Recommendations for Evaluating the Use of Existing Baseline Observational Survey Data for Birds in Offshore Wind Site Characterization Processes for the U.S. Atlantic

Developed by the Avian Displacement Guidance Committee

A Specialist Committee of the Offshore Wind Environmental Technical Working Group

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Disclaimer

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Summary

A Specialist Committee of the Environmental Technical Working Group (E-TWG) was formed in 2022 with expertise in marine birds, at-sea surveys and other research methods, and quantitative modeling and analysis of marine bird survey data. The Committee developed two guidance documents for studies of marine birds in relation to offshore wind (OSW) energy development, of which this document is one; both sets of guidance are available at www.nyetwg.com/avian-displacement-guidance. Existing avian survey guidelines from the Bureau of Ocean Energy Management (BOEM) are focused on site characterization surveys to inform permitting and planning processes prior to construction of OSW facilities, rather than detecting effects of OSW development following construction. Observational surveys to inform site characterization should have different timelines, and study designs, than surveys designed to understand changes to habitat use and distributions due to OSW development. We recommend that OSW energy developers take one of the following two approaches to survey marine birds prior to construction at their lease areas:

- If existing data of sufficient quality are available for a lease area for site characterization purposes (see below recommendations to assess this), these existing data should be used to inform risk assessments for the Construction and Operations Plan (COP) and Environmental Impact Statement (EIS), and separate pre- and post-construction surveys to detect effects should be conducted.

OR

- If existing data at the lease area are not sufficient for site characterization, the OSW developer should conduct site characterization surveys, as well as separate pre- and post-construction surveys to detect effects of the development on birds.

The Committee recognized the need for more detailed guidance on the sufficiency of existing avian observational survey data for site characterization purposes. These recommendations aim to inform an update or addendum to the existing BOEM avian survey guidelines. Existing data should generally be considered sufficient for site characterization purposes if they meet the following criteria:

- Age of Data: Existing observational survey data that is more than 10 years old should not be solely relied on to characterize a lease area. If available, older data can supplement newer data to assess the characteristics of the site and, if possible, assess environmental changes that may already be occurring at the site prior to OSW development. When existing data <10 years in age exist, supplementary new data collection should still be considered at locations where there have been substantial recent shifts in biotic or abiotic patterns. This determination should be made based on the best available science and in consultation with federal agencies.
- Spatial and Temporal Scale of Data: The spatial and temporal scale of existing survey data for a site should be considered sufficient for site characterization purposes if observational surveys were 1) conducted in all seasons (ideally monthly) for at least two years (BOEM 2020), with repeated surveys within each season and year, and surveys can be considered independent of each other, and 2) conducted in the entirety of the area of interest, with at least 10% ground spatial coverage of the lease and buffer area.
- Quality of Data: If existing survey data is to be solely relied on for site characterization, those data should have been collected via dedicated, scientifically rigorous avian observational surveys.
- Applicability to taxa of interest: If surveys are not an appropriate method for detecting and identifying taxa of specific interest, we recommend targeted supplemental data collection for site characterization purposes.
- Data Transparency: For existing survey data to be solely relied on for site characterization, the existing data (with comprehensive metadata) must be available through a recognized, publicly accessible data repository prior to being used in site characterization efforts.

- **Use of Regional Distribution Models**: Large-scale predictive models of marine bird distributions (such as those produced by the Marine-life Data and Analysis Team (MDAT) cannot be solely relied on to characterize a site, as they are not at the necessary scale and resolution for this purpose.

Introduction

The Bureau of Ocean Energy Management (BOEM) has developed a series of guidelines for offshore wind energy leaseholders in U.S. federal waters to meet the avian information requirements in 30 CFR Part 585 Subpart F (BOEM 2020). In 2021, members of the Atlantic Marine Bird Cooperative's Marine Spatial Planning Group (AMBC MSP) sent a letter[1] to BOEM leaders and staff with recommendations and technical comments for improving the "Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf" (BOEM 2020). Their comments focused in part on the integration of existing baseline observational survey data into site characterization efforts (also known as site assessment efforts). The AMBC MSP noted, "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. 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)."

In early 2022, a Specialist Committee ('Committee') of subject matter experts was convened under the auspices of the Offshore Wind Environmental Technical Working Group (E-TWG[2]; Appendix A). The main objective of the Committee was to develop guidance for pre- and post-construction research and monitoring to detect and characterize changes in marine bird[3] distributions and habitat use from OSW development in U.S. waters (Avian Displacement Guidance Committee 2024). In part, the Committee's guidance focuses on recommendations for designing effects studies[4] that use observational survey-based methods, including surveys from vessels and aircraft (Avian Displacement Guidance Committee 2024).

While the Committee's focus is on designing pre- and post-construction monitoring to detect effects, rather than on site characterization surveys, as with the AMBC MSP, Committee members recognized a need for more detailed guidance on when existing avian observational survey data are sufficient for site characterization purposes. Thus, E-TWG support staff from the Biodiversity Research Institute worked with the Committee to develop the following recommendations for regulators and OSW energy developers to consider when planning or assessing site characterization efforts for marine birds at OSW lease sites.

Site assessment vs. effects monitoring

Displacement and other changes to marine bird habitat use and distribution patterns have been documented at OSW facilities across Europe, and appear to vary in conjunction with several factors, including individual and species-level responses, site-level characteristics, and environmental conditions (Fox & Petersen 2019). Thus, carefully designed pre- and post-construction monitoring is important for detecting such changes both inside and outside wind farms, distinguishing them from other sources of variation, and allowing the data to

[1] http://atlanticmarinebirds.org/downloads/Comments_Avian_Survey_Guidelines.pdf

[2] https://www.nyetwg.com/avian-displacement-guidance

[3] Marine birds, in this context, are defined as all birds that interact with the offshore marine environment at or below the water's surface for foraging, roosting, loafing, and/or other behaviors.

[4] Pre- and post-construction research and monitoring to detect effects to marine birds from OSW development are also hereafter referred to as "effects studies" and/or "effects data".

be aggregated across projects to improve broader understanding of potential cumulative effects from OSW development.

Survey guidance for avian site characterization to inform risk assessments (BOEM 2020) is appropriate for informing permitting and planning processes prior to construction, not for surveys to detect effects of the OSW development. Avian site characterization is an essential component in helping developers inform risk assessments. However, **observational surveys to inform site characterization have different goals than those designed to understand changes to habitat use and distributions due to OSW development. Therefore, site characterization surveys may entail different methodologies than surveys that are designed to detect displacement and other effects** (Table 1). Additionally, too much time typically passes between site characterization and the operational period of a wind farm for surveys conducted during site characterization to be reliably compared to post-construction surveys to detect effects (see "age of data," below, for further discussion). The primary goal of site characterization is to provide recent data at an appropriate spatiotemporal resolution on species using the lease area (i.e., baseline occurrence and distributions), including the presence and timing of threatened and endangered species, to inform 1) required environmental review, such as the development of the project Environmental Impact Assessment (EIA) under the National Environmental Policy Act (NEPA) and 2) the identification of specific taxa or issues that may require further study of OSW effects at the site (e.g., via pre- and post-construction monitoring). In contrast, the goals of pre- and post-construction surveys are to detect, quantify, and contextualize the effects of the OSW facility. Due to differences in methodology, as well as timelines for OSW regulatory processes, pre-construction survey designs conducted for site characterization can be insufficient and ineffective for obtaining information required for post-construction assessments (MMO 2014).

While OSW energy developers may choose to use existing data for site characterization purposes, as described in the BOEM Avian Survey Guidelines, this approach will be insufficient for the detection of effects/responses of marine birds post-construction. Regardless of whether site characterization surveys are conducted, separate site-specific surveys (or another type of effects study) will need to be conducted immediately prior to construction in order to compare results to post-construction data and quantitatively evaluate and understand the degree of effects caused by the presence of the OSW facility. To allow for robust before–after gradient survey designs, such surveys will need to include multiple years of data and be focused on the lease area plus surrounding "buffer areas". Detailed recommendations from this Committee on methods for effects studies, as well as the design of observational surveys to detect effects, are available in a separate document (Avian Displacement Guidance Committee 2024). Regional density models (e.g., Winship et al. 2018, Leirness et al. 2021) can help to inform site-specific assessments, but they do not replace site-specific data for the purposes of either site characterization or effects studies (see "Use of Regional Distribution Models," below).

In summary, we recommend that OSW energy developers take one of the following two approaches to survey marine birds at their lease areas:

- **If existing data of sufficient quality and quantity are available for a lease area for site characterization purposes (see below recommendations for how to assess this), these existing data should be used to inform risk assessments, including the Construction and Operations Plan (COP) and Environmental Impact Statement (EIS). The OSW developer should conduct separate pre- and post-construction surveys to detect effects.**

OR

- **If existing data are not sufficient for site characterization, the OSW developer should conduct site characterization surveys, as well as separate pre- and post-construction surveys to detect effects.**

Given the above distinction, we make several recommendations below that are specifically focused on site characterization surveys and on when new marine bird survey data may need to be collected for site characterization purposes.

Table 1. Types of observational surveys for marine birds conducted at offshore wind (OSW) lease areas. NEPA = National Environmental Policy Act; EIA = Environmental Impact Assessment.

Type of Avian Survey	Timing	Purpose	Goal	Data Needed from Surveys	Methodology
Site assessment/ site characterization surveys	Prior to submission of Construction and Operations Plan (COP)	Identify baseline occurrence, abundance, and distributions of avian species at the project site	1) Inform risk assessments during the permitting process, including NEPA, ESA, and EIA, and 2) inform planning of future effects studies	Seasonal occurrence, distribution, and abundance, flight height and other behaviors	Can include use of existing survey data at range of spatial/temporal scales, and/or new survey efforts (BOEM 2020). Existing survey data for the site must meet specific criteria as outlined in this document.
Pre- and post-construction surveys	Prior to initiation of offshore construction activities ("pre-construction") and during normal facility operations (e.g., "post-construction")	Compare distributions, abundance, and habitat use patterns of marine bird species at the project site prior to and following construction of the facility	Detect, quantify, and contextualize effects of the OSW facility on marine bird distributions, abundance, and habitat use (such as macro- to meso-scale avoidance or attraction)	Seasonal distribution, abundance, and habitat use in relation to a range of environmental covariates and wind facility characteristics	Standardized, repeatable surveys designed to 1) ensure statistical power to detect effects such as displacement, 2) distinguish changes caused by an OSW facility from other sources of variation, and 3) inform broader understanding of potential cumulative effects from OSW development (the latter in aggregation with data from other projects). Surveys conducted in the pre-construction period must be replicable post-construction.

Recommendations for Evaluating the Use of Existing Baseline Data in Site Characterization Processes

The Committee has developed a series of recommendations for when OSW energy developers should conduct new surveys at a lease area for site assessment purposes, rather than relying solely on existing baseline data. **These recommendations aim to inform an update or addendum to the existing BOEM avian survey guidelines for site characterization (BOEM 2020). It is strongly recommended that OSW developers follow the existing BOEM guidelines for site characterization surveys**; these supplemental recommendations for use of existing data are aligned with the BOEM guidelines regarding characteristics such as number and spacing of surveys, spatial coverage, and other factors. **Coordination with regulatory agencies, including BOEM and USFWS, is strongly encouraged to ensure that if existing data are being proposed for use in site characterization, the resulting assessment is expected to be adequate and scientifically robust.**

The Committee's recommendations are based on characteristics of existing data, such as geographic/temporal scale (e.g., resolution of coverage), quality, and accessibility. These recommendations are focused on observational surveys used for assessing the abundance and distribution of marine bird species. The below recommendations also note the appropriate uses of BOEM-funded regional avian distributions models (e.g., Winship et al. 2018, Leirness et al. 2021) for site assessment. These recommendations are not focused on collecting other types of data besides occupancy, distribution, and abundance data. **Additionally, the recommendations in this document focus on *site characterization*, and thus may not apply for studies to detect effects of specific OSW energy developments. The Committee pursued a separate guidance development effort that focuses on survey methods for OSW effect studies (Avian Displacement Guidance Committee 2024).**

Age of Data

Physical oceanographic features of marine ecosystems (e.g., sea surface temperature, salinity, chlorophyll *a*) are one of the ultimate drivers of the distributions of marine predators, including marine birds, both directly and indirectly (e.g., through effects on prey; Durant et al. 2004). These effects can occur at the local scale or in relation to large-scale climatic phenomena, such as the El-Niño-Southern Oscillation and the North Atlantic Oscillation (Durant et al. 2004). There is evidence of a regime shift in the U.S. Northeast Shelf ecosystem in 2011–2012, marked by changes in environmental conditions and subsequent shifts in fish and invertebrate populations (Morse et al. 2017, Friedland et al. 2019, 2020a b). **Given the strong influence of bottom-up changes to ecosystems on species including marine birds, observational survey data gathered prior to a regime shift (e.g., data collected prior to 2011–2012 in the U.S. Northeast Shelf ecosystem) should be considered too old on their own to adequately represent current conditions and distributions. Data from surveys carried out before the regime shift (e.g., older than 2011) retain substantial value for site characterization purposes but should not be *solely* relied on for site characterization. Where older data are available, they should be used along with newer survey data to assess the characteristics of the site and, if possible, assess environmental changes that may already be occurring at the site prior to OSW development.**

Kinlan et al. (2012) examined the potential effects of several regional climatic indices (the North Atlantic Oscillation and Atlantic Multidecadal Oscillation) in relation to variation in marine bird abundance and occurrence over decadal timescales. They concluded that "assuming the patterns of the previous ~65 years continue to hold (an assumption that admittedly might need to be re-evaluated in light of global climate change), repeating 1–2 years of survey work at 10–15 year intervals would be adequate to characterize variability due to ocean/atmosphere climate fluctuations," and that "care should be taken to account for possible trends in data separated by more than 10 years." This 10-year cutoff also corresponds with the above findings for a regime shift in the U.S. Northeast Shelf ecosystem (Morse et al. 2017, Friedland et al. 2019, 2020a b). **Thus, in general, existing observational survey data that is more than 10 years old should not be *solely* relied on to characterize a lease area.**

Due to broadscale regional differences, however, a 10-year cutoff may not apply as a useful rule of thumb everywhere or for every species. A solid understanding of local ecosystem status, as well as ecological history, species population trends, adapting management strategies, and socioeconomic shifts[5], should be sought prior to any reliance on, or any justification for the use of, an existing survey dataset for a specific lease area. **The following characteristics, for example, may suggest a need for more frequent or recent data collection at a particular site:**

- **Presence of shorter-term factors (biotic and abiotic) that may influence species abundance and distributions.** For example, if there has been a recent substantial shift in fishing activity, shipping patterns, or breeding colony characteristics near a development site, this will likely influence marine bird distributions such that existing data may no longer be representative of current distributions.
- **Regional differences in regime shifts (as noted above) or timing of large-scale environmental patterns.** The Gulf of Maine, for example, is one of the fastest-warming water bodies in the world, and thus marine bird distribution patterns may be shifting more quickly in this region than in areas where climate change-related shifts are occurring more gradually.

Spatial and Temporal Scale of Data

The results of Leirness and Kinlan (2018) may be informative for assessing whether a specific species and season of interest will require more or less survey effort. In general, however, the spatial and temporal scale of existing survey data for a site should be considered sufficient for site characterization purposes if they meet the following criteria:

- **Observational surveys were conducted in all seasons** (Kinlan et al. 2012). From at least Maine to Virginia, we recommend that seasons be defined according to the definitions used in Kinlan et al. (2012), Zipkin et al. (2015), and Leirness and Kinlan (2018): Spring = March–May, Summer = June–August, Fall = September–November, Winter = December–February.
- **Observational surveys (12+ per year, ideally monthly) were conducted for at least two years** (BOEM 2020), **with repeated surveys within each season and year**. It should be noted, however, that the amount of data required to capture levels of interannual variation will vary by species and season (Kinlan et al. 2012, Zipkin et al. 2015, Leirness & Kinlan 2018). Greater frequency of surveys may be required for specific seasons with large amounts of movement and/or for adequate assessment of species with high levels of spatial autocorrelation (e.g., clustering).
- **Observational surveys were conducted in the entirety of the area of interest,** e.g., surveys covered the entire lease area that is being characterized (Fifield et al. 2017, Johnston et al. 2020), plus the 1 nautical mile buffer area indicated in BOEM guidelines (BOEM 2020). Due to high levels of spatial variation (Kinlan et al. 2012, Friedland et al. 2021), survey data from nearby locations is not adequate to characterize an area of interest.
- **Observational surveys provided at least 10% ground spatial coverage** of the lease area and buffer area (BOEM 2020).
- **Observational surveys were conducted at time intervals such that they can be reasonably considered to be approximately independent of each other.** In general, surveys within a season should be spaced at minimum 3–5 days apart to meet the criterion of statistical independence (Kinlan et al. 2012), though several weeks' separation between surveys is generally preferable. As with questions of interannual variation (above), this minimum separation is species- and season-specific, and longer intervals may be required in certain situations.
- **Spatial and temporal scale of data are appropriate for the taxon of interest.** Specific survey types and survey parameters may be needed to reliably detect rarer species of potential interest (also see "quality of data," below).

[5] E.g., see https://ecowatch.noaa.gov/regions

Quality of Data

To be solely relied on for risk assessments, existing avian survey data should meet the following additional criteria related to study design and data quality:

- **Dedicated avian observational surveys were carried out in a scientifically rigorous manner,** i.e. they were specifically designed, repeated surveys using a standardized data collection protocol focused on marine birds. This includes:
    - Data collection that occurs continuously (or in at least 15-minute time increments) from an appropriate avian survey platform (such as a vessel suitable for wildlife viewing) that was traveling steadily at an appropriate survey speed (e.g., 10 knots for boat surveys; Camphuysen et al. 2004).
    - Collection of geographically referenced observations by qualified observers and georeferenced survey routes to adequately quantify effort per survey.
    - Collection of ancillary data on effort and environmental conditions that may affect detectability of species and/or species distributions using well-documented methodologies (e.g., Buckland et al. 2012, Mackenzie et al. 2013, Matthiopoulos et al. 2022, Garthe et al. 2023).
    - Sampling methods that allow for correction of known biases (e.g., distance sampling to correct for detection bias).
    - Data review for quality assurance and quality control purposes using documented protocols.
- Other than the presence of the survey platform itself, surveys **did not include any activity that would affect the distribution of species being surveyed** (e.g., chumming, breaking transect).
- Existing surveys represent an appropriate method for detecting and identifying taxa of specific interest (if this is not the case, then supplemental data collection targeted at those taxa is recommended, which could include refined surveys methods or other pertinent approaches such as individual tracking).

Data Transparency

For existing survey effort and observation data to be solely relied on for site characterization (e.g., in place of new data collected for this purpose), the existing data and comprehensive metadata must be available through a recognized, publicly accessible data repository (e.g., the Northwest Atlantic Seabird Catalog or OBIS-SEAMAP) prior to being used in site characterization efforts.

Use of Regional Distribution Models

The Marine-life Data and Analysis Team (MDAT) and similar models represent large-scale regional *relative* density estimates of seasonal marine bird distributions (Winship et al. 2018, Leirness et al. 2021). They are appropriate for assessment purposes at large spatial scales but are not intended for use at the comparatively smaller lease area scale. These models could be used to identify species of interest in a particular area for further monitoring and could (and should) be used in conjunction with site-specific data for site characterization (e.g., to put a site of interest in a broader regional context). However, **attempting to use these models *alone* to characterize a site should be avoided, as they are not at the necessary scale and resolution for this purpose**. Likewise, MDAT models should not be used in the examination of potential effects of offshore wind development at the lease area scale (e.g., in comparison with post-construction data) as they are not at the necessary scale and resolution for this purpose, nor do they provide estimates of actual density/abundance (Winship et al. 2018, 2023).

Combining Existing and New Survey Data for Site Characterization

The above criteria are intended to determine when existing survey data for a site are wholly sufficient for site characterization purposes (e.g., without any additional new surveys being required). When existing survey data for a site do not meet all the above criteria, new surveys should be conducted to BOEM's specifications in the avian survey guidelines (2 years of monthly surveys at 10% spatial coverage of the lease area plus a 1

nm buffer area, among other criteria; BOEM 2020). Using existing data for site characterization purposes when they do not meet the above criteria, or combining existing and new data for site characterization, risks mischaracterizing the occupancy, abundance, and distributions of marine birds in the lease area. This is particularly likely for rare species, highly clustered species, species with high levels of interannual variation in distributions and abundance, in situations where local ecosystem characteristics may be changing rapidly due to climate change or other factors, and in locations with strong environmental gradients that may affect marine bird distributions and abundance.

Conclusions

In support of OSW decision-making, BOEM has funded a number of significant projects to support the collection of standardized observational survey data (e.g., development of the SeaScribe app), compile offshore survey data (the Northwest Atlantic Seabird Catalog), and produce broad-scale seasonal avian distribution models (Kinlan et al. 2012, Winship et al. 2018, Leirness et al. 2021). Current work with the Northwest Atlantic Seabird Catalog data is focused on predicting possible changes in the distributions of birds offshore over time (A. Winship, pers comm). The Specialist Committee (co-chaired by avian biologists from BOEM and U.S. Fish and Wildlife Service) has developed further recommendations on the extent, type, and quality of data required to assess the effects of OSW development on marine bird distributions (Avian Displacement Guidance Committee 2024).

In addition to these efforts, targeted updates to the existing BOEM guidelines, incorporating the recommendations above, would help developers already involved in the permitting process to determine the need for new site characterization surveys versus appropriate use of existing data to characterize lease sites. We highly recommend that datasets such as the Northwest Atlantic Seabird Catalog be analyzed (alongside other ecosystem data) to further hone these recommendations, based on criteria such as the age and spatial scale of datasets. In the meantime, however, we hope that these recommendations can inform site characterization efforts and clarify the existing BOEM guidelines regarding when existing survey data at lease areas can be reasonably used for site characterization purposes.

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Appendix A: Specialist Committee Members

Committee members and support staff are listed by Committee role and then in alphabetical order by first name.

Name	Affiliation	Role
Caleb Spiegel	U.S. Fish and Wildlife Service	Committee co-chair
Timothy White	Bureau of Ocean Energy Management	Committee co-chair
Allyn Sullivan	Atlantic Shores	Committee member (Alternate)
Aonghais Cook	British Trust for Ornithology	Committee member
Arliss Winship (Jeffery Leirness)	Contractor to NOAA NCCOS	Committee member (Alternate)
Brad Pickens	U.S. Fish and Wildlife Service	Committee member
Carina Gjerdrum	Environment & Climate Change Canada	Committee member
Chris Haney (Garry George)	National Audubon Society (C. Haney with Terra Mar Applied Sciences under contract to NAS)	Committee member (Alternate)
Dave Pereksta	Bureau of Ocean Energy Management	Committee member
Emily Silverman	U.S. Fish and Wildlife Service	Committee member
Evan Adams	Biodiversity Research Institute	Committee member
Jennifer Stucker	WEST, Inc.	Committee member
Julia Robinson Willmott	Normandeau Associates, Inc.	Committee member
Juliet Lamb	The Nature Conservancy	Committee member
Kim Peters (Brita Woeck)	Ørsted	Committee member (Alternate)
Martin Scott	HiDef Aerial Surveying Limited	Committee member
Shilo Felton	Renewable Energy Wildlife Institute	Committee member
Kate McClellan Press	New York State Energy Research and Development Authority	Moderator
Holly Goyert	AECOM/Biodiversity Research Institute	Committee member/Technical support
Iain Stenhouse	Biodiversity Research Institute	Technical support
Julia Gulka	Biodiversity Research Institute	Technical support
Kate Williams	Biodiversity Research Institute	Technical support