AMERICAN BIRD CONSERVANCY
Bringing back the birds

19 Nov 2018

William Yancey Brown
Chief Environmental Officer,
Bureau of Ocean Energy Management (BOEM)

RE: http://www.regulations.gov Docket No. BOEM-2018-0010

Dear Dr. Brown,

Thank you for the opportunity to comment on the Notice of Intent to Prepare an Environmental Impact Statement (EIS) for Deepwater Wind South Fork (DWSF), LLC's Proposed Wind Energy Facility Offshore Rhode Island and Massachusetts. This footprint is situated within BOEM Renewable Energy Lease Area OCS-A 0486, hereafter referred to as "Lease Area".

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. We are writing to highlight updated information on the "best available science" published recently on protected bird species that the DWSF project is likely to impact.

We also specify grave deficiencies in the project's Environmental and Permitting Assessment, Construction and Operations Plan (COP), and Avian and Bat Risk Assessment (Appendix Q). It is crucial that the project establish a rigorous monitoring and mitigation plan, for consideration in the EIS.

Recent studies provide critical information needed to improve upon BOEM's Revised Environmental Assessment (EA[1]) on the Lease Area. Loring et al. (2018[2]) published a study funded by BOEM, which shows several occasions where six federally Threatened rufa Red Knots cross over the DWSF footprint, at altitudes within the rotor swept zone (Fig. F-7, 11, 13, 15, 17, 19). These crossing events occurred during the first three weeks of November (1st -18th).

Loring et al. (in review) use a similar methodology to track Common Terns, Endangered Roseate Terns, and Threatened Piping Plovers with nanotags across the Motus wildlife network. Tracking technology complements other wildlife surveys (e.g., boat-based and aerial) by offering information on flight heights and nocturnal movements of birds. The Loring et al. tern and plover report has been submitted

[1] BOEM. 2013. Commercial Wind Lease Issuance and Site Assessment Activities on the Atlantic Outer Continental Shelf Offshore Rhode Island and Massachusetts, Revised Environmental Assessment. Office of Renewable Energy Programs. OCS EIS/EA. BOEM 2013-1131. May.

[2] 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.

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to BOEM and should be released by the start of 2019; preliminary results were included in the Loring et al. (2017[3]) annual report.

Across multiple years of the study (2014-2017), Common and Roseate Terns cross directly over the Lease Area several times, particularly during the post-breeding season. If the DWSF project continues with construction, minimization measures will need to be implemented to prevent take of Piping Plovers, Red Knots, and particularly Roseate Terns (all three of which are state-listed in New York, Rhode Island, and Massachusetts).

Winship et al. (2018[4]) modeled and mapped the relative density of marine birds on the Atlantic Outer Continental Shelf, using 3 decades of aerial and boat-based visual surveys at sea. Their results show high densities of Common Loons, Northern Gannets, Cory's Shearwaters, Northern Fulmars, Black-legged Kittiwakes, and other gull species in the Lease Area. This is concerning, particularly for gannets and kittiwakes, which are protected from take by the Migratory Bird Treaty Act (MBTA) but have shown high collision and displacement vulnerability scores (Willmott et al. 2013[5]).

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[6]) 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 surveys has been additionally validated with the use of drones (Harwood et al. 2018[7]).

Offshore wind energy developments pose imminent threats to marine birds with respect to collision and displacement risk, as well as cumulative impacts. American Bird Conservancy has developed a "Bird-Smart Wind Energy Policy" that can be used as guidelines (Appendix) to reduce and redress any unavoidable bird mortality and habitat loss from wind energy development.

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[3] 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.
[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] 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.
[6] 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.
[7] 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.

Our policy states that wind power should employ careful siting of infrastructure, operation and construction mitigation, monitoring, and compensation. We attach guidance points on how to establish a rigorous monitoring and mitigation plan, and these need to be incorporated into the DWSF EIS.

Given that the DWSF project falls in the flight paths of migrating Red Knots, Piping Plovers, and foraging Roseate Terns, particularly during the post-breeding season, the EIS needs to provide certainty on how take will be will be minimized, from collisions, habitat displacement/loss, and cumulative impacts. A multi-year monitoring and mitigation plan, involving scientifically rigorous study (e.g., before-after-control-impact) is critically needed to assess and minimize impacts on the Red Knot, Piping Plover, and Roseate Tern populations. We provide specific comments and recommendations below.

Recommended revisions to COP, Avian and Bat Risk Assessment, and associated documents:
In its current state, the avian risk assessment draws arbitrary conclusions that are not justified through literature or quantitative analysis. Its conclusions are based on outdated literature, at best, and do not include current site-specific analysis of collision modeling or displacement vulnerability, particularly given updated parameters from recent publications (e.g., Johnston and Cook 2016, Loring et al. 2018 and in review, Skov et al. 2018[8]). The findings underrepresent the impacts of collision and displacement on listed species, including Roseate Terns, Piping Plovers, and Red Knots. We recommend major revisions (listed below), including a risk assessment that quantifies collision and displacement vulnerability using updated parameters in the literature. Based on the best available science, we expect that operational impacts on listed bird species (Piping Plover, Red Knot, and Roseate Tern) are likely to be moderate to high.

Specific comments on Environmental and Permitting Assessment

p. 17. Based on new studies published by Loring et al. (2018 and in review), the biological assessments by BOEM and subsequent consultations with USFWS need to be updated: the "likelihood of roseate terns occurring in the [South Fork Wind Farm]" is not "extremely low", but rather high.

Specific comments on COP

p. ES-6. Definitions need to be provided on what is considered negligible, minor, moderate, or major.

Table ES-1. Avian species. A monitoring and mitigation plan is needed for the DWSF project. Details below.

Table 4.3-45. The status of terns offshore needs to be changed from "rare" to "common". Definitions need to be provided to distinguish between "uncommon", "rare", and "occasional".

Table 4.3-46. The status of terns offshore needs to be changed from "rare" to "common". Shorebirds (e.g., Piping Plover, Red Knot) need to be added to this table as "common" during spring and fall migration. Definitions need to be provided to distinguish between "uncommon", "rare", and "occasional".

p. 4-240. Collision risk of terns is moderate – high (not low). This is based on several vulnerability studies cited in the Avian and Bat Risk Assessment

p. 4-241. Federally and state-listed species cross the DWSF several times per month, and sometimes even more than once per day (Loring et al. in review); …"at most twice per year during migration", is inaccurate.

[8] Skov, H., Heinänen, S., Norman, T., Ward, R.M., Méndez-Roldán, S. & Ellis, I. 2018. ORJIP Bird Collision and Avoidance Study. Final report – April 2018. The Carbon Trust. United Kingdom. 247 pp.

Specific comments on Avian and Bat Risk Assessment (Appendix Q)

Executive Summary

p. iii. We disagree that the operations "impacts associated with risk of collision are anticipated to be negligible to minor." We also disagree that displacement effects will be "negligible to minor". We discuss the specifics below, but recommend that operations impacts be listed at the very least as "moderate".

Table E-1. "ROTE" should be replaced with "ROST", as used later in the document.

2.1 ASSESSMENT GOALS AND OBJECTIVES

p. 5. The Red Knot is also state-listed as threatened (in New Jersey).

2.2 APPLICABLE REGULATIONS

Table 2-1. In addition to New York, this should include state-listings and legislation in Rhode Island and Massachusetts, given the Memorandum of Understanding between the two states for this wind energy area.

2.3 RISK ASSESSMENT APPROACH.

p. 8. 2.3 More is now known about the weather conditions when Red Knots, Piping Plovers, Roseate and Common Terns cross over the lease area. Information needs to be included in this section from Loring et al. (2018 and in review). For example, what ***cut-in*** and ***cut-out*** wind speeds will be used and how does this correspond to the median wind speed at which Red Knots departed into federal waters (7.4 m/s, Table 5 of Loring et al. 2018).

2.8.1.3 Key Factor 3: Avian Flight Heights.

p. 24. Roseate Tern flight heights will need to be updated with the Loring et al. study (in review). Here, the report should refer to Common Terns, with a reference to p. 30 Avian Flight Heights: Listed Species, to which the information on Roseate Terns should be moved.

Avian Flight Heights: Listed Species.

p. 30 This needs to be updated using information from Loring et al. (2018), where migratory flight heights of Red Knots were estimated to fall within the rotor swept zone.

2.10.1.1 Collision Risk

p. 45. The section on Operations Impacts (Section 2.10.1) is incorrectly referred to as Section 2.4.1.

p. 55. There are many problems with the following statement: "While the likelihood of a collision for each of these sensitive species is generally considered low, the loss of one or a few individuals per year may represent a minor impact." First, this statement refers to Roseate Terns, which are federally listed species. Therefore, "the loss of one or a few individuals per year" would qualify as take and require an incidental take permit under

Section 7 of the Endangered Species Act (ESA). By definition, "take" is not considered "minor". Third, the conclusions drawn in this risk assessment are based on outdated literature and do not include any site-specific analysis of collision modeling, particularly given updated parameters from recent publications (e.g., Loring et al. in review). The findings of this section need to be updated to adequately quantify the impacts of collisions on listed species, including Roseate Terns, Piping Plovers, and Red Knots.

Table 2-13. This table extremely underrepresents the risk of collision on birds. First, it needs to provide justification for the assigned "Risk of Collision" and "Level of Potential Impact", which appear arbitrary. It needs to include comprehensive citations from all of the existing literature (e.g., Willmott et al. 2013, Furness et al. 2013[9], Garthe and Hüppop 2004[10], Burthe et al. 2014[11]) on vulnerability assessments and the resulting vulnerability scores from those studies (which identify collision risk in terns as high). Second, the table is entitled "Species level of collision risk", when it shows both species and groups; i.e., it is not clear that kittiwakes are included in gull species. Third, it needs to include a site-specific quantitative approach to estimating collision risk.

2.10.1.2 Disturbance.

p. 61. Roseate Terns occur frequently over the DWSF; it is inaccurate to state that Roseate Terns, Piping Plovers, and Red Knots occur "infrequently" over the site. Similarly, it is inaccurate to say that "the loss of a single individual of a listed species could represent a minor impact" – it qualifies as take and requires an incidental take permit in consultation with the USFWS under Section 7 of the ESA.

2.10.2.1 Displacement or Attraction

p. 62. This section is confounded with the next section on Barrier Effects, and should be merged together with it. There needs to be some discussion here of how terns have scored high displacement scores in several vulnerability studies, including those cited on p. 13 of the Offshore Avian and Bat Literature Summary (e.g., Willmott et al. 2013, Dierschke et al. 2016[12]).

2.10.2.2 Barrier Effects.

p. 63. There are many inaccuracies in the following statement:

> "Roseate tern and least tern crossings of the SFWF are expected to be infrequent and largely restricted to post-breeding or migratory periods. Terns are among bird groups that have demonstrated continued use of offshore wind farms, presumably without large increases in

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

[10] Garthe, S. and Huppop, O. (2004), Scaling possible adverse effects of marine wind farms on seabirds: developing and applying a vulnerability index. Journal of Applied Ecology, 41: 724-734.

[11] Burthe SJ, Wanless S, Newell MA, Butler A, Daunt F (2014) Assessing the vulnerability of the marine bird community in the western North Sea to climate change and other anthropogenic impacts. Mar Ecol Prog Ser 507:277-295.

[12] Dierschke, V., R. W. Furness, and S. Garthe. 2016. Seabirds and offshore wind farms in European waters: avoidance and attraction. Biological Conservation 202: 59-68.

energy expenditure while avoiding encounters with WTGs. Micro avoidance behaviors are expected to result in minor changes to tern flight behavior and minimal increases in energy expenditure. Terns may cross the area during migration; however, their flight heights are expected to generally be above the RSZ. Negligible impacts associated with barrier effects to roseate terns are expected."

First, Roseate Terns cross DWSF frequently during the post-breeding season (Loring et al. in review). Second, there are no citations for the rest of the paragraph. Several vulnerability studies cited throughout the risk assessment resulted in high vulnerability scores due to collision and displacement in terns (e.g., Willmott et al. 2013, Furness et al. 2013). Third, tern flight heights are more likely to be below or within the RSZ than above it. Barrier effects on terns are likely to be moderate or high, not negligible (e.g., Harwood et al. 2017[13]).

Table 2-16. This table extremely underrepresents the impacts of displacement and barrier effects on birds. In particular, gannets and gulls have a high displacement vulnerability (Willmott et al. 2013, Skov et al. 2018, Garthe et al. 2017[14]), and therefore are likely to experience habitat loss, which is not shown here; apparently, the vulnerability studies cited later are not used to inform this risk assessment. See comments on Table 2-13, above, for more details.

3.0 AVOIDANCE AND MINIMIZATION MEASURES

3.1 SFWF

p. 67. Given that operational impacts on listed bird species are likely to be moderate to high, the proposed minimization measures are insufficient. A monitoring and mitigation plan is crucial. We also recommend operational curtailment (see below); see our attached guidelines (Appendix) for more suggestions.

[13] Harwood A.J.P., Perrow M.R., Berridge R.J., Tomlinson M.L., Skeate E.R. (2017) Unforeseen Responses of a Breeding Seabird to the Construction of an Offshore Wind Farm. In: Köppel J. (eds) Wind Energy and Wildlife Interactions. Springer, Cham

[14] 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. https://doi.org/10.1007

Avian and Bat Resources Technical Report

2.2 AVIAN ECOLOGY AND DISTRIBUTION IN THE STUDY AREA

p. 9 The Loring et al. studies need to be updated to reflect the final reports (2018 and in review).

Table 2. This should include state-listings and legislation in Rhode Island and Massachusetts, given the Memorandum of Understanding between the two states for this wind energy area. The status of terns offshore needs to be changed from “rare” to “common”. Shorebirds (e.g., Piping Plover, Red Knot) need to be added to this table as “common” during spring and fall migration. Definitions need to be provided to distinguish between “uncommon”, “rare”, and “occasional”.

2.2.1.8 Terns

p. 17. The Loring et al. studies need to be updated to reflect the final reports (2018 and in review).

p. 18. A statement should be added that: it is probable that roseate terns will fly through the South Fork Wind Farm (SFWF) during the post-breeding season. They cross over DWSF from their colony at Great Gull Island to their critical staging area on Cape Cod where they feed on their primary prey item, sandlance (*Ammodytes* spp.).

2.2.4 Bird Ecology and Distribution Summary

Table 5. This table should be consistent with Table 4.3-46 in the COP and Table 2 in the Risk Assessment. For example, it lists Roseate Terns as “occasional”, as opposed to “rare” as in the other Tables. See comments above on those tables.

Offshore Avian and Bat Literature Summary

Citations in this section need to be moved to their appropriate sections earlier in the document and used to inform the risk assessment. In its current state, the risk assessment draws arbitrary conclusions that are not justified through literature or quantitative analysis.

AVIAN AVOIDANCE/ATTRACTION BEHAVIORS

p. 4-5. These citations need to be moved to section 2.10.2.2 Barrier Effects

AVIAN FLIGHT HEIGHT

p. 6-7 These citations need to be moved to 2.8.1.3 Key Factor 3: Avian Flight Heights

VISIBILITY AND LIGHTING

p. 8 These citations need to be moved to section 2.10.1.1 Collision Risk.

DISPLACEMENT/AVOIDANCE

p. 11-13. These citations need to be moved to sections 2.10.2.1 Displacement or Attraction and 2.10.2.2 Barrier Effects; those two sections are confounded and would be better suited for merging together.

p. 13. The following statement is not cited. "While roseate terns had a relatively high displacement sensitivity ranking, data from offshore projects in Europe suggest terns do continue to occur in and around operational wind farms." Roseate Terns have scored high displacement vulnerability in several studies (e.g., Willmott et al. 2013, and this statement presents a weak attempt to ignore that.

Specific comments on BOEM's Revised Environmental Assessment (EA)

p. 3. Based on new studies published by Loring et al. (2018 and in review), the biological assessments by BOEM and subsequent consultations USFWS need to be updated: the "likelihood of roseate terns occurring in the [South Fork Wind Farm]" is not "extremely low", but rather high.

p. 4-16 It is inaccurate to state that densities decline farther from shore, particularly with respect to this lease area. This statement misinterprets the Winiarski et al. 2012 OSAMP study[15] to underrepresent roseate terns, as mentioned in a public comment by the study author. Densities vary by season and dynamic oceanographic features, and terns are not rare offshore.

p. 4-20 Menza et al. 2012 is outdated and shows *relative* abundance, because it does not account for detectability; Winship et al. 2018 provides an updated analysis on relative densities from ship-based and aerial surveys. Based on recent tracking studies (Loring et al. (in review)), it is inaccurate to state that "the likelihood of roseate terns occurring in the action area has been determined to be extremely low".

[15] Winiarski, K.J., Paton, P.W.C., McWilliams, S.R., Miller, D.L., 2012. Studies investigating the spatial distribution and abundance of marine birds in nearshore and offshore waters of Rhode Island. Ocean SAMP Technical Report # 26. University of Rhode Island, Narragansett, RI.

Recommended mitigation specific to Lease Area:

Take of Roseate Terns is ***highly likely*** in the northernmost blocks of the Lease Area (6764-6766, 6815-6817, 6865-6867, 6914-6919[16]) because this region is situated within key foraging routes of Roseate Terns (between Block Island, RI, Noman's Land, MA, and Martha's Vineyard, MA). ***We recommend against siting wind turbines in these lease blocks***. However, if they are considered, we recommend the following:

1. ***Adaptive management*** of the post-construction matrix design, for example where the micro-siting of floating turbines may be modified depending on results from the monitoring plan.
2. ***Operational curtailment*** of any wind turbines planned for these lease blocks, during the months when Roseate and Common Terns frequent the area (breeding and migratory seasons, April – September).

Recommended mitigation specific to DWSF Wind Energy Facility:

The COP and EIS require planned mitigation measures that appropriately address and compensate any permitted take. Given our current knowledge of the best available science with respect to DWSF, we strongly recommend ***full operational curtailment*** of the wind turbines during the Piping Plover migratory period and the Roseate Tern postbreeding season (e.g., 15 July - 15 August), as well as the rufa Red Knot migratory period (e.g., 25 October – 21 November), and additionally during low visibility conditions. Detection-and-curtailment systems should be installed for large flocks and bird species (e.g., kittiwakes and gannets) protected by the MBTA.

Effective mitigation and compensation actions should also be considered for breeding, winter and non-breeding roost sites (Appendix, part 5): 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[17]).

Recommended monitoring and mitigation plan

It is crucial that DWSF establish a ***transparent, scientifically rigorous monitoring and mitigation plan*** that is overseen by the federal and state agencies with affected natural resources (e.g., USFWS, Rhode Island Fish & Wildlife, MassWildlife, New York Bureau of Wildlife), 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 DWSF. 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. We attach ***guidelines*** to improve on this plan (Appendix, part 4), and set a precedent for future development of offshore wind energy in the Northwest Atlantic Outer Continental Shelf.

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[16] BOEM (Bureau of Ocean Energy Management). 2018. Outer Continental Shelf Renewable Energy Leases Map Book. https://www.boem.gov/Renewable-Energy-Lease-Map-Book/

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

To summarize, the monitoring and mitigation plan should be approved by a ***non-affiliated avian stakeholder advisory group, with state and federal agency oversight*** (Appendix, part 6). It should follow the ***mitigation hierarchy***, which prioritizes decision tiers in wind energy development: "(1) avoid when planning, (2) minimize while designing, (3) reduce at construction, (4) compensate during operation, and (5) restore as part of decommissioning." [18] Long term studies (>5 years) need to follow ***"Before, After – Control, Impact"*** or ***"Before-After Gradient"*** protocols (i.e., with appropriately-selected ***control plots*** adjacent to the DWSF 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. Mortality estimates need to be submitted to the overseeing agencies (e.g., USFWS) and ***detection-and-curtailment*** systems installed (for larger bird species, such as kittiwakes and gannets), along with deterrent technology.

We also recommend that DWSF follow an ***adaptive management*** plan based on the results of the monitoring 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). ***Operational curtailment should occur on an annual basis until deemed no longer necessary by the state and federal management agencies with affected natural resources*** (e.g., Rhode Island Fish & Wildlife, MassWildlife, New York Bureau of Wildlife, USFWS), consistent with the Coastal Zone Management Act. These agencies should have the authority to grant approval of the monitoring and mitigation plan and oversee the adaptive management of the operational curtailment based on the results of the monitoring studies.

[18] 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.

General Recommendations

Based on this information, we recommend that BOEM disapprove the DWSF COP ***in its current form***. It requires ***major modifications*** that we stipulated above, and which we reiterate as follows:

1. update to include an ***accurate risk assessment*** for birds protected by the ESA, based on a ***site-specific quantitative approach*** and ***updated literature*** (Loring et al. 2018 and in review). The risk assessment should state that ***operational impacts*** on listed bird species (Piping Plover, Red Knot, and Roseate Tern) are likely to be moderate to high.
2. include ***plan to curtail operations*** (15 July - 15 August, 25 October – 21 November; detection-and-curtailment; low visibility conditions)
3. establish a ***transparent, scientifically rigorous monitoring and mitigation plan*** that is overseen by ***state and federal*** agencies
4. implement an ***adaptive management plan*** based on the results of the monitoring and mitigation plan, which includes ***reassessment of a Section 7 ESA consultation*** with the USFWS.

Sincerely,

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

Appendix: ABC's draft guidelines for offshore bird-smart wind energy development

In 2010, the American Bird Conservancy (ABC) developed a Bird-Smart Wind Energy Program to advance the sustainable development of wind energy while minimizing risk to affected bird life. ABC supports the effort to combat climate change through responsible renewable energy development. However, we have concerns regarding the impacts of offshore wind turbines on seabirds. We are working with partners to implement our Bird Smart Wind Energy Policy, which promotes: compliance with a strong regulatory framework; proper siting of turbines away from high-bird-collision-risk areas; independent, transparent pre-and-post-construction monitoring; effective mitigation by wind energy facilities to minimize bird mortality; and compensation for the loss of protected birds. Below, we provide guidelines on how to establish a rigorous monitoring and mitigation plan for offshore wind energy development. For more information on ABC's Bird-Smart Wind Energy Campaign, please visit abcbirds.org/program/wind-energy-and-birds/

1. Conduct feasibility study to fully assess a complete range of available renewable energy alternatives (e.g., tidal energy, distributed solar, and increased efficiency).
2. Follow guidelines and Best Management Practices (mandatory, not voluntary)
3. Siting
    a. Avoid
        i. Important Bird Areas (e.g., ABC's Wind Risk Assessment Map)
        ii. high risk (i.e., high exposure, hazard, vulnerability)
        iii. hotspots (i.e., ecologically important areas due to good habitat for high species abundance and diversity)
        iv. sensitive habitat (e.g., wetlands)
        v. breeding colonies and movement corridors of rare or endangered species
        vi. marine protected reserves
    b. Encourage
        i. altered habitat (e.g., urban)
        ii. low risk
        iii. coldspots
        iv. resilient habitat (e.g., agriculture)
        v. farther offshore (e.g., floating)
    c. Reduce turbine number
    d. Reduce turbine density (i.e., design corridors)
    e. Select turbine height and rotor swept zone (RSZ) that minimizes collision risk, based on at-risk species
    f. Adaptive management: post-construction matrix design (e.g., floating)

4. Establish > 5 year monitoring/mitigation management plan using pre- and post-construction "Before, After – Control, Impact" or "Before-After Gradient" protocols; independently assessed
    a. Displacement
        i. Avian exposure: surveys in treatment + control plots
            1. Abundance (micro-spatiotemporal scale)
                a. Turbine-mounted Acoustic Monitoring (daily)
            2. Abundance and distribution (macro-spatial scale)
                a. Radar (daily): large birds and flocks, altitudes within RSZ
                b. Boat-Based (monthly / weekly during peak movement)
                c. Traditional aerial (monthly / weekly during peak movement)
                d. High-resolution digital aerial (monthly / weekly during peak movement), altitudes within RSZ
            3. Individual movement (macro-spatial scale): wind energy area crossings
                a. Nanotag tracking (Motus), with estimated altitudes within RSZ
        ii. Avian avoidance (micro- and macro-spatial scale)
            1. GPS tracking, with altitudes within RSZ
    b. Collisions[19]
        i. Collision risk modeling (exposure, hazard, vulnerability)
            1. Use site-specific, expert-derived, up-to-date life history parameters
        ii. Strikes
            1. Turbine-mounted multi-sensor (MUSE) wildlife detection system
                a. vibration/bioacoustics multisensors
            2. Turbine-mounted Radar/Camera
                a. Thermal Animal Detection System (TADS)
            3. Accelerometers, microphones, video cameras
                a. WT-Bird
        iii. Deterrents
            1. Visual
                a. Flight diverters
                b. Markers (e.g., associated infrastructure)
                c. Specialized light spectrum (e.g., UV, red/blue LED)
                d. Lasers
            2. Sound
            3. Attractant removal
                a. Anti-perching devices
                b. Strobe lighting
        iv. Detection-and-curtailment
            1. IdentiFlight & DTBird
                a. activation of warning sounds
                b. curtailment

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

- v. Operational curtailment
    1. Nocturnal
    2. Poor visibility
    3. Peak movement periods
        - a. Seasonal migration
        - b. Post-breeding season
- vi. Standardized mortality statistics
    1. Generalized Fatality Estimator, GenEst

5. Compensation
    - a. reduce and redress unavoidable bird mortality and habitat loss to a net benefit standard
    - b. acquire additional habitat for migratory birds
    - c. buy into mitigation fund
6. Establish non-affiliated avian stakeholder advisory group
    - a. make informed decisions about potential impacts of offshore wind energy development
    - b. encourage regional planning
    - c. establish mandatory guidelines and Best Management Practices
    - d. interpret data, methods, results
    - e. assess cumulative impacts
    - f. identify knowledge/data gaps
    - g. contribute to NEPA process
    - h. provide transparency: disseminate data and results to public
    - i. provide multi-agency oversight
    - j. assess need for incidental take permits
    - k. recommend adaptive management of operations
    - l. develop mitigation fund