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Michelle Morin
Bureau of Ocean Energy Management (BOEM)
Office of Renewable Energy Programs
45600 Woodland Road
Sterling, Virginia 20166
(703) 787–1722
michelle.morin@boem.gov

RE: http://www.regulations.gov Docket No. BOEM–2018–0069

Dear Ms. Morin,

We request an extension to the comment period for public review of the Draft Environmental Impact Statement (EIS) and Construction and Operation Plan (COP) for the Vineyard Wind project offshore Massachusetts (Lease OCS-A 0501). Given the government shutdown, we have been unable to access all necessary resources to inform this review process.

American Bird Conservancy is a 501(c)(3), non-profit membership organization whose mission is to conserve native birds and their habitats, working throughout the Americas to safeguard the rarest bird species, restore habitats, and reduce threats.

If this project is approved, it will set an important precedent for future offshore wind projects. Therefore, we take this opportunity to voice our initial concerns and offer suggestions on treating all future project with rigor and consistency throughout the National Environmental Policy Act (NEPA) process.

Recommendation: Monitoring Program

Our primary concern is a grave deficiency in the current EIS and COP, due to the lack of a monitoring program for birds. In Volume 3 of the COP (Environmental Information), Vineyard Wind specifies that they are developing a framework for a pre- and post-construction monitoring program for fisheries (p. 6-130), marine mammals, and sea turtles (p. 6-188). However, no such monitoring program is specified for birds. In the biological assessment (BA) conducted by the US Fish and Wildlife Service (USFWS), the Service outlines conditions to "minimize or eliminate potential impacts on ESA-listed species of birds and bats" (p. 29). One of these conditions is to "develop a framework for a post-construction monitoring program for birds". It is imperative that approval of this project be withheld until such a monitoring program is disseminated for public comment. Once a monitoring plan becomes available and the EIS is complete, the review process will require additional time allotted by BOEM under NEPA.

Recommendation: Minimization and Mitigation Plan

Other deficient aspects of the COP and EIS are the proposed avoidance, minimization and mitigation measures. While some minimization technologies are under development, many have already been implemented in the offshore realm, and should at the very least be tested by Vineyard Wind. The EIS states "the species with the highest estimated risks were the Herring Gull (*Larus argentatus*), Great Black-backed Gull (*Larus marinus*), Razorbill (*Alca torda*), Cory's Shearwater (*Calonectris borealis*), and Black-legged Kittiwake (*Rissa tridactyla*). The risk for each species may change with the seasons, but at least one species would be at risk during any particular season" (p. 3-34). Of these, we are particularly concerned about Black-legged Kittiwakes, because they have shown large circumpolar declines over the last few decades[1]. They have also shown high collision and displacement vulnerability scores (Willmott et al. 2013[2]). Along with the other bird species facing high risk from the Vineyard Wind project, they are protected from take by the Migratory Bird Treaty Act (MBTA). All of these species are relatively large-bodied and thus make good candidates to be monitored by targeted detection-and-curtailment systems[3].

We are additionally concerned that the risk to some species of concern (e.g., Northern Gannets) has been underrepresented in the COP. Vineyard Wind determined which species were at highest risk of exposure to the project by relying heavily on two data sources. They conducted a rigorous effort-corrected analysis of the MassCEC data but also used data from the Marine-life Data and Analysis Team (MDAT), without providing detailed site-specific effort information. The MDAT data were based on Winship et al. (2018[4]), which modeled and mapped the relative density of marine birds on the Atlantic Outer Continental Shelf, using three decades of aerial and boat-based visual surveys at sea. It would be useful to see the proportion of these surveys that sampled the Vineyard Wind Energy Area.

Furthermore, advancements in digital aerial survey technology in the last couple of years have shown that many collision and displacement vulnerability scores are likely to be even higher than estimated in previous studies, particularly for gannets and terns. Johnston and Cook (2016[5]) have shown that boat surveys underestimate flight heights, where over 50% of terns and gannets are estimated within the rotor swept zone (RSZ) in digital aerial surveys, compared to less than 15% of both species observed in the RSZ during boat surveys (see Table 2 of report). This underestimation of flight heights in boat

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[1] Descamps, S., T. Anker-Nilssen, R. T. Barrett, D. B. Irons, F. Merkel, G. J. Robertson, N. G. Yoccoz, M. L. Mallory, W. A. Montevecchi, D. Boertmann, Y. Artukhin, et al. 2017. Circumpolar dynamics of a marine top-predator track ocean warming rates. Global Change Biology 23:3770–3780.

[2] Robinson Willmott, J. C., 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. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2013-207. 275 pp.

[3] Dirksen, S. 2017. Review of Methods and Techniques for Field Validation of Collision Rates and Avoidance Amongst Birds and Bats at Offshore Wind Turbines. 47 p.
https://tethys.pnnl.gov/sites/default/files/publications/Dirksen-2017.pdf

[4] A.J. Winship, B.P. Kinlan, T.P. White, J.B. Leirness, and J. Christensen. 2018. Modeling At-Sea Density of Marine Birds to Support Atlantic Marine Renewable Energy Planning: Final Report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2018-010.

[5] Johnston, A., & Cook, S. C. P. (2016). How High Do Birds Fly?: Development of Methods and Analysis of Digital Aerial Data of Seabird Flight Heights. British Trust for Ornithology, Report No. 676, 53pp.

surveys has been additionally validated with the use of drones (Harwood et al. 2018[6]). Given the paucity of information on flight heights that is specific to the proposed site, a scientifically rigorous monitoring plan will be necessary to adequately minimize and mitigate birds at risk of collision and displacement.

Proposed alternatives

We are considering a combination of the proposed Alternatives, but require an extension of the comment period, as well as further information in the subsequent draft of the EIS.

Alternative B would remove the New Hampshire Ave. cable landfall, but it is unclear exactly how this may reduce impacts on birds (Table 2.1-1 of the EIS). According to the USFWS BA, it may help avoid a Roseate Tern colony, although the Covell's Beach landfall site is closer to Piping Plovers and Least Terns that have historically nested near Craigsville Beach (e.g., Dowse's Beach). According to the USFWS BA, disturbance would be minimized by the time-of-year restrictions on cable installation. The BA states "the Proposed Action will comply with required time-of-year restrictions during cable installation where no in-water work that produces silt will occur from January 15 to May 30, and jet plowing will only occur from June 1 to January 14" (p. 24). However, this is not specified explicitly in the EIS - we request further clarification of the risks to these species for both sites. Appendix D specifies restrictions on the Covell's Beach site from 1 Apr – 31 Aug (to avoid disturbing shorebirds), and during low tide at Lewis Bay from mid-Jul to mid-Sep (to avoid impacting foraging resources of terns, although species are not specified on p. 3-34 of the EIS). We support this proposed mitigation, and recommend that the benefits to each bird species (Piping Plovers and Least, Common and Roseate Terns) be further discussed and included in Alternatives A and B.

Alternative C would move the 6 northern turbines to the south side of the project. This could help reduce the exposure of sea ducks such as White-winged Scoters (COP Appendix III-C, Fig. 120). Alternative C could also reduce the exposure of Roseate Terns (COP Appendix III-C, Fig. 97), as could Alternative E, as well. Alternative E increases the rotor height from 27-191m (8 MW turbines) to 31-212m (10 MW turbines). There is a chance that increasing the lower limit of the rotor height to 31m would reduce the collision risk of Roseate Terns, by avoiding their dominant flight heights. A Loring et al. study (in review) should be able to provide more information on this (see Loring et al. 2017[7] annual report), however, the final report has been delayed for release due to the government shutdown. This is one of the reasons why we request an extension to the public comment and review period.

Loring et al. (2018[8]) published a study funded by BOEM, which shows a couple of occasions where two federally Threatened rufa Red Knots cross over the Vineyard Wind footprint, at altitudes within the rotor swept zone (Fig. F-17, 18). These crossing events occurred in mid-November (17th -18th). The BA states that, in the Loring et al. unpublished study, "three plovers (7% of 43) [flew] over the Vineyard Wind

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[6] Harwood, A. J., Perrow, M. R. and Berridge, R. J. (2018), Use of an optical rangefinder to assess the reliability of seabird flight heights from boat-based surveyors: implications for collision risk at offshore wind farms. J. Field Orn.
[7] Loring P, Goyert HF, Griffin C, Sievert P, and Paton P. 2017. Tracking Movements of Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers in the Northwest Atlantic. Annual Report to Bureau of Ocean Energy Management, U.S. Fish and Wildlife Service, Northeast Region, Division of Migratory Birds, Hadley, MA. 31 March.
[8] Loring PH, McLaren JD, Smith PA, Niles LJ, Koch SL, Goyert HF, Bai H. 2018. Tracking movements of threatened migratory rufa Red Knots in U.S. Atlantic Outer Continental Shelf Waters. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-046. 145 p.

lease area during fall migration" and that 97.7% of plovers fly outside of the rotor zone (i.e., 2.3% within); however, more information is needed on the time of year and the rotor height of those specific individuals that crossed the footprint. Additionally, the BA conducted a collision risk assessment using high avoidance rates that are not supported by the literature: 98% for Piping Plovers and Red Knots – these values need to be justified. Based on the Loring et al. studies, further collision risk modeling (including for Roseate Terns) using more conservative values is necessary to justify whether an incidental take permit should be required for the Threatened and Endangered species exposed to the Vineyard Wind project.

Given that the Vineyard Wind project falls in the flight paths of migrating Red Knots, Piping Plovers, and Roseate Terns, the EIS needs to provide certainty on how take will be will be minimized, from collisions, habitat displacement/loss, and cumulative impacts. Effective mitigation and compensation actions should also be considered for breeding, winter and non-breeding roost sites (see Mitigation section below): for example, establishment of protected areas, predator control, and habitat restoration (as has recently occurred at Bird Island in Marion, MA, Buzzards Bay, one of the largest breeding colonies of Roseate Terns[9]).

A ***transparent, multi-year monitoring, minimization, and mitigation plan***, involving ***scientifically rigorous*** study (e.g., before-after-control-impact) is critically needed to assess and minimize impacts on at-risk bird populations. Such a plan should be overseen by the federal and state agencies with affected natural resources (e.g., USFWS, MassWildlife), consistent with the Coastal Zone Management Act. Deepwater Wind is currently implementing a post-construction Block Island Avian and Bat Monitoring Plan, which presents a minimum standard on which to establish a management plan for Vineyard Wind. Deepwater Wind reports their results from Block Island to the Army Corps (USACE), USFWS and RI Coastal Resource Management Council (CRMC), and modifies the Monitoring Plan if deemed appropriate. Below we describe best practices to establish such a plan and set a good precedent for future development of offshore wind energy on the Northwest Atlantic Outer Continental Shelf.

[9] https://www.mass.gov/service-details/masswildlife-monthly-july-2017 "Terning around Bird Island"

Best Practices: Bird Smart Wind Energy

American Bird Conservancy's bird-smart wind energy policy provides a strategy to prioritize early decision-making steps in wind energy development: "avoid when planning, minimize while designing, reduce at construction, compensate during operation, and restore as part of decommissioning" (according to the "mitigation hierarchy"[10]). American Bird Conservancy supports wind power development when it is bird-smart, which means following six principles:

(1) proper siting of turbines away from high-bird-collision-risk areas;
(2) independent, transparent pre-and-post-construction monitoring of bird impacts;
(3) effective construction and operation minimization of bird mortality by wind energy facilities;
(4) mitigation to compensate for any unavoidable bird mortality and habitat loss from wind energy development;
(5) evaluation of wind energy as part of a complete analysis on all feasible renewable alternatives; and
(6) environmental compliance with a rigorous local, state, and federal regulatory framework.

Bird-smart Principle 1: proper siting of turbines away from high-bird-collision-risk areas

The first best practice step in wind energy planning, with regard to bird impacts, is to conduct an independent pre-construction risk assessment at the proposed site to carefully evaluate the exposure and vulnerability of birds to turbines and their associated infrastructure[11]. It is good practice to avoid areas in or near sites where birds concentrate, during migration or other times of year. Such high risk regions include Important Bird Areas, marine protected areas, and breeding concentrations or movement corridors. These require additional evaluation to assess the suitability of siting wind turbines.

It is also best practice to determine the total number of species potentially affected, and any state-, federally- or globally-listed species of concern, and avoid siting energy development in areas that are defined as habitat for these threatened and endangered birds. Offshore wind facilities should not be placed near populations of rare or endangered species, large breeding colonies, or in major migratory pathways. The definition of "near" may vary from species to species, as some birds travel long distances to forage. In addition, the ocean is a dynamic habitat, and conditions (e.g., upwelling, concentration of food species) can change over time and space, thus influencing the distribution and concentration of wildlife. Special attention should be paid to wind development near seabird nesting islands where the birds could be at risk of collision when transiting between at sea foraging grounds and their colony sites.

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[10] May. R. (2017). "Mitigation for birds" in Perrow, M. (Ed.). Wildlife and Wind Farms-Conflicts and Solutions, Volume 2: Onshore: Monitoring and Mitigation. Pelagic Publishing Ltd. pp 124-144.
[11] Dewitt, A.L., and Langston, R.H.W. 2006. Assessing the impacts of wind farms on birds. Ibis 148: 29-42.

4301 Connecticut Ave, NW, Suite 451 | Washington, D.C. 20008
Tel: 202-234-7181 | Fax: 202-888-7496 | abc@abcbirds.org | www.abcbirds.org

To aid wind energy project developers, American Bird Conservancy has created a Wind Risk Assessment Map identifying levels of risk throughout the country. Areas that are not suitable for wind development are indicated in red. If developers choose to proceed in areas of moderate risk (orange on the map), they should follow stringent monitoring, minimization, and mitigation requirements (e.g., seasonal shutdowns, i.e., curtailment). For example, the design of movement corridors through or around wind energy arrays, via micro-siting, can help to enable turbine avoidance. Developers could also consider reducing turbine number and density, and selecting turbine sizes with a rotor swept zone that minimizes collision risk, based on at-risk species. There exists a tradeoff in energy output, where few, large turbines have equivalent capacity to a large matrix of small turbines. A reduction in turbine number and/or density may help to minimize collision or displacement risk, as long as the rotor zone remains outside the range of flight heights of at-risk species. While well-sited wind facilities require extensive resource investment at an early stage, they provide the best outcome with the least conflict – poorly sited turbines make the rest of the development process much more difficult.

Bird-smart Principle 2: independent, transparent pre-and-post-construction monitoring of bird impacts

American Bird Conservancy's bird-smart best practice includes an independent body to assess risk in pre- and post-construction monitoring of bird deaths. This guideline removes the external perception of potential under-reporting of injury, and conflicts of interest due to company self-reporting. Studies should include consultation with avian experts that are not paid employees of wind energy companies, but who are intimately familiar with the local avifauna and their habitats. Independent studies can be supported through a mitigation fund, as described below (Mitigation section). Best practice also is the transparent implementation of these studies to allow for public input and review of their design and results, as our nation's birds are a public trust resource.

Bird-smart wind power should employ a site-specific monitoring plan that is federally and state reviewed and approved (e.g., an ***Avian Protection Plan***). A monitoring plan should be included in all Construction and Operation Plans, and reviewed during the NEPA process. An effective plan covers at least 5-10 years and requires independent, transparent, site-specific studies that use standard pre- and post-construction "Before, After – Control, Impact" (BACI) or "Before-After Gradient" (BAG) protocols. These methods set a comprehensive annual baseline against which post-construction studies can be evaluated, to quantify the cumulative impacts of wind turbines on birds. With oversight from regulatory agencies, the plan should be modified on an annual basis, to inform the adaptive management process for improved operational minimization and mitigation.

Pre-construction assessments should last at least 2 years and use all existing available bird study data, providing sufficient site-specific data to best account for detection probability, local environmental variability and bird movements at the appropriate spatial/temporal resolution. Implementing a suite of methods is necessary to assess displacement sensitivity (e.g., boat and aerial surveys, with tracking studies), as well as collision vulnerability (e.g., radar combined with vibration/bioacoustics collision sensors). In the case of birds, abundance (exposure) is one factor, along with vulnerability and hazard, contributing to risk[12, 13]. Estimating the potential impact of one wind energy facility in a site-specific study is very different from assessing the impact of several facilities in the same area in a strategic study[14]. Government regulators need to develop a comprehensive process for assessing cumulative impacts when making wind energy development decisions[15].

Displacement

Avoidance behavior displayed by some birds around wind facilities suggests that, even if they don't collide with wind turbines, birds may experience habitat loss, particularly from large wind farms[16]. Advancements in tracking technology have made it possible to identify behavioral avoidance of wind turbines by individual birds. For example, GPS tracking can be used on large birds (e.g., > 200g) to quantify fine- and macro-scale movements, with a special focus on altitudes within the rotor-swept zone. Alternatively, nanotags are miniaturized tracking devices attached on small birds that are detected by receiving towers throughout the Motus Wildlife Tracking System network. This tool uses automated digital telemetry to estimate the macro-exposure of smaller birds to wind energy development, such as wind energy area crossings[17].

Surveys that assess avian exposure to wind energy development can also address displacement vulnerability. To estimate abundance at a micro-spatiotemporal scale, developers should deploy continuous turbine-mounted acoustic monitors to detect the calls of passing birds and bats. Radar, aerial surveys, and boat-based surveys estimate the abundance and distribution of birds at a macro-spatial scale. Radar should be monitored on a continuous (daily) basis to detect large birds and flocks at altitudes within the rotor zone. Traditional (observer) aerial or high-resolution digital aerial surveys

[12] Marques, A.T., Batalha, H., Rodrigues, S., Costa, H., Ramo Pereira, M.J., Fonseca< C., Mascarenhas, M., and Bernardino, J. 2014. Understanding bird collisions at wind farms: An updated review of the causes and possible mitigation strategies. Biological Conservation 179: 40-52.

[13] Fox, A.D., Desholm, M., Kahlert, Christensen, T.J., and Petersen, I/K. 2006. Information needs to support environmental impact assessment of the effects of European marine offshore wind farms on birds. Ibis 148: 129-144.

[14] Busch, M., Kannen, A., Garthe, S., and Jessup, M. 2013. Consequences of a cumulative perspective on marine environmental impacts: offshore wind farming and seabirds at North Sea scale in context of the EU Marine Strategy Framework Directive. Ocean and Coastal Management 71: 213-224

[15] Goodale, W. and Milman, A. 2014. Cumulative adverse effects of offshore wind energy development on wildlife. Journal of Environmental Planning and Management. 59: 1-21

[16] Garthe, S., Markones, N. & Corman, AM. 2017. Possible impacts of offshore wind farms on seabirds: a pilot study in Northern Gannets in the southern North Sea. J Ornithol. 158: 345

[17] Loring PH, McLaren JD, Smith PA, Niles LJ, Koch SL, Goyert HF, Bai H. 2018. Tracking movements of threatened migratory rufa Red Knots in U.S. Atlantic Outer Continental Shelf Waters. Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. OCS Study BOEM 2018-046. 145 p. https://espis.boem.gov/Final Reports/BOEM_2018-046.pdf

should be run on a monthly basis, and weekly during peak movement periods; digital aerial surveys can be used to estimate altitudes within the rotor zone. Boat-based surveys have the advantage of detecting bird behaviors and should also operate on a monthly basis, weekly during peak movement.

All site-specific avian exposure surveys should follow BACI or BAG protocols within the wind energy area (i.e., treatment) and a reference area (i.e., control plots). Careful selection of reference areas requires a representative sample of the wind energy area consistent with standard environmental variables – such as water depth, productivity, and distance to shore. Mendel et al. (2019)[18] used a BACI approach with 14 years of pre-construction data and 3 years of post-construction data from boat-based and aerial surveys. They showed that wind facilities in the North Sea caused a loss (i.e., reduction and redistribution) of loon habitat, which could lead to indirect long-term effects on their populations.

Collisions

Flight height of a given species is considered the most important factor in determining that species' collision risk[19] and avoidance potential[20]. A radar study around the Great Lakes conducted by the U.S. Fish and Wildlife Service[21] suggests that many migratory birds often fly at lower levels than once thought, and this may be true of other birds as well. For seabirds that use dynamic soaring, such as shearwaters, flight height and behavior are positively related to wind speed and direction[22]. Gannets, gulls (including kittiwakes), and terns also fly within rotor height and have shown particularly high collision and displacement vulnerability scores[23]. American Bird Conservancy encourages the USFWS, Department of Energy (DOE), BOEM, and other U.S. natural resource agencies to further study the species-specific collision risk and avoidance potential to offshore wind energy development on federally-protected birds and their habitats.

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[18] Mendel, B. Schwemmer, P., Peschko, V., Müller, S., Schwemmer, H., Mercker, M., Garthe, S. 2019. Operational offshore wind farms and associated ship traffic cause profound changes in distribution patterns of Loons (*Gavia* spp.). Journal of Environmental Management Volume 231: 429-438

[19] Furness, R.W., Wade, H.M., and Masden, E.A. 2013. Assessing vulnerability of marine bird populations to offshore wind farms. Journal of Environmental Management 119: 56-66

[20] Band, B. 2012. Using a collision risk model to assess bird collision risks for offshore wind farms. http://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS02_Band1ModelGuidance.pdf

[21] Bowden, T. S., E. C. Olson, N. A. Rathbun, D. C. Nolfi, R. L. Horton, D. J. Larson, and Gosse, J.C. 2015. Great Lakes avian radar technical report Huron and Oceana Counties, Michigan. Biological Technical Publication BTP-R3011-2015. http://digitalmedia.fws.gov/cdm/ref/collection/document/id/2092

[22] Ainley, D, Porzig, Zajanc and LB Spear 2015. Seabird flight behavior and height in response to altered wind strength and direction. Marine Ornithology 43: 25–36.

[23] Willmott, J. C. R., 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. Final Report to the U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. OCS Study BOEM 2013-207. 275 pp. https://www.boem.gov/ESPIS/5/5319.pdf

Pre-construction assessments should involve site-specific collision risk modeling, based on avian exposure to the wind energy area (i.e., distribution and abundance), hazards imposed by the turbine parameters (i.e., based on rotor zone), and vulnerability (i.e., based on life history parameters such as flight height and other bird behaviors, including foraging and migratory activity).

Post-construction studies should run for at least 5 years (long enough to determine the efficacy of, and make needed revisions to, operational minimization measures). They must employ mathematical models that best account for variations in local conditions and the relative difficulty of locating bird carcasses in different conditions, as well as any scavenging by predators that may reduce the number of carcasses found. Standardized mortality statistics should be calculated via the Generalized Fatality Estimator, GenEst. Innovations in advanced technologies are under development to monitor bird strikes with turbines[24]. Turbine-mounted systems include vibration/bioacoustics and multi-sensor (MUSE) wildlife detection systems; radar and infrared camera Thermal Animal Detection Systems (TADS); accelerometers, microphones, and video cameras (WT-Bird).

Rigorous metrics are needed to improve upon existing methods of pre-construction risk assessment and post-construction mortality studies, particularly offshore[25]. Determination of post-construction mortality for birds is more difficult in the offshore realm than onshore, since carcasses will be immediately lost in the water, thus precluding species identification and determination of actual numbers taken. American Bird Conservancy strongly encourages research on new technologies that will test and verify accurate pre-construction risk assessment and post-construction mortality monitoring at offshore wind facilities.

In summary, site characterization and assessment studies need to follow ***"Before, After – Control, Impact"*** or ***"Before-After Gradient"*** protocols (i.e., with appropriately-selected ***control plots*** adjacent to the lease area for comparison). Such studies should be ***independent*** from the leasing industries and be systematically designed to accurately and precisely quantify the ***collision and displacement vulnerability*** of protected birds to offshore wind energy development.

[24] Dirksen, S. 2017. Review of Methods and Techniques for Field Validation of Collision Rates and Avoidance Amongst Birds and Bats at Offshore Wind Turbines. 47 p. https://tethys.pnnl.gov/sites/default/files/publications/Dirksen-2017.pdf
[25] Bailey, H., Brookes, K.L., and Thompson, P.M. 2014. Assessing environmental impacts of offshore wind farms: Lessons learned and recommendations for the future. Aquatic Biosystems 10 (8)

Bird-smart Principle 3: effective construction and operational minimization of bird mortality by wind energy facilities

Several cost-effective strategies can be taken to minimize bird mortalities, although further innovation and testing is needed[26]. Improving existing methods is an important factor in taking a science-based approach to wind-energy development, since "…technologies to minimize impacts at operational facilities for most species are either in early stages of development or simply do not exist" (DOE EERE 2014). The collective challenge is to have precaution-based minimization that seeks to increase the resilience of the populations in the absence of empirical evidence of mortality. American Bird Conservancy encourages research on ways to minimize the effects of wind turbines on birds, including ways to detect and cease wind turbine rotation when large numbers of birds are present, as well as employ appropriate measures that do not attract birds[27].

Bird-smart wind power uses the ***best technology*** and ***management practices*** to avoid harm to birds. Effective construction and operation minimization should be implemented as part of the monitoring plan to reduce bird fatalities. Examples include burying transmission lines in high risk areas, following Avian Power Line Interaction Committee (APLIC) standards for above-ground transmission lines, and using un-guyed rather than guyed meteorological towers. Electrical cables can pose a significant risk to birds through collisions and electrocution[28]. Sonic and visual deterrents (e.g., flight diverters, markers on associated infrastructure, or specialized light spectrum deterrent devices using UV or red/blue LED lights or lasers). Attractant removal is also good practice, such as anti-perching devices and lighting that minimizes nighttime migratory bird collision mortality (such as strobe lights).

Operational curtailment (i.e., feathering, or shutting-down turbines) is necessary during high risk (i.e., poor visibility weather) and peak movement periods (e.g., nocturnal, seasonal migration, or post-breeding season). Offshore marine environments are particularly dynamic and can change rapidly with changing weather conditions, such as strong wind and fog. Measures need to be taken into account to accommodate changing distributions in bird hotspots, as a result of weather conditions and climate change. Detection-and-curtailment systems (e.g., IdentiFlight and DTBird) detect eagles and activate warning sounds prior to curtailment within seconds. For breeding seabirds that regularly transit between island nest sites and open-ocean feeding areas, seasonal closures, buffers or corridors around colony sites should be considered to minimize wind impacts.

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[26] Wang, S., Wang, S. and Smith, P. 2015. Ecological impacts of wind farms on birds: Questions, hypotheses, and research needs. Renewable and Sustainable Energy Reviews 44: 599_607

[27] May, R., Reitan, O., Bevanger, K., Lorentsen, S. H., & Nygård, T. 2015. Mitigating wind-turbine induced avian mortality: sensory, aerodynamic and cognitive constraints and options. Renewable and Sustainable Energy Reviews, 42, 170-181

[28] Manville, A.M. 2005. Bird strikes and electrocutions at power lines, communication towers, and wind turbines: State of the art and state of the science-Next steps toward mitigation. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191: 1051-1064

4301 Connecticut Ave, NW, Suite 451 | Washington, D.C. 20008
Tel: 202-234-7181 | Fax: 202-888-7496 | abc@abcbirds.org | www.abcbirds.org

Adaptive management is necessary to determine the monitoring, minimization, and mitigation plan's efficacy, and revise operational minimization measures, such that when parameters are exceeded they trigger required remedies (e.g., sage grouse planning is updated when habitat loss is exceeded). Given regulatory flexibility, minimization efforts could involve an adaptive post-construction matrix design, for example, where floating offshore turbines may be re-located under circumstances where bird distributions shift dramatically. However, poorly-sited turbines must be avoided else face heightened monitoring, minimization, and mitigation restrictions.

Bird-smart Principle 4: mitigation to compensate for any unavoidable bird mortality and habitat loss from wind energy development

Following efforts by developers to properly site wind energy facilities and minimize bird mortalities, further harm to birds can be unavoidable. In these situations, bird-smart wind power redresses the loss of any birds or habitat, to a net benefit standard. This means that developers must find ways to produce enough birds to offset the losses imposed by collisions, displacement, and the cumulative effects of wind turbines. Examples include predator control and restoration of disturbed habitat post-construction and post-decommission (e.g., replanting of native vegetation). Best practice is that developers buy into a mitigation fund, for example via an HCP o other MOU with the USFWS. This can be used to support conservation and independent research on the vulnerability of birds to the wind energy facilities, or studies designed to improve monitoring and minimization through technology innovation.

Compensation should also include ***acquiring additional habitat*** for migratory birds, such as off-site habitat conservation projects at wintering grounds, National Wildlife Refuges, and/or marine protected areas. Under a Section 10 ESA consultation, developers can apply for Incidental Take Permits (ITP) to engage in Safe Harbor Agreements, Candidate Conservation Agreements, and HCPs (e.g., Great Plains Wind Energy HCP). Offshore wind energy involves Section 7 ESA consultation, meaning that an ITP could include restoration to breeding colonies, such as that which occurred at the Bird Island Roseate Tern colony in 2017. American Bird Conservancy supports such actions that help in the recovery trajectory for endangered species.

American Bird Conservancy recommends that wind energy companies also enter into an agreement with local/regional science-based birding and conservation organizations to reduce and redress any unavoidable bird loss. For example, to mitigate the effects of the proposed Morro Bay wind energy project in California, Castle Wind LLC has entered into an agreement with the local commercial fishing community, to offset the anticipated impacts to the fishing community by the wind facilities (see p. 31). Bird-watchers contribute over $1 billion in birding expenditures to the economy of Massachusetts[29], and

[29] Tables 31 and 33 in: U.S. Fish and Wildlife Service and U.S. Census Bureau. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Massachusetts. U.S. Department of the Interior and U.S. Department of Commerce. https://www2.census.gov/programs-surveys/fhwar/publications/2011/fhw11-ma.pdf

"pelagic birding tours can be an alternative source of income to many fishermen that have been hard-hit by disappearing fish stocks"[30]. A ***bird mitigation fund*** could support independent research on the vulnerability of birds to the wind energy facilities, the development of collision monitoring and deterrent technology, and/or habitat acquisition for birds, and other compensatory conservation actions.

Bird-smart Principle 5: evaluation of wind energy as part of a complete analysis on all feasible renewable alternatives

Given all of the aforementioned impacts of wind energy on birds, it is good practice that project developers conduct a complete feasibility analysis to determine whether other renewable alternatives may be more appropriate at their proposed sites. Alternative energy sources, such as distributed solar energy (i.e., photovoltaic panels on preexisting structures such as houses or other buildings), can require less infrastructure, such as power lines, and have less impact on birds. In 2011, the Bureau of Land Management and the California Public Utilities Commission considered distributed solar as a feasible alternative to three energy projects in San Diego County (BLM/CPUC EIS). California is an example of a state that invested so heavily in solar that it is exporting its power to other states[31]. A complete **feasibility analysis** would determine the need and justification for additional energy capacity generated from other renewable sources, including wind energy.

Bird-smart Principle 6: environmental compliance with a rigorous local, state, and federal regulatory framework

In the US, birds are protected federally from incidental take by wind turbines under the Endangered Species Act (ESA), Bald and Golden Eagle Protection Act (BGEPA), and Migratory Bird Treaty Act (MBTA). Despite efforts to weaken the ESA and MBTA, these laws have a record of success. A recent interpretation of the MBTA exonerates developers from incidental take of migratory birds – this is extremely insufficient, under litigation, and opposed by several organizations and members of congress. Members of our policy team are working towards developing a process of protecting migratory birds similar to the Bald and Golden Eagle Protection Act (BGEPA). Additionally, American Bird Conservancy has been actively involved in the National Environmental Policy Act (NEPA) process to ensure that Environmental Assessments (EA) and Environmental Impact Statements (EIS) include adequate measures to monitor, minimize, and mitigate bird mortalities. American Bird Conservancy is particularly concerned about the effects of wind turbines on rare species, including those listed as Threatened and Endangered.

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[30] Sekercioglu, C. H. 2003. Conservation through commodification. Birding, 35(4), 394-402. http://sekercioglu.biology.utah.edu/PDFs/Sekercioglu%202003%20Birding_Conservation%20through%20commodification.pdf

[31] Penn, I. 2017. California invested heavily in solar power. Now there's so much that other states are sometimes paid to take it. L.A. Times, 22 Jun. https://www.latimes.com/projects/la-fi-electricity-solar/

4301 Connecticut Ave, NW, Suite 451 | Washington, D.C. 20008

Tel: 202-234-7181 | Fax: 202-888-7496 | abc@abcbirds.org | www.abcbirds.org

American Bird Conservancy works with legislators to improve the existing policy and regulatory framework designed to protect birds We also collaborate with state and federal agencies to provide guidelines for energy developers. In 2011, the US Fish and Wildlife Service published voluntary guidelines for developing wind energy on land. American Bird Conservancy favors mandatory, rather than voluntary guidelines for wind energy that effectively protect our nation's native birds from this rapidly expanding industry, both on and offshore. In 2015, American Bird Conservancy petitioned the Department of the Interior to develop a rulemaking process and mandatory permitting system – this was endorsed by several partner groups. Guidance for developing offshore wind energy is currently under review by the USFWS, which is a step in the right direction. We urge a precautionary approach when it comes to wind energy compliance with avian guidelines and regulations. BOEM has issued guidelines for avian surveys[32] as well as Construction and Operation Plans[33]. We encourage BOEM to treat these guidelines as mandatory and continue to engage stakeholders in updating these guidelines.

Build capacity

We commend BOEM's participation in regional planning to guide leasing decisions, with state and federal oversight, as has occurred with the U.S. National Offshore Wind Strategy[34]. Organization of an independent ***avian stakeholder advisory group*** is key to the regional planning process. An independent avian stakeholder advisory group should be charged with a variety of tasks throughout the wind energy planning and operation process. This group makes informed decisions about the potential impacts of offshore wind energy development, contributes to the NEPA process, encourages regional planning, and establishes mandatory guidelines and best management practices. It also helps to identify knowledge/data gaps, interpret data, methods, and results from the monitoring plan, and assess cumulative impacts. The group provides transparency by disseminating data and results to public, and also ensures multi-agency oversight. It should assess the need for incidental take permits, recommend adaptive management of operations, and help to develop and implement the mitigation fund. As an example, the New York State Energy Research and Development Authority (NYSERDA) has developed an Environmental Technical Working Group (ETWG) to pursue similar goals. Such existing groups may be used as a foundation to structure future groups dedicated to regional issues nationwide. We highly recommend that the BOEM Intergovernmental Renewable Energy Task Force establish such an advisory group.

[32] https://www.boem.gov/Avian-Survey-Guidelines/
[33] https://www.boem.gov/COP-Guidelines/
[34] DOE. 2016. A national offshore wind strategy: Facilitating the development of the offshore wind industry in the United States. Department of Energy, Washington, DC. https://www.boem.gov/National-Offshore-Wind-Strategy/

General Recommendations

To summarize, in their current form, the COP and EIS are incomplete without a ***transparent, scientifically rigorous monitoring, minimization, and mitigation plan***. The monitoring, minimization, and mitigation plan should be approved by a ***non-affiliated avian stakeholder advisory group, with state and federal agency oversight***.

Long term (>5 years) pre- and post-construction studies need to follow ***"Before, After – Control, Impact"*** or ***"Before-After Gradient"*** protocols (i.e., with appropriately-selected ***control plots*** adjacent to the Vineyard Wind for comparison). Such studies should be conducted ***independently*** from the developer (i.e., supported through a ***bird mitigation fund***) and be systematically designed to accurately and precisely quantify the ***collision and displacement vulnerability*** of protected birds to offshore wind energy development. Mortality estimates need to be submitted to the overseeing agencies (e.g., USFWS, MassWildlife) and ***detection-and-curtailment*** systems installed (for larger bird species, such as kittiwakes and gannets), along with deterrent technology.

We also recommend that Vineyard Wind follow an ***adaptive management*** plan based on the results of the monitoring, minimization, and mitigation plan (see ABC's comments on BOEM's EA). This needs to include the reassessment of a Section 7 ESA consultation (i.e., determining the likelihood for adverse effect).

Sincerely,

Holly Goyert, PhD
Bird-Smart Wind Energy Campaign Director
American Bird Conservancy
Washington, DC
https://abcbirds.org/program/wind-energy-and-birds/

4301 Connecticut Ave, NW, Suite 451 | Washington, D.C. 20008
Tel: 202-234-7181 | Fax: 202-888-7496 | abc@abcbirds.org | www.abcbirds.org