ATLANTIC MARINE BIRD COOPERATIVE

13 April, 2021

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Office of Renewable Energy Programs
Bureau of Ocean Energy Management
U.S. Department of the Interior
45600 Woodland Road, VAM-OREP
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Dear Michelle Morin,

RE: Comments and Recommendations on *Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf Pursuant to 30 CFR Part 585*

On behalf of the Atlantic Marine Bird Cooperative (AMBC) Marine Spatial Planning (MSP) Working Group[1], we write to provide unsolicited constructive comments and recommendations on the Office of Renewable Energy Programs at the Bureau of Ocean Energy Management (BOEM) guidance for avian surveys concerning offshore wind energy development (BOEM 2020).

Founded in 2005, the AMBC is an international group of resource managers, scientists, and other professionals, with specific interest and expertise in marine birds. The MSP Working Group brings together experts in avian spatial data and planning to synthesize and evaluate information on bird abundance, distribution, and movement in the offshore environment to inform management and conservation decisions related to marine spatial planning. Members represent a diverse set of agencies, non-governmental organizations, industry, and universities.

This input is based on several years of discussions among AMBC members and other stakeholders, including the following targeted forums:

1) an offshore wind-focused meeting of the AMBC MSP Working Group in Princess Anne, MD (November 2019), and

2) a workshop to develop a scientific research framework for understanding impacts to birds and bats from offshore wind energy development, which was sponsored by the New York State Energy Research and Development Authority (NYSERDA) in New York, NY (March 2020).

[1] The views and opinions expressed herein do not necessarily state or reflect views, opinions, or policies of the United States or Canadian governments or any agency thereof, nor any state or provincial government or agency thereof. Mention of any trade names or commercial products does not constitute their endorsement by federal, state, or provincial governments.

The current survey guidelines are well-considered and include many useful recommendations, and the MSP Working Group commends BOEM for their efforts in developing this guidance and acknowledges its utility in informing stakeholders about conducting consistent surveys that are grounded in the best available science. In our opinion, however, the document could be updated to better reflect current best available science and clarify how information obtained through these survey guidelines should be used.

Most fundamentally, there is a discrepancy between the stated scope of the current guidance and the stated goals of survey plans developed using the guidance, and we feel that this discrepancy negatively affects the utility of the guidance for understanding the impacts of offshore wind developments on birds.

The existing guidance is explicitly focused on what the guidelines call "site characterization" surveys to inform risk assessments, and methodological guidance included in the document is oriented towards this purpose. The stated objectives of avian survey plans (p. 2), however, include not just identifying distribution and abundance patterns of avian species that are using the project site at the time of surveys (and thus should be considered during risk assessment), but also understanding the impacts of the development, such as changes in distribution and abundance patterns, once the offshore wind facility has been constructed. The methodological guidance on pre-construction survey design is inadequate for the latter purpose.

As such, we strongly encourage BOEM to develop post-construction survey guidelines, and integrate them with updated site characterization and pre-construction guidance (see recommendations below) to avoid the decoupling of these processes. We also recommend that BOEM strongly encourage all developers to adopt these guidelines as the standard best practice for assessing risk and monitoring impact.

COMMENTS & RECOMMENDATIONS ON EXISTING SURVEY GUIDELINES

We provide the following specific comments for BOEM's consideration regarding the current guidelines for site characterization surveys:

General Comments

- **Clarify the scope and purpose of the guidelines.** If the survey data generated under these guidelines are intended to inform regulatory decisions, the links between the guidelines and specific regulatory questions should be more explicitly stated in the survey guidelines.

- **Ensure that the guidelines incorporate survey designs that can address impact assessment in addition to site characterization.** The existing guidance is focused on site characterization surveys, and should take a more holistic approach to additionally inform questions about impact assessment and post-construction monitoring. While site characterization is an essential component in helping developers inform risk assessment, this scope largely ignores other reasons that developers should conduct surveys, namely to understand impacts of the development. This focus can result in pre-construction survey designs that are insufficient and ineffective for obtaining information required for post-construction assessments (MMO 2014).

- **Provide additional clarity and reduce uncertainty on how and when to integrate existing baseline data into analyses.** While the existing guidelines have substantial value for informing site characterization surveys, additional clarity should be provided regarding the appropriateness of using existing baseline data versus collecting new surveys. This would reduce uncertainties and inconsistencies among developers on how data are collected and analyzed. For example, the Northwest Atlantic Seabird Catalog and resulting modeling efforts (e.g., Winship et al. 2018) can provide valuable insights during the scoping stage into the likely sensitivity of different areas, or complement and contextualize new survey data. We recommend that BOEM rely on their own scientific assessments in this area (Kinlan et al. 2012) to make clear, consistent recommendations to developers about when existing baseline data at a site is sufficient for both site characterization ***and*** pre-construction monitoring purposes. These recommendations should articulate circumstances under which additional monitoring is recommended (for example, insufficient geographic or temporal scale and/or resolution of baseline data coverage, methodological issues with baseline surveys, and age of existing data).

- **Expand the minimum recommended survey buffer area.** The existing survey guidance currently states: *"In order for the plan to be useful, the baseline information and post-construction survey effort needs to have the statistical power to detect a significant impact*" (p. 5). However, the literature suggests that the minimum buffer zone recommended to be surveyed beyond the wind farm footprint (one nautical mile) is inadequate for attributing any detected changes (between pre- and post-construction distribution and abundance data) to the presence of the wind facilities. Before-after-gradient (BAG) designs have become the accepted method for assessing displacement, due to challenges with before-after-control-impact (BACI) studies relating to identification of suitable control sites; however, BAG designs are most effective with large buffer areas (Mackenzie et al. 2013, Methratta 2020). For example, sensitive marine bird species can be displaced up to 20 km (Skov et al. 2018, Heinänen, et al. 2020, Vilela et al. 2020, Peschko et al. 2020). European projects are required to survey a minimum of 4 km or more around projects (Thaxter and Burton 2009, Jackson and Whitfield 2011), and a 10 km survey buffer is increasingly used in Europe. Thus, BOEM should greatly expand the recommended survey buffer zone size for pre-construction surveys to facilitate detection of displacement. Increasing the buffer zone size would lead to developers surveying parts of neighboring lease areas in some locations, therefore, in such situations, BOEM should recommend and strongly encourage developers to advance collaborative, regional approaches to surveys.

- **Increase recommended survey frequency to at least one per month during time periods of interest.** The existing survey guidelines currently state: "*Surveys should be conducted monthly in an effort to capture the peak annual abundance; however, surveys may be conducted less frequently if peak use times are known*" (Tables 1-3, pp. 6-9). The current wording (perhaps inadvertently) suggests that surveys conducted during peak use times could occur less often than once per month. We believe that surveys should be conducted *at least* (i.e., minimum) monthly, with surveys potentially occurring more frequently during peak abundance periods or other time periods of interest, depending on the specific management question to be answered. Developers should also be encouraged to monitor and consider real-time environmental conditions that might warrant additional surveys, to ensure repeated effort during windows of ecological interest. Other factors, such as the occurrence of rare species or outliers (e.g., observations divergent from expected patterns) may also warrant additional surveys during time periods outside of peak use, if known. In general, developers should consider the balance between the benefits of timing surveys further apart (e.g., greater

than 5–7 days) to maximize independence among surveys (and reduce unnecessary survey costs/resources), with the risk of missing important patterns in ecological variability if spaced too far apart. Identifying BOEM's priorities during the review and feedback process would maximize survey quality and resolve questions surrounding this tradeoff between the frequency of surveys and the width of survey windows.

- **Better justify the recommendation of conducting two annual cycles of surveys for site characterization**. The existing survey guidance calls for: "*two annual cycles of surveys to capture inter-annual variation in counts*" (Tables 1-3, pp. 6-9). We believe that this recommendation should be better justified with a reference to appropriate published studies. Otherwise, we suggest removing the current justification (i.e., "to capture inter-annual variation") from the guidance and instead attribute this timing to logistical or other reasons. In practice, the seasonal baseline documented in two years of pre-construction surveys is often too variable to fully capture inter-annual variation in counts (Bailey et al. 2014, Goyert et al. 2016). We believe it is important to capture inter-annual variability, although this usually requires at least 5-10 years and consideration of the oceanic lags that occur in response to climate phase shifts (e.g., North Atlantic Oscillation, Visbeck et al. 2003).

- **Update recommendations for data collection and management.** First and foremost, we believe BOEM should strongly recommend that observation and survey effort data be made publicly available in a timely fashion following data QA/QC completion (within one year). Standardized formats for data reporting and centralized data storage should help to meet this timeline, which is important in assessing the cumulative impacts of offshore wind energy on wildlife. Second, the survey guidelines should define and describe what is meant by "species of interest." Third, we recommend updating the name "National Oceanographic Data Center (NODC)" to the more current "National Centers for Environmental Information" (NCEI; https://www.ncei.noaa.gov/).

- **Specify reliable avian flight height data collection methods, particularly during boat surveys**. Flight heights of birds are difficult to record accurately and precisely, and recent studies have indicated biases in flight heights recorded during boat surveys (Glennie et al. 2015, Johnston et al. 2014, 2016, Borkenhagen et al. 2017 and Harwood et al. 2018). These biases are largely due to measurement error, platform effects, and sampling conditions, since boat surveys occur during relatively fair weather (Beaufort Sea States <4, see below), and flight heights tend to increase with wind speed (Ainley et al. 2014). To avoid this, studies should account for the analysis of flying birds using established methods, particularly for slow-moving vessels (e.g., <10 knots; Spear et al. 1992 and 2004). With respect to digital aerial surveys and the use of LiDAR (Light Detection and Ranging technology), flight height estimation methods are currently evolving (Cook et al. 2018) and BOEM should consider the reliability of these methods as they are rolled out (e.g., Humphries et al. *in press*). Non-survey sensor-based methods (e.g., radar, GPS tags and/or altimeters) often provide more reliable flight height data, depending on species traits such as body size and behavior (Largey et al. 2021). However, these methods also pose analytical challenges with respect to biases and error, for example tags tend to be deployed on breeding birds captured at colonies, and radar often cannot provide information on species identity (Ross-Smith et al. 2016, Péron et al. 2020). The survey guidelines should acknowledge biases in height data obtained from boat-based surveys and encourage the collection of flight heights only where they can be reliably recorded or estimated (e.g., following Largey et al. 2021).

- **Update Appendix 1.** Many recent studies with direct application to developer-funded site characterization surveys have been published in recent years, many with funding from BOEM. We recommend that the list of resources be updated to include such studies as Leirness and Kinlan 2018, Loring et al. 2018, Loring et al. 2019, Winship et al. 2018, etc.

Boat-based Surveys

- **Clarify how to maximize the effectiveness of boat-based surveys.** Boat-based surveys are widely used to collect data for site characterization and baseline distribution and abundance studies, and there may be specific research or monitoring questions that can only be answered with boat-based surveys (e.g., behavioral associations with *in situ* environmental data). However, many bird species respond to vessel traffic, which could impact bird distributions and our capacity to measure changes; while habituation can occur within shipping lanes, it is less likely to occur elsewhere (e.g., in and around offshore wind developments; Schwemmer et al. 2011). Therefore, due to such issues as disturbance (or attraction), repeatability, and safety, boat-based surveys need to be very carefully designed if they are to be effective, particularly for comparing avian distributions or abundance pre- and post-construction.

- **Clarify the degree of spatial coverage required.** Line-transect and snapshot sampling are well-established boat survey methods (Tasker et al. 1984), although the latter is preferred in Europe over the use of range and bearing, to avoid double-counting birds in flight. Estimating spatial coverage requires a different process for each survey method. The current guidelines mention a line-transect sampling method employing distance sampling (following Camphuysen et al. 2002), but also describe a mix of strip and line transect methods for boat-based surveys employing a 300 m half strip width with an observer on each side of the survey vessel. Boat-based marine bird surveys are often restricted to viewing one side of the vessel, and the effective strip width is usually less than 300 m for most species in a distance sampling framework, particularly aboard smaller vessels with lower observation platforms. Poor assumptions about strip width may result in less than 10% coverage, if species-level variability in effective strip width is not considered when planning transect spacing. We recommend that BOEM remove language specific to strip transects and strip width completely and focus the guidelines on line transect methods with distance sampling. Survey coverage could be estimated based on the detection ranges of focal species representative of the geographical area or avian community.

- **Clarify acceptable sea conditions.** The current guidelines state that "*no surveys should be conducted if conditions are ≥4 on the Beaufort Scale, or when visibility is poor*." Sea State 4 on the Beaufort Scale is defined as a moderate breeze (20–28 km/hr) with small waves (1–2 m) and occasional whitecaps. Restricting surveys to conditions ***less than*** Sea State 4 seriously limits the number of days in which boat-based surveys can be conducted, especially in some seasons and in far offshore areas where Wind Energy Areas and most lease blocks are currently located. We recommend BOEM consider including Sea State 4 as acceptable conditions for boat-based surveys. Digital aerial surveys (see below) can be flown at greater sea states, up to Sea State 6, although this can potentially reduce data quality: a better understanding between detection rates and sea state is needed.

- **Allow for flexibility in rigorous multi-model analyses.** The guidelines should encourage standardized tools for analyzing data (e.g., MRSea, MacKenzie et al. 2013),

including an objective and transparent model selection approach (e.g., Arnold et al 2010). BOEM suggests using Akaike Information Criterion values for multi-model analyses, which should be expanded to incorporate other appropriate information criteria (e.g., AICc for small samples, or analogous criteria relevant to Bayesian analyses, like DIC or BIC).

Traditional Aerial Surveys

- **Discourage use of visual aerial surveys where digital aerial surveys are feasible.** Although traditional aerial surveys have been used to collect data for site characterization and baseline distribution and abundance studies, there are substantial limitations to these data (Webb and Nehls 2019). Traditional aerial surveys require flying at such low altitudes that they cannot be repeated safely post-construction, due to the height of project infrastructure. Therefore, they do not provide data that can be used to meet the broader goals of assessing post-construction changes in seabird distributions and abundance. In addition, low-elevation flying is known to disturb marine bird species, causing some to dive or flush ahead of the plane, which can bias survey results (Buckland et al. 2012, Žydelis et al. 2019). Robust sampling methods (e.g., distance sampling) are limited because of narrow effective strip widths (Briggs et al. 1985) and low avian detection rates when estimating range and bearing from an aircraft moving at survey speed. Low-altitude human observer-based aerial surveys also pose substantial safety concerns for pilots and observers. In particular, use of single-engined piston aircraft should be highly discouraged (or prohibited) for offshore surveys.

Digital Aerial Surveys

- Recommend use of digital aerial surveys over traditional observer surveys, and **identify a minimum flight altitude and image resolution for aerial surveys.** As stated above, digital aerial surveys outperform visual aerial surveys in their ability to maintain species identifiability at higher altitudes, which reduces disturbance to wildlife. In addition, to replicate pre- and post-construction surveys, aircraft must maintain a safety margin above rotor swept zones. Higher survey altitudes reduce image resolution and clarity, however, which makes it more difficult to reliably identify small bird species. Published studies suggest that digital aerial surveys should be flown above 460 m, preferably a minimum altitude of 500 m, to avoid disturbance (Thaxter et al. 2016), but operators have reported minimal disturbance or flushing of target species during surveys conducted at 415 m. More empirical support is needed to determine the ideal minimum survey altitude, and whether it should range depending on environmental conditions. It is also important to develop a standard best practice for capturing images at an ideal resolution that enables consistent identification of smaller, rarer species, such as the *Endangered* Roseate Tern.

- **Promote and support innovation to improve imaging technology.** One challenge of digital aerial surveys is the time-consuming process of reviewing and coding raw imagery; however, they also have the important added advantage of providing a lasting record of all observations for QA purposes, allowing records and IDs to be revisited and/or reviewed by taxonomic experts. Established methods exist to account for uncertain species identity (Johnston et al. 2015), but more is needed to address availability bias, and novel approaches (e.g., machine learning) are being developed to enhance these capabilities. However, we recognize that larger and taller turbines will push the limits of digital aerial surveying. We suggest that BOEM continue to encourage

further innovation and advances that will be key to optimizing the tradeoff between aerial flight altitudes, disturbance, and image resolution.

BROAD RECOMMENDATIONS FOR IMPLEMENTATION & USE OF THE GUIDELINES

In addition to the above comments, we have several broader recommendations for BOEM's consideration. We encourage BOEM to expand their efforts in the following areas:

- **Reinforce the importance of the guidelines as minimum standards.** We recommend that BOEM strongly encourage all developers and their representatives to utilize the avian survey guidelines as accepted best practices during initial pre-survey planning meetings and other early consultations. This will prompt developers to follow a more consistent and replicable approach to risk assessment and impact assessment that is supported by best available science, while leaving room for innovation.

- **Develop guidelines for construction and operational (i.e., post-construction) periods, and integrate these with updated pre-construction guidance.** The existing survey guidelines provide useful information for helping developers conduct 'site characterization' surveys to inform risk assessment. However, they are limited in scope and thus do not meet all the stated aims of avian survey plans as listed in the guidance (list on p. 2). These aims include not just identifying distribution and abundance patterns of avian species that are using the project site at the time of surveys (to inform site characterization for initial risk assessment), but also understanding the impacts of the development once the offshore wind facility has been constructed, such as changes in distribution and abundance patterns. We believe that the development of clear guidelines for post-construction surveys may help compensate for other limitations (e.g., by supporting enough survey years to truly account for inter-annual variation, and requiring larger survey areas outside project footprints).

  Offshore wind energy development has progressed in the U.S. to the point that multiple developers are now working on post-construction monitoring plans. However, there is currently no comprehensive and consistent guidance from BOEM on what those plans should look like or what types of studies they should include. For example, environmental covariates should be incorporated into species distribution models to try to better account for any changes recorded pre- and post-construction. A strategic approach is vital to monitoring – some data are likely to be essential at all sites (e.g. density estimates within the footprint and buffer), but there should be potential for funding specific projects to address key questions of wider relevance, elsewhere (e.g., to complement survey data collection with GPS and/or Motus tracking, radar etc. where appropriate). We suggest that BOEM provide clear guidance for site-specific monitoring during the site characterization, pre-construction, construction, and operational periods, and that BOEM strongly encourages developers to follow that guidance. This would ensure a minimum standard of quality, greatly reduce inconsistencies between plans, and promote a more regional approach to answering key environmental questions.

- **Provide strong federal leadership**. We believe that leaving developers to make many of their own decisions about avian survey needs based on individual internal risk assessments leads to increased uncertainty for developers. It may also lead to poorer research standards when decisions are based more on short-term economic considerations than following scientifically sound monitoring approaches. Such a

strategy also leads to inconsistencies in the quality and replicability of the work and associated inferences that can be drawn about impacts to birds. BOEM can improve outcomes for birds while providing greater clarity and certainty for developers by developing clear, flexible guidelines, and by (1) proactively disseminating those guidelines, and (2) ensuring that developers understand and follow them.

In addition to providing developers with more consistent and comprehensive guidance in study design at the site level, including pre- and post-construction monitoring, as well as site characterization, implementation of these guidelines would facilitate cumulative impact assessment at broader scales as the offshore wind industry develops in North America.

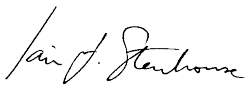
- **Develop a consistent process for regularly updating the survey guidelines**. We recommend that BOEM develop a process for regularly updating the survey guidelines to ensure that they adequately reflect rapid advances in science and technology. We encourage BOEM to include external partners at some point in this revision process to provide the input of a diverse set of experts and stakeholders.

- **Provide funding to support development of more detailed and comprehensive pre- and post-construction avian monitoring guidelines.** BOEM and its partners are expected to review applications for dozens of proposed offshore wind projects in the upcoming decade. In order to facilitate a timely and consistent review process, we suggest that BOEM could fund the creation of more detailed and comprehensive guidelines by an independent stakeholder advisory group with appropriate technical and scientific expertise.

In conclusion, we recognize and appreciate that BOEM has the authority and scientific expertise to clarify and strengthen existing guidelines, as well as to develop additional guidelines to inform offshore wind energy development in the U.S. Taking these steps will reduce budgetary and process uncertainty for offshore wind energy developers, ensure consistency and quality of data collection to understand and minimize environmental impacts of development, allow for improved cumulative impact assessments at broader regional scales, and help ensure that the offshore wind energy industry is developed in a way that is compatible with wildlife populations and informed by best available science.

We truly appreciate the opportunity to provide comments and recommendations on the guidelines, and we encourage you to include them in future guidance documents and other written and verbal communications with offshore wind energy developers. Please do not hesitate to reach out to us for clarification or further information.

Sincerely,



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American Bird Conservancy	APEM
Biodiversity Research Institute	California State University, Fresno
Canadian Wildlife Service	City University of New York, College of Staten Island
CSS Inc. (NOAA Contractor)	HiDef Aerial Surveying
Mass Audubon	National Audubon Society
New York State Department of Environmental Conservation	Normandeau
	Stellwagen Bank National Marine Sanctuary
U.S. Fish and Wildlife Service	U.S. Geological Survey
University of Manitoba	WEST, Inc.

CC: David Bigger, Tim White, and David Pereksta (BOEM),

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