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April 30, 2018

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

Re: Notice of Intent to Prepare an Environmental Impact Statement for Vineyard Wind, LLC's Proposed Wind Energy Facility Offshore Massachusetts

Dear Vineyard Wind COP EIS Program Manager:

On behalf of the Natural Resources Defense Council, the National Wildlife Federation, the Conservation Law Foundation, Mass Audubon, Surfrider Foundation, Sierra Club, IFAW – International Fund for Animal Welfare, Defenders of Wildlife, and our millions of members, we submit these scoping comments to inform the preparation by the Bureau of Ocean Energy Management ("BOEM") of an Environmental Impact Statement ("EIS" or "Draft EIS") for the Construction and Operations Plan ("COP") of Vineyard Wind, LLC's proposed wind energy facility offshore Massachusetts. *See* 83 Fed. Reg. 13,777 (Mar. 30, 2018).

This is an exciting moment for offshore wind along the U.S. East Coast. Our nation's heavy reliance on fossil fuels has come at a great cost, exacerbating climate change, polluting air and water resources, and significantly impacting public health and wildlife, among other impacts. To ensure a safe, secure, and sustainable energy future, we must begin the transition to a clean energy economy. Responsibly developing offshore wind resources is a necessary and positive step in that direction. To ensure that America builds a clean energy future while safeguarding ocean wildlife and habitat, offshore wind energy can and must develop in an environmentally responsible manner. A responsible approach uses precautionary, science-based measures to avoid, reduce, and mitigate impacts on the most vulnerable coastal and marine species throughout the development process. In addition, a responsible approach engages stakeholders and commits to supporting peer-reviewed science aimed at addressing key questions on the impacts of development activities and the most effective ways to manage those impacts.

Our organizations have long supported BOEM's efforts to designate and lease the Massachusetts Wind Energy Area,[1] with appropriate mitigation measures in place, and we welcome BOEM's actions to

[1] *See, e.g.,* comment letters from the Conservation Law Foundation, Natural Resources Defense Council, and the National Wildlife Federation to the Bureau of Ocean Energy Management regarding: Atlantic Lease Sale 4 (ATLW4) Commercial Leasing for Wind Power on the Outer Continental Shelf Offshore Massachusetts – Proposed Sale Notice [Docket No: BOEM-2014-0034; MMAA104000] (Aug. 18, 2014); Environmental Assessment for Potential Commercial Wind Lease Issuance and Site Assessment Activities for on the Outer Continental Shelf Offshore Massachusetts [Docket No: BOEM-2012-0086] (Dec.

advance the nation's first EIS for a COP of an offshore wind energy facility in a federal Wind Energy Area. We submit the following comments to guide BOEM in meeting its obligations under the National Environmental Policy Act ("NEPA"). The comments below address: *first*, recommendations regarding BOEM's analysis of impacts, including cumulative impacts, and highlight potential opportunities for mitigation and monitoring; *second*, pertinent considerations regarding the design envelope approach in the context of alternatives; and *third*, specific mitigation measures essential for the protection of the highly endangered North Atlantic right whale during the construction and operations phase of development. Following these general comments, we provide our initial recommendations on the Vineyard Wind, LLC, Construction and Operations Plan for Lease OCS-A 0501.

I. The National Environmental Policy Act

NEPA requires "efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man" 42 U.S.C. § 4321 and mandates that "to the fullest extent possible" the "policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with [NEPA]." 42 U.S.C. § 4332. As the Supreme Court explained,

> NEPA's instruction that all federal agencies comply with the impact statement requirement – and with all the requirements of § 102 – "to the fullest extent possible" [cit. omit.] is neither accidental nor hyperbolic. Rather the phrase is a deliberate command that the duty NEPA imposes upon the agencies to consider environmental factors not be shunted aside in the bureaucratic shuffle. *Flint Ridge Development Co. v. Scenic Rivers Ass'n*, 426 U.S. 776, 787 (1976).

Central to NEPA is its requirement that, before any federal action that "may significantly degrade some human environmental factor" can be undertaken, agencies must prepare an environmental impact statement. *Steamboaters v. F.E.R.C.*, 759 F.2d 1382, 1392 (9th Cir. 1985) (emphasis in original). The fundamental purpose of an EIS is to force the decision-maker to take a "hard look" at a particular action – at the agency's need for it, at the environmental consequences it will have, and at more environmentally benign alternatives that may be substituted for it – before the decision to proceed is made. *See* 40 C.F.R. §§ 1500.1(b), 1502.1; *Baltimore Gas & Electric v. NRDC*, 462 U.S. 87, 97 (1983). This "hard look" requires agencies to obtain high-quality information and accurate scientific analysis. *See* 40 C.F.R. § 1500.1(b). "General statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." *Klamath-Siskiyou Wilderness Center v. Bureau of Land management*, 387 F.3d 989,994 (9th Cir. 2004) (quoting *Neighbors of Cuddy Mountain v. United States Forest Service*, 137 F.3d 1372, 1380 (9th Cir. 1998)). The law is clear that the EIS must be a pre-decisional, objective, rigorous, and neutral document.

3, 2012); Call for Information and Nomination for Commercial Leasing for Wind Power on the Outer Continental Shelf Offshore Massachusetts [Docket No: BOEM-2011-0097] and Notice of Intent to Prepare an Environmental Assessment for Commercial Wind Leasing and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Massachusetts [Docket No: BOEM-2011-0116] (Mar. 22, 2012); Request for Interest – Commercial Wind Leasing for Wind Power on the Outer Continental Shelf Offshore Massachusetts [Docket No: BOEM-2010-0063] (Apr. 18, 2011).

To comply with NEPA, an EIS must *inter alia* include a "full and fair discussion" of direct and indirect environmental impacts (40 C.F.R. § 1502.1), including positive as well as negative impacts, consider the cumulative effects of reasonably foreseeable activities in combination with the proposed action (*id.* § 1508.7), analyze all reasonable alternatives that would avoid or minimize the action's adverse impacts (*id.* § 1502.1), address measures to mitigate those adverse effects (*id.* § 1502.14(f)), and assess possible conflicts with other federal, regional, state, and local authorities (*id.* § 1502.16(c)).

As such, we hope to see development of a Draft EIS that fully identifies the potential impacts described in Section II, as well as the efficacy of possible mitigation measures, and specifies future monitoring efforts that could advance our understanding of species' interactions with offshore wind facilities and their onshore connections. The Draft EIS should ensure that it fully addresses all species found in critical wildlife protection laws, including, but not limited to, the Migratory Bird Treaty Act, Marine Mammal Protection Act, and Endangered Species Act.

II. Impacts Analysis and Cumulative Impacts Assessment

Fundamental to satisfying NEPA's requirement of fair and objective review, agencies must ensure the "professional integrity, including scientific integrity," of the discussions and analyses that appear in environmental impact statements. 40 C.F.R. § 1502.24. To this end, they must make every attempt to obtain and disclose data necessary to their analysis. The simple assertion that "no information exists" will not suffice; unless the costs of obtaining the information are exorbitant, NEPA requires that it be obtained. *See* 40 C.F.R. § 1502.22(a). Agencies are further required to identify their methodologies, indicate when necessary information is incomplete or unavailable, acknowledge scientific disagreement and data gaps, and evaluate indeterminate adverse impacts based upon approaches or methods "generally accepted in the scientific community." 40 C.F.R. §§ 1502.22(2), (4), 1502.24. Such requirements become acutely important in cases where, as here, so much about an activity's impacts depend on newly emerging science. Finally, NEPA does not "permit agencies to falsify data or to ignore available information that undermines their environmental impact conclusions." *Hoosier Environmental Council v. U.S. Department of Transportation*, 2007 WL 4302642 *13 (S.D. Ind. Dec. 10, 2007). Thus, BOEM's review must be thorough and they may not "sweep[] negative evidence under the rug." *National Audubon Society v. Department of the Navy*, 422 F.3d 174, 194 (4th Cir. 2005).

A. Impacts to species and habitats

Various stressors associated with offshore wind construction, operations, and cable-laying activities have the potential to directly, indirectly, and cumulatively impact marine species and habitats in the offshore, coastal zone, and nearshore environment. The likelihood and significance of potential impacts will vary based on the siting, design and construction, and operation plans of specific projects. As noted above, NEPA requires the examination of mitigation measures for identified environmental impacts. Based on the experience with European offshore wind, there may be mitigation measures for the stressors discussed below that should be thoroughly identified and discussed in the draft EIS.

(1) *Avian species*

In general, there are three main categories of potential threats posed by offshore wind farms to birds:[2] (i) direct risk of collision, which often prove fatal to birds; (ii) displacement from foraging grounds; and (iii) avoidance of wind farms, which can impact bird migration patterns and result in increased energy expenditure, with serious consequences. Attraction to the lights emitted by the wind project may also increase collision-risk, and boat traffic during construction and maintenance can increase stress and result in habitat exclusion. Strategies to minimize impacts to birds include avoiding siting turbines in important avian habitats where significant presence and abundance of species has been documented by the best available science (including nearshore areas, shoals, mouths of inlets, rocky/boulder reefs, and other areas important to various life stages of sensitive coastal and marine species) and alternative lighting designs that take birds into account.

It is important for BOEM to consider the full range of potential impacts on all bird species known to forage and rest in or near the lease area, including those species protected under the Migratory Bird Treaty Act and the Endangered Species Act, and, as such, BOEM should collect and evaluate data on bird species' vulnerability before, during, and after wind turbine construction in order to inform decision-making, improve mitigation, and advise future offshore wind efforts. We are aware that the Department of the Interior ("DOI") and the U.S. Fish and Wildlife Service ("FWS") are now relying on a new interpretation of the Migratory Bird Treaty Act that limits the scope of the Act to the purposeful take of birds.[3] Our organizations strongly oppose this interpretation as contrary to the plain language and intent of the law, and we urge BOEM to continue to implement its Migratory Bird Treaty Act responsibilities as all previous administrations have done in the past, with explicit recognition that incidental take is prohibited. This would also be consistent with the memorandum of understanding that BOEM signed with FWS in 2009 to protect migratory bird populations.[4] If DOI's new interpretation changes BOEM's analysis and associated requirements for impacts to migratory birds in any way, a detailed description and explanation of such changes must be included in the EIS.

(2) *Marine mammals*

There are a number of potential impacts on marine mammals from offshore wind development. These include: (i) potential injury and behavioral impacts, including short- and long-term displacement, from pre-construction and construction noise and other activities; (ii) heightened collision risk from construction and service vessels; and (iii) long-term alteration of the prey base at the wind energy site. As we highlight in Section III.B., given the highly endangered status of the North Atlantic right whale, protection of this species should be BOEM's top priority; however, it is important for BOEM to consider the full range of potential impacts on all marine mammal species known to utilize the lease areas, and

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[2] Drewitt, A. and Langston, R., "Assessing the impacts of wind farms on birds," *Ibis*, vol. 148(s1), pp. 29-42 (2006); Furness, R., Wade, H., and Masden, E., "Assessing vulnerability of marine bird populations to offshore wind farms," *Journal of Environmental Management*, vol. 119, pp. 56-66 (2013).

[3] U.S. Department of the Interior, "The Migratory Bird Treaty Act Does Not Prohibit Incidental Take," Memorandum M- 37050 (Dec. 22, 2017). Available at: https://www.doi.gov/sites/doi.gov/files/uploads/m-37050.pdf.

[4] Memorandum of Understanding Between the Department of the Interior U.S. Minerals Management Service and the Department of the Interior U.S. Fish and Wildlife Service Regarding Implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds" (Jun. 4, 2009). Available at: https://www.boem.gov/Renewable-Energy-Program/MMS-FWS_MBTA_MOU_6-4-09-pdf.aspx.

surrounding areas, as required under the auspices of the Marine Mammal Protection Act and the Endangered Species Act.

(3) *Migratory bats*

Research and monitoring studies identify two potentially serious possible impacts on migratory bats from operational offshore wind turbines: (i) fatalities of migratory species from direct strikes and/ or barotrauma from the negative pressure associated with operating wind turbines; and (ii) cumulative impacts on populations of migratory tree-roosting species that are resident onshore or migrate offshore along the eastern United States.[5] Throughout the development process, BOEM should carry out the necessary research and monitoring to address uncertainties regarding the potential interactions of bats and offshore wind development and should thoroughly examine mitigation options. It is important to note, however, that given the challenges of conducting fatalities assessments at offshore sites,[6] many dead or injured bats would most likely go unrecorded, either falling into the water or becoming prey to marine scavengers or predators. BOEM's assessment of the impacts to bats should, therefore, be conservative, and employ the best available scientific methods, such as autodetection and thermal imaging technology.

(4) *Sea turtles*

Sea turtles are expected to be vulnerable during both the construction and operation periods of offshore wind development. Sea turtles may experience: (i) behavioral changes and displacement from noise[7] and other disturbances produced by construction vessels, geophysical surveys, foundation installation, cable laying, and operational wind energy projects; (ii) increased risk of collision with construction and service vessels;[8] (iii) attraction to bright lighting during construction and cable laying;[9] (iv) orientation and navigational issues during migration due to electromagnetic fields emitted by cables;[10] and (v) long-term alteration of the prey base at the wind energy site. Significant data gaps exist regarding how sea turtles

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[5] Kunz, T.H., Arnett, E.B., Erickson, W.P., Johnson, G.D., Larkin, R.P., Strickland, M.D., Thresher, R.W., and Tuttle, M.D., "Ecological impacts of wind energy development on bats: Questions, hypotheses, and research needs," *Frontiers in Ecology and the Environment*, vol. 5, pp.315-324 (2007); Arnett, E.A., Brown, W.K., Erickson, W.P., Feidler, J.K., Hamilton, B.L., Henry, T.H., Jain, A., Johnson, G.D., Kerns, J., Koford, R.R., Nicholson, C.P., O'Connell, O.J., Piorkowski, M.D., and Tankersly, Jr., R.D., "Patterns of bat fatalities at wind energy facilities in North America," *Journal of Wildlife Management*, vol. 72, pp. 61-78 (2008).

[6] *Id.*; Kunz, T.H., Arnett, E.B., Cooper, B.M., Erickson, W.P., Larkin, R.P., Mabee, T., Morrison, M.L., Strickland, M.D., and Szewczak, J.D., "Assessing impacts of wind energy development on nocturnally active birds and bats: a guidance document," *Journal of Wildlife Management*, vol. 71, pp. 2449-2486 (2007); Rydell, J., Bach, L., Dubourg-Savage, M., Green, M., Rodrigues, L., and Hedenstrom, A., "Bat mortality at wind turbines in northwestern Europe," *Acta Chiropterologica*, vol. 12, pp. 261–274 (2009).

[7] Piniak, D., Eckert, S., Harms, C., and Stringer, E., "Underwater hearing sensitivity of the leatherback sea turtle: assessing the potential effect of anthropogenic noise," Herndon: BOEM (2012); Piniak, W., Mann, D.A., Harms, C.A., Jones, T.T., and Eckert, S.A., "Hearing in the Juvenile Green Sea Turtle (Chelonia mydas): A Comparison of Underwater and Aerial Hearing Using Auditory Evoked Potentials," *PLoS ONE*, vol. 11, no. 10, art. e0159711 (2016).

[8] Bailey, H., Brookes, K.L., and Thompson, P.M., "Assessing environmental impacts of offshore wind farms: lessons learned and recommendations for the future," *Aquatic Biosystems,* vol. 10, art. 8 (2014).

[9] Michel, J., Dunagen, H., Boring, C., Healy, E., Evans, W., Dean, J.M., McGillis, A., and Hain, J., "Worldwide synthesis and analysis of existing information regarding environmental effects of alternative energy uses on the outer continental shelf," U.S Department of the Interior, Minerals Management Service, Herdon, VA, MMS OCS Report 2007-038, pp. 254 (2007).

[10] Copping, A., Sather, N., Hanna, L., Whiting, J., Zydlewski, G., Staines, G., Gill, A., Hutchinson, I., O'Hagan, A., Simas, T., Bald, J., Sparling, C., Wood, J., and Masden E., "Annex IV 2016 State of the science report: environmental effects of marine renewable energy development around the world," pp. 224 (2016).

will respond to wind energy development and we urge BOEM to undertake careful consideration of these potential impacts and carry out research and monitoring required to better understand potential impacts, and effective mitigation measures, for sea turtles off the U.S. East Coast.

(5) *Fish*

The potential impacts to fish from offshore wind development are generally understood to fall into the following categories: (i) interactions with electromagnetic fields emitted from cables;[11] (ii) temporary or permanent loss of habitat from construction activities and the operational wind farm (*e.g.*, from acoustic masking due to continuous noise emitted by operational turbines and increased vessel traffic);[12] (iii) localized injury or mortality due to barotrauma from pile driving;[13] and (iv) increased use of the habitat as a result of turbines potentially acting as artificial reefs, thereby increasing benthic prey resource and acting as an aggregating device.[14] BOEM should carefully evaluate the potential impacts of offshore wind development to fish populations and their habitat as part of the Draft EIS, as well as work with commercial and recreational fishermen to identify optimal siting.

(6) *Benthic habitat*

Introducing hard bottom structures onto the seabed can result in:[15] (i) mortality of individuals immediately underneath the towers by compaction or burial (the footprint of such an effect would be relatively small); (ii) increased habitat heterogeneity, which may alter the composition of the benthos and potentially result in broader ecosystem-level effects; (iii) for mobile species, short- or possibly long-term habitat displacement due to construction and operations, including due to hydrodynamic changes caused by the presence of turbines in the water column; (iv) potential injury from construction noise and vibration; (v) heightened physiological stress with potential long-term fitness consequences (*e.g.*, due to continuous noise exposure from the operational wind farm, or heat emitted from subsea cables); and (vi) changes in orientation or foraging ability due to electromagnetic fields emitted by subsea cables. BOEM should carefully evaluate the potential impacts of offshore wind development on benthic species and their habitat, and site turbines with an eye toward maximum conservation of benthic species.

B. Cumulative Impacts

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[11] Hutchinson, Z., Sigray, P., He, H., Gill, A., King, J., and Gibson, C., "Electromagnetic field (EMF) impacts on elasmobranch (shark, rays, and skates), and American lobster movement and migration from direct current cables," Report by the University of Rhode Island, Cranfield University, and FOI (Swedish Defense Research Agency), pp. 254 (2018).

[12] *See, e.g.,* Bracciali, C., Campobello, D., Giacoma, C., and Sara, G., "Effects of Nautical Traffic and Noise on Foraging Patterns of Mediterranean Damselfish (Chromis chromis)," *PLoS ONE,* vol. 7, no. 7, art. e40582 (2012); Spiga, I., Cheesman, S., Hawkins, A., Perez-Dominguez, R., Roberts, L., Hughes, D., Elliot, M., Nedwell, J., and Bentley, M., "Understanding the Scale and Impacts of Anthropogenic Noise upon Fish and Invertebrates in the Marine Environment," SoundWaves Consortium Technical Review (ME5205) (2012).

[13] Casper, B.M., Halvorsen, M.B., Matthews, F., Carlson, T.J., and Popper, A.N., "Recovery of barotrauma injuries resulting from exposure to pile driving sound in two sizes of hybrid striped bass," *PLoS ONE,* vol. 8, no. 9, art. e73844 (2013).

[14] Wilhelmsson, D., Malm, T., and Ohman, M., "The Influence of offshore wind power on demersal fish." *ICES Journal of Marine Science,* Vol. 63, pp. 775-784 (2006).

[15] *See,* Draget, E., "Environmental Impacts of Offshore Wind Power Production in the North Sea: A Literature Overview," Oslo: WWF (2014).

In addition to the consideration of individual stressors, the Agency must analyze how stressors from offshore wind development, including those we outline above, affect the habitat as well as the physiology and behavior of marine life both within the project site and cumulatively for the U.S. East Coast. In addressing these issues, the agencies should, *inter alia*:

(1) *Undertake cumulative impacts analyses at the level of the project and lease area, and programmatically for the U.S. East Coast*

Given the rapidly expanding offshore wind development activity off the U.S. East Coast, and the array of potential impacts to marine life, including the acute vulnerability of the North Atlantic right whale, it is vitally important that BOEM undertake a careful and detailed quantitative analysis of cumulative impacts, at the project-level and lease area-level, and also programmatically for the U.S. East Coast. In conducting these analyses, cumulative impacts should be defined by BOEM to encompass: (i) repeated disturbance from the same activity over time; (ii) the interactions between different types of stressor; (iii) multiple wind energy development projects; and (iv) the broader context of other ocean uses both within the leasing area and that may be encountered by transboundary and migratory species during their life cycle.

BOEM should conservatively assume that any substantial decrements in communication range or habitat for the North Atlantic right whale, including habitat avoidance, will result in adverse impacts on the stock. A conservative approach is justified given the species' extreme vulnerability, where any additional stressor may potentially result in population-level impacts, and the difficulty in obtaining empirical data on population-level impacts on wild animals. To account for the impacts of the simultaneous development of multiple lease areas on North Atlantic right whales, as well as other species and habitats, we recommend that the agency also prepare a programmatic EIS encompassing all U.S. East Coast offshore wind development.

Finally, the impacts of offshore wind development would occur in an already compromised acoustic and otherwise affected environment. In this context, BOEM must consider the impacts of other activities and events as part of its environmental analysis, including non-acoustic impacts from vessel collisions, bycatch and entanglement, and the potential for large-scale seismic exploration and offshore oil and gas drilling.

(2) *Address limitations of the National Marine Fisheries Services' acoustic thresholds in the assessment of impacts to marine mammals*

In determining the potential impact of noise from geophysical surveys, and construction and operations activities, BOEM needs to request new guidelines on thresholds for marine mammal behavioral disturbance from the National Marine Fisheries Service ("NMFS") that are sufficiently protective and consistent with the best available science. Multiple marine species have been observed to exhibit strong, and in some cases lethal, behavioral reactions to sound levels well below the 160 dB threshold defined by NMFS for Level B take, leading to calls from the scientific community for the Agency to revise its guidelines.[16] Acceptance of the current NMFS' acoustic threshold for Level B take will lead to BOEM

[16] *E.g.*, Evans, D.L. and England, G.R., "Joint interim report: Bahamas marine mammal stranding event of 15-16 March 2000" (2001); Nowacek, D.P., Johnson, M.P., and Tyack, P.L., "Right whales ignore ships but respond to alarm stimuli," *Proceedings of the Royal Society of London B: Biological Sciences*, vol. 271, no. 1536, pp. 227-231 (2004); Parsons, E.C.M.,

significantly underestimating the impacts to marine mammals and potentially the permitting, recommendation, or prescription of ineffective mitigation measures (*e.g.*, under-protective exclusion zones).

(3) *Account for the potential costs of habitat avoidance*

In the evaluation of potential impacts of offshore wind development, the assumption is often made by the agencies that mobile species (*i.e.*, birds, fish, sea turtles, and marine mammals) can avoid impacts by moving to other available habitat for the duration of the activities of concern. This habitat avoidance is generally considered to have no negative impact on the species in question. In our view, this is an as yet unsupported assumption. Scientists, including those employed by NMFS, recently published a paper highlighting the potential costs of habitat displacement, noting resident populations may "have nowhere to go" and be forced to remain in close vicinity to the source of disturbance.[17] We therefore ask BOEM to deemphasize the assumption of avoidance for wildlife in the Draft EIS and, instead, recommend that research will be needed to understand: (i) if, and how, wildlife exhibit avoidance behavior, and (ii) what, if any, the cost of that behavioral modification may be for the individual and population. This is of particular concern for migratory species, such as the North Atlantic right whale, that may traverse multiple wind energy areas during its annual life cycle.

III. Reasonable Range of Alternatives and Mitigation

An EIS must "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment." 40 C.F.R. § 1502.1. This requirement has been described in regulation as "the heart of the environmental impact statement." *Id.* § 1502.14. The courts describe the alternatives requirement equally emphatically, citing it early on as the "linchpin" of the EIS. *Monroe County Conservation Council v. Volpe*, 472 F.2d 693 (2d Cir. 1972). The agencies must therefore "[r]igorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." *Id.* § 1502.14(a). Consideration of alternatives is required by (and must conform to the independent terms of) both sections 102(2)(C) and 102(2)(E) of NEPA. In addition, agencies must discuss measures designed to mitigate their action's impact on the environment. *See* 42 C.F.R. § 1502.14(f). Several mitigation measures are noted in the species descriptions in Section II. In this Section, our comments further address the concept of the design envelope approach and specific mitigation measures for the North Atlantic right whale.

A. Interpreting the Design Envelope Approach in the Context of the NEPA Impacts and Alternatives Analysis

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Dolman, S.J., Wright, A.J., Rose, N.A., and Burns, W.C.G., "Navy sonar and cetaceans: Just how much does the gun need to smoke before we act?" *Marine Pollution Bulletin*, vol. 56, pp. 1248-1257 (2008); Tougaard, J., Wright, A.J., and Madsen, P.T., "Cetacean noise criteria revisited in the light of proposed exposure limits for harbour porpoises," *Marine Pollution Bulletin*, vol. 90, pp. 196-208 (2015); Wright, A.J., "Sound science: Maintaining numerical and statistical standards in the pursuit of noise exposure criteria for marine mammals," *Frontiers in Marine Science*, vol. 2, art. 99 (2015).

[17] Forney, K.A., Southall, B.L., Slooten, E., Dawson, S., Read, A.J., Baird, R.W., and Brownell, Jr., R.L., "Nowhere to go: noise impact assessments for marine mammal populations with high site fidelity," *Endangered Species Research*, vol. 32, pp. 391-413 (2017).

As organizations eager to see responsibly developed offshore wind power advance in the Atlantic, we recognize that a carefully implemented design envelope approach could provide both environmental and economic benefits. Offshore wind energy technology and construction practices are evolving rapidly, and project design and planning takes years. A flexible permitting system that ensures developers can capitalize on new opportunities for environmental impact mitigation or cost reduction is beneficial for both the industry and wildlife. For example, larger, fewer turbines, that are positioned higher off the water, can produce more renewable energy with potentially less environmental impacts from construction and operation. It is critical that project developers not be discouraged from pursuing these and other opportunities to take advantage of technologies and practices currently progressing through the research and development process that could help facilitate the increasingly responsible development of offshore wind energy.

However, to ensure BOEM can perform a sufficient NEPA review of a project, the COP must provide enough specifics of the critical species impacts and each possible configuration covered by its envelope to fully evaluate the proposal. For example, it would be insufficient to simply identify the total number of turbines that might be built because the timing of pile-driving is also critical to evaluating noise-related impacts to marine mammals. Additionally, to encompass the full range of reasonably foreseeable impacts, a careful assessment of a "design envelope" alternative must amalgamate the most disruptive components of each option included in the envelope. Thus, if Option A involves 20 turbines and Option B involves 30, the analysis of pile-driving noise should be based on the installation of 30 turbines; on the other hand, if Option B proposes the use of suction caisson foundations, the analysis of noise impacts should be based on the 20 pile-driven foundations from Option A. Finally, the "design envelope" alternative cannot be conceived so broadly, or assessed without regard to the independence of its several options, that it vitiates BOEM's duty to effectively "inform decision-makers and the public of the reasonable alternatives which would avoid or minimize impacts," as NEPA requires. 40 C.F.R. s. 1502.1.

It should be noted that the "design envelope" approach does not remove the agency's duty to evaluate other reasonable alternatives that fall outside the envelope. NEPA requires that BOEM analyze such other options, as may be suggested by public commenters, as independent alternatives within the EIS or else clearly explain why they have not been carried forward to analysis. 40 C.F.R. s. 1502.14(a); *Southern Utah Wilderness Alliance v. Norton*, 237 F.Supp.2d 48, 52-54 (D.D.C. 2002).

We strongly advise BOEM to ensure all project details relevant for assessing potential impacts are provided and reviewed so a solid, legally defensible Record of Determination ("ROD") may be issued.

B. Mitigation Measures for the North Atlantic Right Whale

Among the species of greatest priority off the U.S. East Coast is the North Atlantic right whale, whose foraging grounds, migratory corridor, and calving habitat coincide with areas proposed for wind energy development. As the agency is aware, the conservation status of the North Atlantic right whale is dire.

Recent scientific analysis, considered the best available science by the agency,[18] confirms that the species has been declining since 2010 and only approximately 450 individuals were estimated to remain at the end of 2016. At least another 18 individuals have died since that time, leading NMFS to declare an Unusual Mortality Event in June 2017.[19] Moreover, females are more negatively impacted than males, now surviving to only 30-40 years of age with an extended inter-calf interval of approximately ten years.[20] To our knowledge, no calves have been born in this year. If these trends continue, the North Atlantic right whale may be functionally extinct in twenty years;[21] the species simply cannot withstand any additional stressors. This is especially true of disruption to critical life history behaviors, including foraging, social and mating behaviors, and communication between mothers and calves, which have the potential to lead to population-level consequences.

Any responsible approach to offshore wind development must take strong, precautionary action to safeguard the North Atlantic right whale. To provide a legally defensible ROD, the following best management practices ("BMPs") must be in place to demonstrate that sufficient actions will be taken to protect this critically endangered species. In the context of a design envelope, either seasonal restrictions and/or specific schedules must be included in the alternatives and/ or mitigation analysis, pursuant to the agency's duty to consider reasonable alternatives and mitigation measures, and should be included in the ROD.

Our organizations endorse the measures outlined below as BMPs for the protection of the North Atlantic right whale during wind energy development off the U.S. East Coast.[22] The BMPs are designed to: (i) reduce co-occurrence of development activities with this sensitive species; (ii) minimize and mitigate any impacts that do occur to the maximum extent practicable; (iii) reduce risk of vessel collisions throughout the life of the project; and (iv) ensure effective long-term monitoring of the health of marine life present at the new offshore wind site to help guide the development of this nascent American industry.

(1) *Site selection*
Offshore wind projects should not be sited in North Atlantic right whale foraging or calving critical habitat, as defined under the Endangered Species Act, unless and until research demonstrates that wind project operations will not displace right whales or adversely modify their habitat use.

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[18] NOAA-NMFS, "North Atlantic right whale (*Eubalaena glacialis*): Western Atlantic stock." (Feb. 2017). Available at: https://www.nefsc.noaa.gov/publications/tm/tm241/8_F2016_rightwhale.pdf.

[19] NOAA-NMFS, "North Atlantic right whale Unusual Mortality Event." Available at: http://www.nmfs.noaa.gov/pr/health/mmume/2017northatlanticrightwhaleume.html.

[20] Pace III, R.M, Corkeron, P.J., and Kraus, S.D., "State-space mark-recapture estimates reveal a recent decline in abundance of North Atlantic right whales," *Ecology and Evolution*, vol. 7, no. 21, pp. 8730-8741 (2017); Kraus S.D., "*Marine mammals in the Anthropocene: Keeping endangered from becoming extinct*," Plenary speech, Society of Marine Mammalogy Biennial, Halifax, Canada (Oct. 23, 2017).

[21] *Id.*; *See, also*, https://www.theguardian.com/environment/2017/dec/10/north-atlantic-right-whales-extinct.

[22] The measures were produced in collaboration with leading experts on right whale distribution, population ecology, and conservation: Dr. Scott Kraus (New England Aquarium), Dr. Helen Bailey (University of Maryland), Dr. Caroline Good (Duke University), and Dr. Aaron Rice (Cornell University).

(2) *Temporal restrictions on geophysical surveys and construction*
Construction activities and geophysical surveys with noise levels that could cause injury or harassment in marine mammals must not occur during periods of highest risk to North Atlantic right whales, defined as times of highest relative density of animals during their migration, and times when mother-calf pairs, pregnant females, surface active groups (indicative of breeding behavior), or aggregations of three or more whales (indicative of feeding behavior), are expected to be present, as supported by best available science.

Geophysical survey and pile driving activities should commence, with ramp-up, during daylight hours only to maximize the probability that North Atlantic right whales are detected and confirmed clear of the exclusion zone (*see*, *also*, (3), below). The activity can then continue into nighttime hours. If a right whale is detected in the exclusion zone during nighttime hours and the activity is shut down, developers should be required to wait until daylight hours for ramp-up to commence.

(3) *Exclusion zones and exclusion zone monitoring during geophysical surveys and construction*
For the North Atlantic right whale, a minimum exclusion zone of 1,000 meters should be established around all vessels conducting activities with noise levels that could result in injury or harassment to these species (*e.g.*, geophysical surveys and pile driving).

To maximize the probability of detection of North Atlantic right whales, comprehensive exclusion zone monitoring is essential. At minimum, a combination of certified Protected Species Observers ("PSOs") and passive acoustic monitoring should be required during daylight hours. Staffing and shift-schedules should allow for each PSO to monitor a maximum of 180° during daylight hours. Aerial surveys would also provide a useful supplement to increase detection probability. At night, a combination of night-vision, thermal imaging technology, and passive acoustic monitoring should be used.

(4) *Vessel speed restriction for the lifetime of the project*
Ship strikes are one of the leading causes of mortality for large whales, including the North Atlantic right whale. Probability of serious injury or mortality significantly increases when vessels of any length are traveling at speeds greater than 10 knots.[23] Therefore, all vessels operating within or transiting to/from lease areas should observe a speed restriction of 10 knots during times when mother-calf pairs, pregnant females, surface active groups (indicative of breeding behavior), or aggregations of three or more whales (indicative of feeding behavior), are expected to be present based on best available science. As an alternative to speed reductions for transiting vessels, developers may propose monitoring technologies or vessel design alternatives that have been scientifically proven to reduce the probability of collision, mortality, and serious injury to an equal or lesser extent as a speed reduction of 10 knots.[24] We look forward to working with developers on developing an independent and scientific testing protocol if they wish to explore such alternatives.

[23] Conn, P.B., and Silber, G.K., "Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales," *Ecosphere*, vol. 4, art. 43 (2013).
[24] *Id.*

(5) *Reduction of underwater noise during construction*
During construction, developers should commit to minimizing impacts of underwater noise on the North Atlantic right whale to the full extent practicable through: (i) the consideration and use of foundation types and installation methods that eliminate or reduce noise, and (ii) the use of technically and commercially feasible and effective noise attenuation measures, including the use of the lowest practicable source level.

(6) *Commitment to scientific research and long-term monitoring*
Developers should commit to carry out scientific research and long-term monitoring in lease areas to advance understanding of the effects of offshore wind development on marine and coastal resources, and the effectiveness of mitigation technologies (*e.g.*, noise attenuation, thermal detection). Science should be conducted in a collaborative and transparent manner, utilizing recognized marine experts, engaging relevant stakeholders, and making results publicly available. Developers should coordinate with state and regional scientific efforts to ensure results from individual lease areas can be interpreted within a regional context and contribute to the generation of regional-scale data, which is required to address questions related to population-level change and cumulative impacts across the geographic range of the North Atlantic right whale.

(7) *Contribution to species conservation efforts*
As a broad commitment to species conservation efforts, offshore wind developers should consider supporting mitigation approaches and strategies to reduce other stressors facing potentially affected species such as the critically endangered North Atlantic right whale.

C. Mitigation-related Research

(1) *Alternative foundation types and installation methods*
The most effective means of mitigating the impacts of noise on the marine environment during construction activities is to employ alternative foundation types that eliminate or reduce noise and quieter installation methods. For example, suction caissons (or "suction buckets")—a foundation type where a cylindrical bucket-shaped structure is placed on the seabed and internal pumps are used to pump out the water within the internal cavity to suction the caisson into the seafloor—require no pile driving activity. They have proven to be a cost-effective foundation-type in Europe,[25] may increase the stability of the turbine in some instances, have been used extensively by other industries, such as for oil and gas infrastructure, and are suitable for use at depths and seabed types along the East Coast. New installation methods that reduce the sound at the source during pile driving are also emerging. For example, BLUE Piling Technology (patented),[26] which generates energy for driving the pile with a gas combustion that accelerates a large column of water, has proven capable of reducing underwater noise levels by up to 20 dB (SEL). These are two notable examples of alternative foundation types and installation methods; however, other promising technologies are also emerging. BOEM should drive the research and testing of these solutions and provide the support necessary for their supply chain development and manufacture in

[25] Govoni, L., Gottardi, G., Antonini, A., Archetti, R., and Schweizer, J., "Caisson foundations for competitive offshore wind farms in Italy," *Procedia Engineering*, vol. 158, pp. 392-397 (2016).
[26] *See*, https://fistuca.com/

the United States. BOEM should also incentivize developers to employ these best available technologies in their construction plans, ensuring that the United States acts as a global leader in the manufacture and employment of cutting-edge technology capable of maximizing both wind energy generation and environmental protection.

(2) *Effectiveness of night vision and infrared technology*

The effectiveness of night vision and infrared technology in detecting marine mammals, including large whales, has not yet been tested and published for the geographic regions where lease areas are sited. In general, night vision equipment, relying on image intensifying technology, has not been widely used or tested for marine mammal monitoring, and is heavily affected by environmental conditions often present at sea. Infrared technology, relying on thermal differences between the target species and the environment, has shown promise for night time detection of several marine mammal species from vessels. However, the application of infrared technology as a mitigation tool is still in development and studies have reported varying results depending on the type of equipment used, the environmental conditions, and the species in question. The reduced temperature differential between whale blow and the surrounding water expected at least for the Mid-Atlantic states and the Northeast during summer months, in contrast to cooler high-latitude waters, is likely to negatively impact the detection effectiveness of infrared equipment.[27] These technologies have also not been well tested for detection of North Atlantic right whales and may be relatively ineffective for detecting other large whale species, such as minke whales.[28] BOEM should ensure that research is conducted, optimally in collaboration with developers, to test the effectiveness of night vision and infrared technology for detecting marine mammals, and particularly the North Atlantic right whale, in all climatologies (*i.e.*, air and water temperatures) representative of lease areas off the U.S. East Coast.

(3) *Effectiveness of real-time monitoring approaches for mitigation purposes*

There remains uncertainty regarding the effectiveness of real-time monitoring approaches for mitigation purposes during geophysical surveys and construction (*e.g.*, Protected Species Observers, passive acoustic monitoring, and infrared autodetection technology). In developing its mitigation requirements for developers, BOEM should carry out research on the most effective combination of these real-time monitoring approaches for detecting marine mammals off the U.S. East Coast, including large whales, at distances capable of mitigating the impacts of harmful noise and other disturbances. The development of a comprehensive real-time monitoring approach, supported by science, is necessary before large-scale offshore wind energy construction commences in the Atlantic and, by proxy, advances within North Atlantic right whale habitat.

D. No-Action Alternative

NEPA requires examination of the "No Action Alternative" to the proposed action. 40 CFR 1502.14. In discussing the "No Action Alternative," the Draft EIS should identify and discuss the positive

[27] Lathlean, J, and Seuront, L, "Infrared thermography in marine ecology: methods, previous applications and future challenges," *Marine Ecology Progress Series*, vol. 514, pp. 263-277 (2014).

[28] Cuyler, L.C., Wiulsrød, R., and Øritsland, N.A., "Thermal IR Radiation from Free Living Whales", *Marine Mammal Science*, vol. 8, no. 2, pp. 120-134 (1992).

environmental impacts of offshore wind, including the climate, environmental and public health benefits of offshore wind in backing out existing fossil fuel power plants and the associated public health, climate pollution, other air pollution and water pollution impacts associated with fossil fuel generation.[29] BOEM has also catalogued other potential environmental, public health and socio-economic benefits of offshore wind (including electricity system benefits and jobs benefits) that should be identified and discussed in the environmental review process.

IV. Specific Comments on Vineyard Wind Proposal

We look forward to submitting detailed comments on the forthcoming Draft EIS and offer the following observation on the Vineyard Wind, LLC, COP with the intention of identifying for BOEM and the developer important additional project information that would be needed to conduct a thorough and meaningful environmental review of the potential impacts of this project.

Vineyard Wind, LLC, is proposing an 800 megawatt ("MW") wind energy project within BOEM Lease Area OCS-A 0501. The project will be located in the northern portion of the Lease Area, referred to by Vineyard Wind, LLC, as the "Wind Development Area (WDA)" (4903/COP, Volume 1, 1-1). The project is being developed and permitted using a design envelope concept, which is intended to define the range of project characteristics for the purposes of environmental review and permitting, while maintaining a reasonable degree of flexibility for the developer (4903/COP, Volume 1, 1-8). Vineyard Wind, LLC, offer three alternative construction schedules within the design envelope based on different scenarios of incremental build out of the project: (i) construction of the first 400 MW of the project is completed by the end of 2021 and construction of the remaining 400 MW may occur concurrently and be completed by the end of 2022; (ii) construction of the first 400 MW of the project is completed by the end of 2021, but construction of the second 400 MW may occur after an up to five-year gap; or (iii) a smaller increment of 200 MW could be constructed depending on offtake awards to Vineyard Wind, LLC (4903/COP, Volume 1, 1-11). To further illustrate these alternatives, the COP includes construction schedules for each alternative, indicating when major development activities may occur by calendar quarter for each scenario (4903/COP, Volume 1, Figures 1.5-1, 1.5-2, and 1.5-3). However, the construction schedules for specific development activities (*e.g.*, pile driving) are not resolved.

As we describe in Section III.A. of this letter, it is imperative that the design envelope considered by BOEM for permitting includes all pertinent information to enable a rigorous environmental review. In the context of evaluating impacts to the endangered North Atlantic right whale, and potentially other migratory species of concern, the provision of a construction schedule for pile driving must be included in the COP. Pile driving is considered to be the most impactful, and potentially harmful, offshore wind development activity for North Atlantic right whales, as well many other species.

North Atlantic right whales are present within and close to the WDA year-round; however, based on sightings and acoustic data, right whales are most consistently present within or near the project site at their highest densities from November to May. Seasonally consistent aggregations of right whales are

[29] Buonocore, J., Luckow, P., Fisher, J., Kempton, W., Levy, J. "Health and climate benefits of offshore wind facilities in the Mid-Atlantic United States," *Environ. Res. Letts*, vol 11, no. 7, art. 074019 (2016).

observed feeding and possibly mating within or close to the WDA from at least March through May 4th,[30] and at least part of the WDA is considered to be a right whale "hotspot" from March to May.[31] Females of reproductive age are also present in the area in February and March, and April appears particularly important for mothers and calves.[32] Pregnant females are known to travel though the area in November and December.[33] In light of the strong seasonal presence of North Atlantic right whales in the WDA, and the evidence that the WDA may provide important habitat for life history behaviors that are now critical to the species' survival, it is imperative that BOEM require a detailed schedule for pile driving as part of each proposed construction schedule presented in the COP. Subsequently, BOEM must carefully analyze potential impacts to North Atlantic right whales, and other species of concern, based on that construction schedule, in the Draft EIS.

Without the provision of a construction schedule for pile driving, we fail to see how BOEM will be able to adequately analyze, and reduce, the potential impacts of the design envelope on the marine environment, as required under NEPA.

V. Conclusion

Thank you for considering our comments. For all of the above reasons, we urge BOEM to set an important precedent for environmentally responsible offshore wind power development in the United States with this EIS so that Vineyard Wind, LLC, and all other offshore wind developers provide analysis consistent with NEPA and other applicable law that will move the U.S. offshore wind industry forward in a sustainable form. We believe this is essential for ensuring that critically needed offshore wind energy can scale up to its full potential as a major climate and clean energy solution for America. We welcome the opportunity to meet with you, and your staff, at any time to discuss these matters.

Sincerely,

Francine Kershaw, Ph.D.
Project Scientist, Marine Mammal Protection and Oceans, Nature Program
Natural Resources Defense Council

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[30] Kraus, S.D., Leiter, S., Stone, K., Wikgren, B., Mayo, C., Hughes, P., Kenney, R.D., Clark, C.W., Rice, A.N., Estabrok, B., and Tielens, J., "Northeast large pelagic survey collaborative aerial and acoustic surveys for large whales and sea turtles. Final Report," OCS Study, BOEM 2016-054, pp. 118 (2016); Leiter, S.M., Stone, K.M., Thompson, J.L., Accardo, C.M., Wikgren, B.C., Zani, M.A., Cole, T.V.N., Kenney, R.D., Mayo, C.A., and Kraus, S.D., "North Atlantic right whale *Eubalaena glacialis* occurrence in offshore wind energy areas near Massachusetts and Rhode Island, USA," *Endangered Species Research*, vol. 34, pp. 45-59 (2017); Quintana, E., "Monthly report No. 3: May 2017," Report prepared for the Massachusetts Clean Energy Center by the New England Aquarium, pp. 26 (May 15, 2017); North Atlantic right whales were observed feeding in the vicinity of the lease area during the first half of May for the first time in 2017.

[31] Leiter, S.M., *et al*., *id.*

[32] Dr. C. Good *pers. comm.* to Dr. F. Kershaw and M. Jasny, Oct. 24, 2017.

[33] *Id*.

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