) as well as several thousand pairs of Massachusetts' nesting Least Terns are also being actively managed by the Division.

ESA- and MESA-listed terns forage in the waters surrounding Massachusetts during the nesting, staging, and migratory seasons. Spring migration occurs roughly between April and May. During the nesting season (May through July), birds generally forage closer to their nesting grounds. Post-breeding tern aggregation areas ("staging areas") include the beaches of Cape Cod, Martha's Vineyard, and Nantucket where terns prepare for southern migration (July through late September). These post-breeding staging areas can include the majority—and potentially all—of the North American Roseate Tern population.

Massachusetts expends extensive resources in its efforts to restore and conserve imperiled avian species, with a long history of success. For example, when Massachusetts initiated recovery efforts for the Piping Plover in the 1980s, the population had dwindled to only 130 nesting pairs. Today, Massachusetts supports nearly 700 pairs of Piping Plover, exceeding USFWS's regional recovery goal.

For listed tern species, the state has operated and invested in an intensive tern restoration program for over 20 years, including a specific focus on Roseate Terns (staff participate on the Roseate Tern Recovery Team). In addition to managing and monitoring tern colonies on an annual basis, the Division has restored habitat for Common and Roseate Terns on Ram Island, Marion, and Penikese Island in Gosnold. Most recently, the viability of Massachusetts second largest North American Roseate Tern nesting colony (Bird Island, Marion) has been threatened by coastal erosion, increased storm frequency and severity, and sea-level rise. To protect and enhance this breeding colony, the Division, the U.S. Army Corps of Engineers, and the Town of Marion recently restored

Bird Island in close coordination with USFWS; the cost of this project was approximately $6 million.

The DEIS, COP and BA collectively assess potential impacts of the proposed Vineyard Wind Project (including construction, operations, maintenance, and decommissioning). The BA concludes that effects are ***insignificant and discountable*** and thus, "not likely to adversely affect" ESA-listed bird species. More specifically, and concerning collision effects to Roseate Terns, the BA (Section 4.2.1.7) concludes:

> *The distance from shore to the offshore portions and the lack of suitable habitat of the Action Area precludes use by nesting and foraging roseate terns. Despite extensive regional surveys in the region and in the leased action area, there are no records of roseate terns in the area proposed for offshore wind turbines. In addition statistical models using the survey data, predict an absence of roseate terns in the area proposed for offshore wind turbines. Although it is possible for migrating roseate terns to pass through the lease area, a recent multi-year study did not track any migrating roseate terns through the area proposed for offshore wind turbines. Collison with WTGs is unlikely because terns are agile fliers and can easily avoid WTGs; in addition, terns fly when visibility was greater than 5 km and at 10-20 meters above the water - below the rotor swept zone. Therefore, based on the above findings, the likelihood of collision fatalities resulting from the Proposed Action would be* ***insignificant and discountable****.*

However, the DEIS, COP and BA do not provide sufficient evidence to support these conclusions. Several previous studies that run counter to the conclusions drawn above were not included, and as such existing and recently collected avian data are not fully characterized. Below, the Division provides several examples with literature references. As a result, the DEIS does not fully account for increased mortality risk and other negative impacts to ESA- and MESA-listed bird species associated with the Project. Based on a review of the available information, the Division anticipates that the construction, operation, maintenance and decommissioning of Wind Turbine Generators (WTGs) will result in an increased risk of direct mortality to ESA- and MESA-listed birds.

Based on limited and unpublished data, the BA concludes that "... any migrating terns passing through the action area are likely to be flying during good weather conditions and below the rotor swept zone." However, the best available science indicates that terns do fly within the rotor swept zone (RSZ) (Everaert and Stienen 2006; Vlietstra 2008) and frequently travel and forage in limited visibility conditions (C. Mostello, Coastal Waterbird Biologist, MA Division of Fisheries and Wildlife, personal observations). If terns used the Wind Development Area (WDA) for foraging only, tern flight heights would indeed be expected to be below the RSZ. However, because the majority of terns

passing through the WDA will be doing so during migration, it is likely that more higher-altitude "travel" flights will occur within the RSZ. Additionally, the BA states that tern "collision with WTGs is unlikely because terns are agile fliers and can easily avoid WTGs." Although terns are agile fliers, collisions with wind turbines have been recorded (Everaert and Stienen 2006).

The BA states that "[t]he Distance from shore... and the lack of suitable habitat...precludes use by...foraging roseate terns." However, the WDA can provide suitable habitat for listed terns, including foraging, resting, and migratory habitats. The Vineyard Wind Spring Tern Survey (Appendix III-O) prepared by Biodiversity Research Institute (BRI) observed state-listed terns flying, resting/sitting, and foraging within the WDA. Although Roseate Terns were not confirmed, the BA does not acknowledge the possibility that 5 of its unidentified tern observations, or a portion thereof, could be Roseate Terns.

For Piping Plovers, the BA states that (p. 23) "...Piping Plovers... do not nest in either of the two potential landfall sites." However, the Division's records document that Piping Plovers have utilized Covell's Beach (Barnstable, MA) for nesting since 2007 and have utilized adjacent beaches since the early 1980's. Ideally, work activities within nesting habitats should be avoided or minimized during the nesting season. Should cable installation occur during the nesting season the DEIS, COP and BA should thoroughly detail avoidance and minimization measures that will be taken to reduce potential impacts to nesting Piping Plovers and their habitats.

The BA states that "no roseate terns were detected in the proposed offshore Action Area during previous offshore survey efforts" (Section 3.1). However, Veit et al. (2016) performed aerial surveys in federal lease areas south of Nantucket and Martha's Vineyard (including portions of the proposed WDA) and observed one or both species within and adjacent to the proposed WDA (with highest concentrations during spring migration; they did not distinguish between Common and Roseate Terns). In addition, BRI (Appendix III-O) reported 18 Common Terns and 5 unidentified terns flying, foraging, and sitting on the water in its April and May 2018 boat-based surveys of the proposed WDA.

As asserted in the BA, land-based detection stations would have been too far away to detect nanotagged Roseate Terns in the WDA. Because lack of detection stations within the WDA would have precluded tern detections, the tracking study cannot be used to support the BA's conclusion that the WDA is not important to terns and that very little Roseate Tern activity is expected to occur within WDA.

The BA states that "...very little Roseate Tern activity is expected to occur within marine waters in and around the Action Area ... based on a statistical model that used 354 roseate tern sightings throughout the Atlantic ... to predict Roseate Tern presence" (Section 3.1). The authors of this model (presumably the Marine-life Data and Analysis Team "MDAT" [Curtice et al. 2016]) rated model quality for the Roseate Tern as Fair to Poor, depending on season; for the Common Tern, Fair to Good; and for the Least Tern, Fair. However, the BA does not acknowledge that the

model being relied upon to assess risk for ESA- and MESA-listed bird species is of limited applicability.

Importantly, the MDAT model relies on offshore survey data, which is individually insufficient. While quality survey work in the offshore environment has increased knowledge of avian abundance and distribution in recent years, marine birds have notoriously patchy distributions and there is high temporal variation in their presence and abundance across the ocean, even within a single season; inshore distributions of birds are much better known. Thus, models that rely solely on relatively sparse offshore data are compromised. Notably, as detailed by the BRI survey report (Appendix III-O), terns have been observed within the WDA during April and May, and have utilized the WDA for migration, resting, and foraging. The BRI data referenced in the BA demonstrates seasonal exposure to the WTGs that could significantly increase mortality risk for listed terns. Therefore, neither the BA nor the MDAT analysis appears to fully or accurately integrate all available data.

Epsilon (2018; Draft COP, Vol. III, 6.2 Coastal and Marine Birds) uses the MDAT and Veit et al. (2016) data to calculate exposure scores (a combination of flight height, habitat area, and temporal factors) of different bird groups relative to the Project. The COP's Exposure Assessment determined that both Common and Roseate Terns have an annual "insignificant" exposure level. The COP (pg. 1-2) states that "...the limited number of surveys conducted in each season means that individual observations (or lack of observations, for rare species) may in some cases carry substantial weight in determining seasonal density scores... "unidentified" observations were excluded...With the exception of terns, there were relatively few unidentified observations..." In addition, the COP states:

> *Seasonal exposure scores should be interpreted as a measure of the relative importance of the WDA for a species/group, as compared to other surveyed areas in the region and in the northwest Atlantic. It does not indicate the absolute number of individuals likely to be exposed. Rather, the exposure score is our attempt to provide regional and population-level context for each taxon... [T]hese scores should be viewed as the relative importance of the WDA for a species/group aggregated across an entire annual cycle.*

However, the COP's Exposure Assessment methodology is not appropriate for listed terns, especially Roseate Terns, because the MDAT model performed poorly for these species and the Veit et al. (2016) surveys did not distinguish between Common and Roseate Terns. Further, the Exposure Assessment produced annual average exposure scores (averaging each seasonal risk) for migratory species, which is likely to artificially lower the "risk" for migratory species because they are not present within a project area for one or multiple seasons each year. The Exposure Assessment did not account for increased sensitivity of listed species, given that the global population size for these species is reduced relative to more common species. This is particularly true for the Roseate Tern, Least Tern, and Piping Plover.

Listed tern species should have been excluded from this assessment methodology for the issues and concerns stated above. A more conservative approach to the data, exposure, and risk assessment is warranted for ESA- and MESA-listed species. In the case of ESA- and MESA-listed species in particular, exposure and risk assessments should consider effects on individuals, (*i.e.* "take") not just the relative importance of a project site for a species/group.

Robinson Willmott et al. (2013) provide an example of a risk assessment methodology that is more appropriate to ESA- and MESA-listed tern species. Robinson Willmott et al. (2013) assessed relative vulnerability of marine birds to offshore wind projects on the Atlantic Outer Continental Shelf (AOCS) through an evaluation of population sensitivity, displacement sensitivity, and collision sensitivity. This assessment incorporated information on ecology, behavior, and population characteristics that would influence vulnerability of populations to wind facilities, including: global population size, proportion of the population in the AOCS, IUCN/USFWS threat rankings, adult survival rates, time spent in the AOCS, nocturnal/diurnal flight behavior, flight height, response to disturbance, avoidance of wind facilities, habitat flexibility, and breeding/feeding in the AOCS. Because of data gaps, uncertainty values were also incorporated into the analysis. The study concluded that:

- Least and Roseate Tern **population sensitivities** were among the highest of any species with Piping Plover, ranked only slightly lower, reflecting their small, threatened populations.
- **Collision sensitivity** was ranked "Higher" for Roseate, Common, and Arctic Terns, reflecting their presence on the AOCS during the breeding season, and "Medium" for Least Tern and Piping Plover, which spends less time on the AOCS.
- **Displacement sensitivity** was ranked "Higher" for Roseate, Common, and Arctic Terns, reflecting only moderate habitat flexibility combined with their presence on the AOCS during the breeding season. Least Tern and Piping Plover were ranked "Lower", reflecting limited presence on the AOCS.

Based on the fact that Common Terns – and very likely, Roseate Terns, Arctic Terns, and Least Terns – seasonally migrate across and feed within the WDA and travel in poor visibility conditions, listed terns are likely to collide with WTGs constructed there. The magnitude of the collisions is uncertain, but it would be expected to increase as the number of wind facilities constructed in the WEA increases. Even small numbers of adult fatalities can compromise population stability, particularly for species with limited population size. The Endangered Roseate Tern, with its limited population size and considerable population volatility over the past 30 years (USFWS and MassWildlife, unpublished data), would be particularly vulnerable in this regard. Therefore, the BA should address the potential for cumulative impacts to ESA- and MESA-listed birds as a result of the Project and, to the extent practicable, consider anticipated future wind development in the WEA.

Marine Mammal Endangered Species and Sea Turtles Impacts and Mitigation
The loss of individual ESA- and MESA-listed marine mammals and sea turtles are appropriately considered in the DEIS to be "irreversible and irretrievable impacts." As a result, the proactive minimization and mitigation measures included in the DEIS to

address any marine mammal impacts are appropriate. This is in large part because projects that might lead to even minor increases in adult mortality can compromise the long-term viability and recovery of a listed species.

The BA for ESA- and MESA-listed marine mammals (p. 15) states that, "[w]hen animals are transitory, the weather is poor, and/or single flights are flown, many whales will be missed (Hain et al. 1999). Because of these factors, the characterization of the occurrence of NARWs [North Atlantic Right Whale] in the proposed Project area from visual survey data alone should be considered conservatively low." The BA acknowledges some of the flaws and limitations associated with visual survey data relative to large marine mammals. These same survey flaws are also applicable to avian surveys, and are particularly important for listed avian species, which are likewise difficult to locate due to their significantly smaller body size, patchy distribution, and altitude of flight. Observation and behavioral information for marine mammals were considered when these observations occurred outside the WDA, and the BA (p. 17) states, "[a]lthough the WDA comprises a relatively small portion of the study area, the behaviors recorded in the larger area are relevant to the Action Area, since these animals are highly mobile." Avian species also display high mobility; therefore, to the extent that observations of marine mammals observed outside of the WDA were utilized in the BA to evaluate potential effects of the Project, the same extrapolation should be applied to avian species. The BA for ESA- and MESA-listed marine mammals and sea turtles addresses pre-existing threats to these species, including climate change. As detailed throughout the BA, climate change may impact marine mammal reproduction (p. 11), food abundance and distribution (p. 13), additional or increased environmental stressors such as algal toxins (p. 15), as well as breeding locations and migration as a result of changing ocean currents, food distribution and water temperature (p. 27). Roseate Tern, Common Tern, Least Tern and Piping Plover are all ranked as "Highly Vulnerable" to the effects of climate change (Massachusetts Audubon Society, 2017). The DEIS references Massachusetts Audubon Society's (2017) species vulnerability ranking and acknowledges that "[c]oastal birds, especially those that nest in coastal marshes and other low-elevation habitats, are additionally vulnerable to sea-level rise and the increasing frequency of strong storms." However, the BA does not incorporate climate change as a pre-existing threat to ESA- and MESA-listed avian species.

Overall, the Roseate Tern and other MESA-listed avian species warrant similar assessment and consideration relative to ESA- and MESA-listed marine mammals and sea turtles, especially given the limitations of the BA/DEIS's risk assessment and the conclusions of Robinson Willmott et al. (2013). Adult mortality for Roseate Tern and other MESA-listed tern species, and the cumulative effects of such mortalities on the long-term viability of these species, should not be considered "negligible" or "minor." Given the probability of listed tern mortality resulting from the Project and the likelihood of future expansions of Vineyard Wind's facility (and other future wind facilities) within the WEA, mitigation is appropriate to ensure that individual losses are offset and populations of the affected bird species benefited.

The DEIS does not evaluate such mitigation measures for mortality to ESA- and MESA-listed terns. The Supplemental DEIS or Final EIS should include the development and integration of suitable, reasonable conservation measures to benefit populations of the affected bird species and

mitigate any unavoidable Project impacts. We respectfully request that the Project proponent consult with the Division in evaluating potential mitigation measures, including but not limited to support for ongoing tern colony monitoring and management and or the restoration and enhancement of critical colony nesting habitats. These actions would provide meaningful and measurable benefits to the Roseate Tern and, because listed terns typically nest in mixed species colonies, would necessarily also benefit other state-listed tern species.

In addition, the DEIS mentions only one *minimization* measure (bird deterrent devices, not described) to reduce bird collisions. There may be additional minimization measures that could reduce bird mortality through increasing turbine visibility. For instance, contrasting paint colors or phosphorescent paint could be used on portions of turbine blades and monopoles, implemented experimentally or as part of an adaptive management framework. Because the WTGs would be far from shore, increased turbine visibility should not result in major visual impacts to humans and may also benefit vessel operators. We therefore recommend that other potential minimization measures be developed and evaluated as part of a Supplemental DEIS or Final EIS. Similarly, the Supplemental DEIS or Final EIS should include and describe a monitoring plan to provide additional information on bird collisions and/or displacement resulting from the Project. A robust monitoring plan is crucial for informing adaptive management efforts and guiding future expansions of Vineyard Wind's facility (and other future wind facilities) within the WEA.

Additionally, the changes in finfish abundance may also impact listed terns, especially the Roseate Tern, a sand lance specialist. It is expected that there will be changes in bottom type over a substantial area of the seafloor as a result of the proposed Project, including changes from sandy bottom to rocky bottom across 35 acres. As the DEIS acknowledges, this is likely to result in a loss of sand lance habitat. Additionally, electromagnetic fields from buried cables are predicted to negatively affect demersal species such as sand lance, a major prey item for all of Massachusetts's nesting tern species. Noise from pile-driving, which will occur during the bird breeding season, is expected to have the largest consequences for small fish, particularly those with swim bladders, such as herring and hake, which form a large portion of the diets of terns in Massachusetts (MassWildlife, unpublished data). Massachusetts' tern populations swell during the post-breeding period (July through September) when Common, Roseate, and Arctic Terns from outside the state arrive to feed on the abundant small fish in the Massachusetts waters while they are readying themselves for migration. Changes in abundance or species composition of prey fish could have consequences on carrying capacity and pre-migratory fitness. This may be particularly true for the Roseate Tern population, all or nearly all of which stage on Cape Cod, Martha's Vineyard, and Nantucket before migration (Jedrey et al. 2010). Therefore, it is recommended that the BA, and Supplemental DEIS or Final EIS, address the loss of forage fish resources on tern populations as a direct effect of the Project on terns.

Commercial Fisheries and For-Hire Recreational Fishing

In general, the DEIS oversimplifies several major challenges associated with developing a wind farm that is compatible with existing fishing activities. It is a stated objective that wind farm development *should maximize compatibility of the offshore wind industry with the recreational and commercial fishing industries* (MA DMF 2018). We recommend expanding the stakeholder process with regards to alignment (NE/SW versus E/W). Vineyard Wind has referred to

consultations with fishermen, but there is no record of this process, and other fishermen have publicly supported the E/W layout. The discussion about transit lanes occurred at the Massachusetts Fisheries Working Group and at a meeting in Rhode Island. This discussion was more transparent, but it did not allow for more comprehensive feedback regarding the various options, and it was clear that some parties (fishermen and wind energy companies) were not in agreement with the consensus decisions made at those meetings. The FEIS should describe how transit lanes were identified and provide a map indicating where they are relative to WTGs.

"Trawl and dredge vessels require a relatively large space between turbines to maneuver their gear, as the gear does not directly follow the vessel, fishermen have commented that a 1-nautical mile spacing between WTGs may not be enough to safely operate. BOEM expects that disruptions to access or unavailability of fish as a result of the Proposed Action during operations and maintenance may be limited to pelagic fisheries and highly migratory species" (DEIS p. 3-184). Considering that the Proposed Action has WTGs spaced less than one mile apart, we recommend that BOEM clarify why it believes that only pelagic fisheries and highly migratory species, which are defined as squid and mackerel fisheries, will be excluded.

We recommend that information pertaining to this topic be provided from offshore wind farms in Europe. We believe the FEIS should include an analysis of the ability of gears to fish within a wind farm and the minimum spacing for WTGs to enable continued access for mobile fishing gear commonly used in the area (otter trawls, scallop dredges, and clam dredges which are described in Fishery Management Plans). This analysis will enable a better comparison of tradeoffs between the Proposed Action, Alternative D (1 mile spacing and/or E/W layout), and examining which turbines can be dropped if the Project goes forward with Alternative E (84 turbines instead of 100).

If operational impacts on access to fishery resources were unmitigated, the impacts would likely be moderate to major. However, implementation of mitigation measures identified in Appendix D might reduce impacts from minor to moderate depending on the level and efficacy of the mitigation provided[1] (DEIS p. 3-184). We agree that a mitigation program will be necessary, but the details of the mitigation structure still need to be determined. Specifically, we are concerned about direct negotiations between the claimant and the lessee.

BOEM states NMFS survey methodology "may need to change" (DEIS p. 3-179) but does not further consider the challenges and potential broader impacts associated with this impact. The NMFS bottom trawl survey provides critical information on the abundance, distribution, biology, and size structure of fish and invertebrate species throughout the Northeast and Mid-Atlantic. This time series of fisheries-independent data is utilized in the stock assessments of commercially and recreationally important species. The survey has been designed and carried

[1] Appendix D has following compensation mechanisms: 1) Implement a financial compensation program for damage to or loss of fishing gear due to collision with proposed Project infrastructure within the WDA and along the export cable corridor. 2) Implement a financial compensation program for documented loss of income due to inability of fishing vessels to access previously fished locations within the WDA and temporary loss of use during cable maintenance. Compensation would be restricted to demonstrated loss of net revenue due to inability to access fishery resources within the WDA. The compensation would be directly negotiated between the claimant and the lessee, and could include direct payments to fishermen and/or funding of fishery directed projects (e.g., research; infrastructure improvements).

out using a stratified random design since the 1960's. Changes should be handled delicately and comprehensively, as alterations could have profound implications for the survey results and may lead to greater uncertainty within stock assessments. We recommend that the FEIS represent the full implication of the loss of trawl survey stations and a shift in its station selection process.

We requested that the DEIS consider whether the potential increase in angler activity in the WDA would require new or additional fishery management measures and potential socioeconomic impacts of those measures. The relevant statement we identified was "that Days-at-Sea allocations 'may need to be revisited'" (DEIS p. 3-179). We recommend the FEIS explain how fisheries management actions can be taken to mitigate impacts to commercial and recreational fishermen and weigh the complexity of making such changes.

Construction areas will be closed via "temporary safety zones," and the COP states "It is anticipated that the majority of the WDA will remain open to non-Project related vessels throughout the construction and installation phase" (COP Vol 3, p7-146). However, the COP states "the majority of the inter-array cable is expected to be installed via jet plowing after the cable has been placed on the seafloor" (COP Vol 1 p. 4-15). The exposed cable on the seafloor will impact fishermen who will be unable to fish the area while the cable is exposed whether or not the area has a "temporary safety zone" or not. Additional information clarifying the potential size and length of closure periods for the various cable laying methods (e.g., simultaneous lay and burial versus laying and then burying the cable) is needed.

Cable laying across Nantucket Sound should avoid the spring season due to high concentrations of fishing activities and natural resource events (spawning and egg laying). Minimization and mitigation measures specific to this season should be identified if cable laying cannot avoid it.

Fisheries Resource Characterization

While the DEIS contains additional information beyond what was previously presented in the COP, we believe additional information is lacking for certain species and in some instances we disagree with the new information provided in the DEIS. The determinations of impacts were based mostly on EFH, HMS, and coastal pelagic species managed by the New England and Mid-Atlantic Councils and by NOAA.

Some Atlantic States Marine Fisheries Commission managed species, such as river herring, shad, and striped bass were not included in the EFH Assessment, which was the basis for determining impacts. Additionally, horseshoe crab, Jonah crab and other invertebrate species were not directly addressed in the EFH Assessment.

River herring (alewife and blueback herring) and American shad overwinter in areas of southern New England, including the WDA (Bethoney et al. 2013). The DEIS considers impacts of the proposed Project on Atlantic herring and mackerel, which would be similar to impacts on river herring during marine migration. However, because blueback herring is currently a Candidate ESA species, the FEIS should specifically consider impacts from the Project on this species. The updated COP continues to depict fish biomass as the sum of the interpolated values in each grid cell. We recommend that section 6.6.1.1 (COP Vol III p 6-124) be updated to represent fish biomass in terms of the average weight per tow, which would help to normalize the figures in

order to account for potential differences in trawl survey intensity amongst grid cells. We believe that using the sum of the interpolated fish biomass in each grid cell is not an appropriate way to assess fish abundance in the WDA and the adjacent habitats. The trawl survey coverage (i.e., number of tows) is unlikely to be equivalent across all grid cells in the WDA and adjacent areas. We are concerned that the soft-start procedure, the only recommended mitigation for pile driving, may be insufficient to minimize harm to schooling fish or other fish sensitive to sound impacts. Fish kills should be monitored and a response plan in the event of a fish kill event should be prepared.

Invertebrates

The importance and presence of the Southern New England (SNE) lobster resource is under-represented in the WDA in the DEIS. A short summary was provided (DEIS p. 3-72), but no landings statistics are presented. The DEIS describes its decline, rather than noting its existing value. The lobster stock assessment (ASMFC 2015) indicates that 'offshore' SNE stock landings are now more important to the SNE area (partly illustrated in Fig 3.2.3.1.). This increased fleet dependence on the WEA region warrants further analysis of economic impacts. Lobster fishing activities are spatially constrained—individual fishers' access is restricted by permitting rules as well as the territorial nature of pot gear fisheries—so estimates of lost revenue should be specific to the management area to which they are restricted (i.e., Area 2) and should not assume that relocation to new areas will be feasible. We recommend the FEIS include a better estimate of lost revenue that is specific to impacts to the Massachusetts and Rhode Island-based SNE fleet (inclusive of lobsters and Jonah crabs) and not be based solely on VTR data.

We disagree with the DEIS's characterization of the importance of the project area to horseshoe crab fisheries. The DEIS states that "most of the catch comes from Cape Cod Bay" and "some minor fishing occurs in Nantucket Sound" (DEIS p. 3-174). Our data shows that more than 80% of landings come from Nantucket Sound with less than 10% derived from Cape Cod Bay (MA DMF 2016).

The DEIS identifies hard bottom as a preferred habitat for Jonah crab and lobster and notes only "small amounts of hard-bottom habitat exist in the WDA and OECC" (DEIS p. 3-72). While hard-bottom may represent a preferred habitat type where it is available, lobsters regularly traverse and feed over soft bottom and can use sand and mud-depressions as shelter. Additionally, a recent study near the lease area (Collie and King 2016) reported high lobster catches in all surveyed bottom types. Jonah crabs actually prefer soft substrates. As noted in the DEIS, SRA 537 contains little hard bottom (1.4%), but accounts for approximately 70% of national Jonah crab landings.

We are concerned that the assessment of impact discounts potential sensitivities that slow moving invertebrates may have to sedimentation. In the Sediment Deposition section, Jonah crabs are described as mobile species that "would likely avoid or abandon deposition areas" (DEIS p. 3-76). We do not concur with this assessment. Jonah crabs often bury rather than disperse in response to threats and are slow moving with recent MA DMF tagging studies showing median dispersal of only 70 meters per day for adult males (MA DMF Unpubl. Data). Horseshoe crabs are also relatively slow and could have a similar level of impact from deposition. Whelk are also likely to be impacted by cable laying activities as "significant"

numbers of knobbed whelk as well as whelk egg cases were identified in video surveys along the cable route (COP Vol 2 p. 5-9). Impacts to whelk remain of particular concern given their commercial importance, prevalence along sections of the cable route area, and challenges in developing avoidance or impact minimization strategies as life stages are sensitive to burial during all months. We recommend that the FEIS provide an improved characterization of the spatial and temporal distribution of these species to provide a better understanding of their potential vulnerabilities.

Reef Effect

The DEIS is lacking information assessing impacts associated with shifts in distribution of species that prefer hard benthic structures. This assessment should consider potential economic (e.g., changes to fishing activities or management plans) as well as biological (changes in species distribution) impacts. While the addition of hard structure may have positive impacts to structure-seeking species, potential negative impacts may also occur to species that prefer soft sediments. A particular concern that is not addressed in the COP or the DEIS is the potential for black sea bass to spend more time offshore in the WDA, which would affect the nearshore population. We recommend that the FEIS identify species that could be vulnerable to this change and pre- and post- construction monitoring should be developed to measure this potential impact.

Hydrodynamic Modeling

To address potential impacts of WTGs a study by Chen (2016) is cited *"WTGs in the region would not have a significant influence on southward larval transport, although foundation placement could cause relatively large cross-shelf larval dispersion during storm events."* This issue requires further analysis as any impacts to transport of zooplankton or larvae could have wide scale impacts on a broad array of marine species including marine mammals (alteration of foraging habitat) as well as shellfish, crustaceans, and finfish with planktonic larvae. We recommend potential impacts be assessed across different WTG array alternatives, different foundation types, and different levels of buildout.

Electromagnetic Field (EMF) Impacts

We recommend providing further details in the FEIS concerning potential electromagnetic field (EMF) impacts on marine fauna, particularly regarding demersal species. Cable shielding and burial are the primary means of minimizing such impacts (COP Vol 3 Ch. 6). Therefore, an explanation of how the proposed burial depth adequately minimizes risk to EMF-sensitive species is needed.

The COP states that Cable Inspection/Repair is planned for eight surveys over the Project's lifespan (Years 1,2,3,6,9,12,15, and 20) (COP Vol 1, page 4-47). We recommend including in the cable conduits continuous monitoring mechanisms that can verify cable burial (such as temperature monitoring). If continuous monitoring cannot be done, then geophysical surveys should occur more frequently and always after major storm events such as hurricanes and nor'easters.

The DEIS includes new information from a recent review of EMF impacts (Taormina et al. 2018), but this review notes the shortage of information on impacts to many marine species, particularly invertebrates and pelagic species. There is additional information in the literature

and in the response to MA DMF comments for the Massachusetts FEIR that supports the statements in the DEIS. We recommend a more cohesive assessment of the effectiveness of EMF shielding via burial, the potential impacts on benthic species, and a commitment to highly resolved burial monitoring for the FEIS. Furthermore, a study to confirm assumptions made in the FEIS EMF impact assessment is recommended as part of the pre- and post- fisheries resource monitoring plan that Vineyard Wind has committed to.

Light Impacts
The FEIS should address potential impacts of light on finfish, invertebrates (especially squid), and EFH as recommended in MA DMF's previous comment letter on the scoping of the EIS.

Additional Comments on Methodology
Benthic Habitat Monitoring Plan (COP Vol 3 App 3). The BACI approach seems appropriate but needs additional detail and samples taken along a gradient of distance from the impact site would be very useful to answer the question "What is the distance of detectable habitat changes?" (MA DMF 2018). The benthic stations where infauna are being sampled should also be sampled for grain size. SPI images should be taken pre- and post-construction. We recommend that the entire cable pathway be re-imaged with multibeam post-construction and that data should then be incorporated in a post-construction impact analysis. Similarly, studies focused on scour can be combined with benthic habitat assessments. Video surveys should use high resolution video and be georeferenced. The timeline of sampling, including the season, should be clarified. The specific impact/recovery assessment metrics included are abundance and community composition of infauna, presence/absence of lobster and crabs, shellfish, evidence of burrowing activity, and changes in surface features. The benthic monitoring plan needs additional detail with respect to how change will actually be measured and may need additional sampling stations for a quantitative assessment. The plan should state the hypotheses being tested. The plan identifies reports as the primary product; we recommend all data be made available in regional database management systems.

Environmental Management System – this is referred to in the COP (Vol 1, page 4-1) but the EMS is not provided. We request clarity on whether or not it will be used. Our primary concern is that contractors do not damage vulnerable seafloor areas that are being avoided by cable routing. Damage to these areas could occur via anchoring, grounding, prop wash, etc. The identification of these areas and ensuring contractors are avoiding these areas is important. We also want to ensure that the maximum efforts are taken to reduce the risk of at sea disposal of contaminants including grouts, HDD fluids, plastics, and oils.

Monitoring of weather and sea (COP Vol 1, p. 4-44). We recommend that sea monitoring include ongoing monitoring of the soundscape by placing hydrophones on multiple WTGs to enable the identification of marine mammal activities to reduce risk of vessel strike. Appendix D identifies that passive acoustic monitoring will be used; we recommend integrating this into the Monitoring and Control section of the COP.

The COP states that "Seabed preparation may be required prior to foundation installation. This could include the removal of large obstructions at the seabed, or to avoid excessive seabed gradients." (Vol 1, page 4-17) It is our understanding that the WTGs will be located to avoid

large obstructions and avoid excessive gradients. If "seabed preparation" due to unforeseen conditions is needed, BOEM should be notified prior to that work.

In cases where monopile drilling is needed, "The interior sediment will then be drilled out and deposited on the seabed adjacent to the scour protection material until the monopile is no longer obstructed." (COP Vol 1, p 4-18). Does this material get left on the seafloor? Is that area included in the 10% estimate for scour protection?

Scour protection. According to the COP, the scour protection will be one to two meters high (3-6 ft), with stone or rock sizes of approximately 10-30 centimeters (4-12 inches) (COP Vol 1, page 3-12 and Figure 3.1-9). We recommend that the scour protection be sloped to its outer edge so there is no edge with the surrounding seafloor. Stone with a variety of sizes between the stated sizes are recommended. Additional variety in grain size and porosity is beneficial for marine organisms. The method for placing scour protection has not been identified. The method should be accurate in its placement of material to minimize the extent to which the seafloor disturbed.

Table 5-1. Required permits. Needs to include MA DMF Letter of Authorization (LOA) for the pre-lay grapnel run. (COP Vol page 5-2)

Water Quality

The MassDEP 401 (Water Quality Certification) (WQC) Program supports the proposal of Vineyard Wind LLC to use proven installation techniques to deepen the export cable and avoid hard and complex seafloor to the maximum extent possible in order to avoid or minimize impacts to natural resources and marine habitats. MassDEP discourages cable protection using rock placement, concrete mattresses, or other protective methods due to their detrimental impacts to biological resources and marine habitat.

Dredging

Pursuant to 314 CMR 9.07(2)(b)(5), for projects displacing over 10,000 cubic yards of dredged material, the Proponent shall develop a project-specific sampling and analysis plan and this plan shall be submitted in draft form to MassDEP for review and comment as part of the pre-application process. The DEIS states that the submarine cable will be installed using either jetting by jet-plow or mechanical trenching to minimize the area of dredging and direct seafloor impact. For the installation of the two cables, total dredging could impact up to 69 acres (279,400 m^2) and could include up to 214,500 cubic yards (164,000 cubic meters) of dredged material. For the cable installation within state waters, volumes of sand wave dredging and appurtenant volumes of sediment fluidized in-trench will vary, depending on which route and dredging methods are selected. The final proposed dredging method and total dredge volume should be provided as part of the MassDEP 401 WQC/Chapter 91 Dredging Permit applications. Due to the scale of the dredging operation, sediment plumes are expected. It is essential that the Proponent monitor the turbidity (and total suspended solids, if appropriate) within both the construction/dredging corridor and the immediate area beyond the work corridor. Impacts from turbidity and sedimentation to biological resources and their habitats are anticipated. Dredging of sand waves will directly impact organisms within and adjacent to the dredge footprint. Although sediment dispersion and turbidity impacts to water quality during installation and cable-laying may be minor due to limited duration and small work area, it is recommended that the Proponent

adopt Best Practice Management to reduce turbidity as much as possible during construction. After the final installation route is identified, the following actions should be taken by the Proponent: collection of pre-installation data such as grain size composition, substrate type, and bathymetric map along the installation route; monitoring of the sediment plume and water turbidity during cable installation; and documentation of changes in sediment composition and bathymetry mapping. Long-term monitoring will be required to document any changes to the sediment profile in order to assess habitat recovery.

Dredging of the top portion of sand waves may be necessary to allow the cable installation tool to reach the stable sediment layer under the base of the mobile sand unit/habitat. Any associated impact to the habitat is assumed to be minimal and short in duration because the disturbed bedform will evolve back to its original morphology as a result of prevailing tidal forces and associated sand migration. The Proponent should provide an estimated time period expected for the natural restoration of the ocean bottom morphology based on the best available information or experience.

Horizontal Directional Drilling (HDD)

The Project plans to install two approximately 1,000-foot-long conduits via horizontal directional drilling (HDD) to bring the two offshore export cables onshore. The preferred transition site from offshore to onshore is the paved parking lot at Covell's Beach. The use of HDD to transition the submarine cables from offshore to onshore can minimize impacts to marine habitats and natural resources within intertidal areas. The HDD design at Covell's beach is proposed to angle eastward from the beach to avoid impacts on eel grass, hard bottom, and complex habitats. The Covell's Beach route in Barnstable appears to be the preferable landfall for cable routing option because it will allow the project to avoid impacts to rare species habitat, coastal dunes, beach, near shore area, eelgrass, and tidal zone.

Cable Installation

The offshore cables will be buried using a jet plow, mechanical plow, and/or mechanical trenching, as suited for the bottom type in the immediate area. Dredging may be necessary in some areas, especially where large sand waves occur. The 401 WQC/Chapter 91 permit application should provide more detailed information on why and how cable installation tools can further minimize dredging and the impact to benthic organisms.

Long-Term Natural Resource Monitoring

Vineyard Wind LLC has committed to performing post-construction monitoring to examine the disturbance of and recovery of coastal and benthic habitats in the Proposed Action area. As stated in the DEIS, impacts and recovery times will vary dependent upon habitat types. These habitat types can generally be separated into the high-energy oceanic environment versus the low-energy estuarine environment. However, more detailed information such as monitoring frequency on recolonization and succession of benthic communities among different habitats is not clearly described in the long-term monitoring plan. We recommend a more detailed sampling and analysis plan (SAP) be developed and included in the 401 WQC application. A monitoring plan should also be provided to assess the impacts following the removal or decommission of all installations.

Long-term Invasive Species Monitoring

The DEIS states that the project may have possible long-term beneficial effects on biological communities. Although possible, these newly created habitats may also facilitate the establishment and spread of invasive species. Invasive species are considered to be one of the greatest threats to biodiversity resulting in severe ecological and economic damage. In coastal New England, invasive tunicates have become an emerging issue (Colarusso 2018) [2]. New artificial structures will create hard substrate for invasive species colonization with the potential for impacts to commercial and recreational fishing operations. Warming ocean and coastal waters and species range expansions influenced by climate change will further compound these issues (Eberhardt et al. 2015)[3].

Therefore, a systematic monitoring plan for potential marine invasive species colonization should be developed prior to commencement of the project. Corresponding appropriate management actions should also be adopted to control colonization of invasive species in these artificial habitats if necessary.

Baseline Data need to be provided

Because an SAP requires approval from MassDEP per 314 CMR 9.07(2)(5), it is recommended that all pre-construction data (baseline data) be submitted, or collected as needed and submitted, to MassDEP before filing a 401 WQC application. This information is required in the 401 WQC permitting process to ensure the project meets the state water quality standards to avoid, minimize, and mitigate impacts to biological communities and their habitats. Both raw data and secondary data are welcome. These data include but are not limited to the 2018 Marine Habitat Survey, Eelgrass, Benthic Community, Fisheries. Electronic data format such as Access or Excel is preferred and will be helpful in facilitating the 401 WQC review process. We encourage the Proponent to discuss appropriate data collection and analysis methodologies with MassDEP during the development of any data collection plan.

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2 Colarusso, P. 2018. Impacts of Invasive Tunicates on Eelgrass. Northeast Panel on Aquatic Nuisance Species Fall Meeting. Portsmouth NH. December 3 to 4, 2018

3 Eberhardt, A., J. Pederson and B. Bisson. 2015. Rapid Response Plan for Management and Control of the Chinese Mitten Crab - Northeast United States and Atlantic Canada. New Hampshire, MIT and Maine Sea Grant Programs.

References and Literature Cited:

ASMFC (2015) Atlantic States Marine Fisheries Commission American Lobster Benchmark Stock Assessment and Peer Review Report. 493 pp.

Bethoney ND, Schondelmeier BP, Stokesbury KDE, Hoffman WS (2013) Developing a fine scale system to address river herring (*Alosa pseudoharengus, A. aestivalis*) and American shad (*A. sapidissima*) bycatch in the U.S. Northwest Atlantic mid-water trawl fishery. Fish Res 141:79–87

Collie JS, King JW (2016) Spatial and temporal distributions of lobsters and crabs in the Rhode Island Massachusetts Wind Energy Area. US Dept. of the Interior, Bureau of Ocean Energy Management, Atlantic OCS Region, Sterling, VA. OCS Study BOEM 2016-073. 48 pp.

Curtice, C., J. Cleary, E. Shumchenia and P. Halpin. 2018. Marine-Life Data and Analysis Team (MDAT) Technical Report on the Methods and Development of Marine-Life Data to Support Regional Ocean Planning and Management. Prepared on behalf of the Marine-life Data and Analysis Team (MDAT). Retrieved from: http://seamap.env.duke.edu/models/MDAT/MDAT-Technical-Report.pdf.

Everaert, J. and E.W.M. Stienen. 2006. Impact of wind turbines on birds in Zeebrugge (Belgium): Significant effect on breeding tern colony due to collisions. Biodiversity and Conservation. DOI 10.1007/s10531-006-9082-1.

Jedrey, E.L., R.J. Harris, and E.A. Ray. 2010. Roseate Terns—Citizens of the World: The Canada to Cape Cod Connection. Bird Observer 38(3):146-150.

MA DMF (2018) Recommended regional scale studies related to fisheries in the Massachusetts and Rhode Island-Massachusetts offshore Wind Energy Areas. Report to the Massachusetts Fisheries Working Group. 57 pp.

MA DMF (2016) 2016 Massachusetts commercial horseshoe crab percentage of landings by embayment. Massachusetts trip level reports and federal vessel trip reports, MA DMF

Mass Audubon. 2017. State of the Birds. Massachusetts Birds and Our Changing Climate. Report No. 3. Retrieved from: https://www.massaudubon.org/content/download/21633/304821/file/massaudubon_state-of-the-birds2017-report.pdf.

Robinson Willmott, J., G. Forcey and A. Kent. 2013.The Relative Vulnerability of Migratory Bird Species to Offshore Wind Energy Projects on the Atlantic Outer Continental Shelf. An Assessment Method and Database. Prepared under BOEM Contract. Retrieved from: https://www.boem.gov/ESPIS/5/5319.pdf.

Taormina B, Bald J, Want A, et al (2018) A review of potential impacts of submarine power cables on the marine environment: knowledge gaps, 2 recommendations and future directions. Renew Sustain Energy Rev 96:380–391

Veit, Richard R., Timothy P. Wihte, Simon A. Perkins, and Shannon Curley. 2016. Abundance and Distribution of Seabirds off Southeastern Massachusetts, 2001-2015: Final Report U.S. Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2016-067. Retrieved from: https://www.boem.gov/RI-MA-Seabirds/

Vlietstra, L. 2008. Common and Roseate Tern Exposure to the Massachusetts Maritime Academy Wind Turbine: 2006 and 2007. Massachusetts Maritime Academy, Buzzards Bay, MA. Report to Massachusetts Division of Fisheries & Wildlife.