UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Ocean Energy Management
Office of Renewable Energy Programs

May 27, 2020

Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf Pursuant to 30 CFR Part 585

Guidance Disclaimer

Except to the extent that the contents of this document derive from requirements established by statute, regulation, lease, contract, or other binding legal authority, the contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding legal requirements, related agency policies, and technical issues.

Cancellation

This guidance document cancels and supersedes the previous guidance entitled, "Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf Pursuant to 30 CFR Part 585," dated May 2017, and will remain in effect until cancelled.

I. Introduction to Guidelines

Before the U.S. Department of the Interior, Bureau of Ocean Energy Management (BOEM) will approve the siting of a facility proposed for a renewable energy project on the Outer Continental Shelf (OCS), a lessee must submit the results of its site characterization surveys to BOEM with its Site Assessment Plan (SAP), Construction and Operations Plan (COP), or General Activities Plan (GAP) in accordance with 30 CFR part 585, subpart F. The purpose of this national guidance document is to provide recommendations for complying with the avian information requirements in 30 CFR Part 585 Subpart F.

BOEM requires lessees to submit the results of site characterization studies so that BOEM can evaluate the impact of proposed activities on physical, biological, and socioeconomic resources, as well as the seafloor and sub-seafloor conditions, which could be affected by the construction, installation, and operation of meteorological towers, buoys, cables, wind turbines, and supporting structures. The information will be used by BOEM, other Federal agencies, and potentially affected states in the preparation of National Environmental Policy Act (NEPA) documents; interagency consultations, such as Section 7 of the Endangered Species Act (ESA); and to meet other statutory and regulatory requirements. Early communication with BOEM and adherence to these guidelines should ensure that BOEM's information needs are met. Survey results obtained through procedures consistent with these guidelines should be sufficient for BOEM's decision-

making process. BOEM may stipulate through lease or grant terms that lessees and grantees submit a SAP, COP, or GAP, and schedule a pre-survey meeting with BOEM to discuss the plan prior to conducting survey activities in the leased or granted area.

This document relates only to avian surveys. BOEM provides recommendations for conducting and reporting the results of other baseline collection studies in separate guidelines: http://www.boem.gov/Survey-Guidelines/. These national guidelines may be updated periodically, as new information or methodologies become available. This version supersedes previous versions.

The purpose of the required avian surveys is to describe the key species and habitat within the survey area possibly affected by the proposed operations. 30 CFR part 585, subpart F. The avian survey plan should aim to:

- Identify and confirm which avian species are using the project site, and when these species may be present where development is proposed;
- Establish a pre-construction baseline which may be used to assess whether detectable changes associated with proposed operations occurred in post-construction abundance and distribution of avian species;
- Collect additional information aimed at reducing uncertainty associated with baseline estimates and/or to inform the interpretation of survey results; and
- Develop an approach to quantify any substantial changes in the distribution and abundance of avian species associated with proposed operations.

For all proposed projects on the OCS, the lessee should use https://ecos.fws.gov/ipac/ (and any other sources) to obtain a list of migratory bird species that may be in the project area. For all projects, lessees should also describe the measures to be taken to minimize or eliminate potential impacts to migratory bird species in their COP, SAP, or GAP. In addition, for projects involving the installation of wind energy turbines on the OCS, the lessee should prepare an avian survey plan that describes its methods for collecting sufficient information on the biology of the survey area to allow BOEM and other agencies with jurisdiction to make well-founded decisions in context with the regional biology. The amount of new information collected should match the scale and/or complexity of the proposed project. For example, a project to install wind energy turbines may need additional site-specific survey work prior to the submittal of a plan to build the energy generating structures. In contrast, a project to install a meteorological tower, meteorological buoy, or subsea cable would most likely not need additional survey work in the field and no survey plan for avian resources would be needed.

II. Authority and Regulations

BOEM has statutory obligations under the Outer Continental Shelf Lands Act (43 USC § 1337(p)) to provide for protection of the environment and conservation of natural resources of the OCS. Additionally, BOEM has statutory obligations under NEPA, ESA, and the Migratory Bird Treaty Act. Under BOEM's regulations, a plan (SAP, COP, or GAP) must describe biological, social, and economic resource information potentially affected by activities proposed in the SAP, COP, or GAP

(see SAP–30 CFR 585.610(b)(5), 585.611(a),(b)(3), (5) and (7); COP–30 CFR 585.626(a)(3), 585.627(a)(3), (5), and (7); and GAP – 30 CFR 585.645(a)(5), 585.646(c), (e) and (g)). BOEM also has a memorandum of understanding (MOU) with the U.S. Fish and Wildlife Service (FWS) describing how both agencies will work together in the implementation of Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*. The MOU identifies specific areas in which cooperation between BOEM and FWS will substantially contribute to conservation and management of migratory birds and their habitats, many of which are supported by these guidelines. The MOU can be viewed at https://www.boem.gov/renewable-energy/stakeholder-engagement.

To evaluate impacts to biological, social, and economic resources, BOEM and its Federal consulting partners under the aforementioned statutes (FWS and National Marine Fisheries Service [NMFS]) require adequate baseline information on the potentially affected area. These guidelines are meant to clarify and provide a general understanding of the information that would be sufficient for BOEM, in consultation with FWS and NMFS, to adequately address impacts of offshore renewable energy projects on biological, social, and economic resources. BOEM will review the submitted SAP, COP, or GAP and associated information to determine if it contains sufficient information for BOEM to conduct its technical and environmental reviews. Upon completion of BOEM's technical and environmental reviews, BOEM may approve, approve with modifications, or disapprove the proposed activities.

Elements of these guidelines may be required as terms and conditions of a specific lease or grant. A lease or grant may also have different requirements from those discussed in these guidelines. Lessees or grantees should be aware that to the extent these guidelines conflict with conditions in a lease or grant, the lessee or grantee must comply with the terms of their lease or grant.

III. Early Coordination with BOEM

BOEM recommends that lessees meet with BOEM as soon as possible after lease acquisition (and well before COP submission) to discuss BOEM's potential information needs. Early coordination allows for BOEM and the lessee to discuss common goals and expectations prior to mobilization of a biological survey. BOEM believes maintaining an early and open dialogue with the lessee is critical to timely, comprehensive execution of a biological survey. Engaging in discussions with other agencies (e.g., FWS) and concerned parties as early as possible will also help resolve any issues that may arise. The lessee is advised to resolve any technical issues that may be in dispute with other agencies prior to submitting their final plans to BOEM. BOEM may determine it is prudent for a developer to resurvey some or all of the lease area in the event survey results are insufficient.

BOEM strongly recommends a pre-survey meeting. This meeting may include, but is not limited to, discussions regarding:

- applicability of existing data;
- survey logistics (proposed survey area, dates, times, survey period length, weather limitations, etc.);
- field techniques and equipment to be utilized/specifications of data acquisition systems;

- data to be acquired;
- data processing and analysis; and
- data and information to be submitted.

IV. Survey Methodology

An avian survey plan that satisfies all of the parties' needs is an important first step towards a successful biological survey. In developing an avian survey plan, a review of previous investigations, such as other biological survey efforts of the area, can be helpful to a lessee in selecting equipment, and in choosing the sampling and analytic approaches.

The amount of new information collected should match the scale and/or complexity of the proposed project. For example, a project involving the installation of wind energy turbines may need additional site-specific survey work prior to the submittal of a plan to build the energy generating structures.

The lessee should employ the appropriate equipment and analytical techniques for all surveys. BOEM encourages the lessee to review the Developing Environmental Protocols and Modeling Tools to Support Renewable Energy and Stewardship (McCann, 2012) to assist in determining the most appropriate protocols for the proposed project: https://espis.boem.gov/final%20reports/5208.pdf (see Appendix 1 for other sources of information on the Atlantic and Pacific OCS).

Given that the distribution and abundance of many avian marine species are known to change under ambient conditions, multiple survey visits are often needed to establish a baseline characterizing the species' distribution in space and time. On the Atlantic OCS, analyses of temporal variability suggests that most inter-annual variance in relevant environmental conditions for seabird occurrence and abundance (sea surface temperature and surface chlorophyll concentration from satellite remote sensing), and in relative abundance of birds observed in BOEM lease blocks, will be captured by surveys spread over two to three years (Kinlan et al., 2012).

In some cases:

- The area affected could have sufficient information to establish a baseline from previous study efforts. In such a case, fewer (if any) additional surveys may be needed to establish a baseline. As a first step, BOEM recommends examining environmental assessments, maps predicting the distribution and relative abundance of almost 50 seabird species on the Atlantic OCS by Winship et al. (2018) at http://www.northeastoceandata.org, and examining past survey efforts in the area of interest to determine whether there is sufficient baseline information. A similar modeling effort is currently in development for the Pacific OCS.
- It may be necessary to expand the survey area beyond the project area to aid in the interpretation of survey results and to improve confidence estimates (Ib Peterson, pers. comm.), or to use control sites to assess post-construction effects.

These situations, and justifications for the lessee's survey effort, should be discussed with BOEM on a case-by-case basis during the pre-survey planning and coordinating phase.

Pursuant to 30 CFR 585.610(a)(8) and 30 CFR 585.626(b)(15), lessees must submit with SAPs and COPs "proposed measures for avoiding, minimizing, reducing, eliminating, and monitoring environmental impacts." Lessees and grantees need to consider these future monitoring and mitigation measures, and submit them in a post-construction monitoring plan in their COP. A monitoring plan may include post-construction surveys to assess significant impacts of post-construction operations to a species, or impacts that may be associated with a phased buildout of a project. 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. Peterson et al. (2011) provides an example of an analytic approach that was used to assess displacement using pre- and post-construction survey data.

Boat-based and Traditional Aerial Surveys

Boat-based surveys and aerial surveys are examples of common methods used to characterize the spatial distribution and abundance of avian species on the OCS. Boat-based surveys allow for a fine level of detail, but can be expensive, slow, and require more time to cover a large geographical area. Aerial surveys allow for more coverage of a larger geographic area in a shorter period of time. However, traditional aerial surveys do not always allow for identification to the species level, and can cause disturbance at low altitudes. In addition, when there are large numbers of birds, observers are likely to miss birds and would be unable to get an accurate count. Tables 1 and 2 provide general guidance for conducting and presenting results from pre- and post-construction boat and traditional aerial surveys.

Table 1
Recommendations for Boat-based Surveys for Projects Requiring a Construction and Operations Plan

Focus	Determine spatial temporal distribution and abundance and behavior of avian species.	
Timing	Two annual cycles of surveys to capture inter-annual variation in counts.	Additional surveys may be needed to fill in temporal or spatial gaps from preliminary investigations (e.g., to complete an annual cycle; to increase spatial certainty; to capture a specific migration period). Additional surveys may be needed if initial surveys were poorly executed or if conditions have changed since initial surveys were conducted (e.g., El Nino).
Scope	• Surveys should be collected in a manner presentable in a geo-spatial database. • Surveys should be conducted in all seasons in which the species of interest are present. • 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. • For commercial wind projects, all blocks where development is proposed should be surveyed, plus a buffer > 1 nautical mile (nmi) to reduce edge effects.	
Technical Suggestions	• Use line-transect sampling method (i.e., Camphuysen et al., 2004) using parallel lines or a saw-tooth pattern, and covering at least 10% of proposed development area (It is assumed that 300 meters (m) from both sides of the transect line can be surveyed). During the survey, the ship's speed should be a constant at 10 knots. • Start surveys after sunrise, when there is enough light to identify birds to species. • To count as independent, conduct surveys of the same location three or more days apart (Kinlan et al., 2012). • Record weather conditions at the start of each transect line (wind speed and direction; visibility; % cloud cover; precipitation; temperature at start and finish; time of day; name of observers). No surveys should be conducted if conditions are >4 Beaufort, or when visibility is poor. • Use at least two qualified biologists with binoculars, specializing in seabirds, to identify birds (not to detect them). To improve data standardization and workflow, use the survey application SeaScribe to collect data (Gilbert et al., 2016). • Identify each bird to species; if this cannot be done, then identify taxonomic group. • Estimate actual distance and bearing for all detections so distance sampling techniques can be used to correct for birds missed at greater distances from the ship (see Buckland et al., 2001). Before each survey, surveyors should calibrate distance estimation using a laser rangefinder on objects (e.g., buoys) at a variety of distances. • Record each bird observation time; use GPS to record the location of each observation along transect line; record the number of birds in each flock; and record the behavior of birds on water (resting, foraging, flying, etc.). For flying birds, estimate vertical flight elevation and flight direction. Record birds following the ship for possible separate analysis. • Note any events that may attract or deter birds, such as a fish kill, passing ships, or passing planes during the survey. • Account for detectability. To estimate the density and abundance for each species viewed on the water, use distance data collected from line-transect sampling to model a distance function (see Buckland et al., 2001). Analyses should use recent versions of distance software which allows covariates (observer, sea state, etc.) to be incorporated into the estimation of detection functions, and the Akaike Information Criterion values should be used to determine whether it is advantageous to use these covariates (Maclean et al., 2009). Report density estimates, standard errors, and 95% confidence intervals.	
Suggested Presentation of Results	• Provide spatially explicit density estimates and associated variance (95% confidence intervals) by species/taxonomic groups in map and tabular formats. • Provide the distribution of flight heights for each species.	

Table 2
Recommendations for Traditional Aerial Surveys for Projects Requiring a Construction and Operations Plan

Focus	Determine spatial temporal distribution and abundance of avian species.	
Timing	Two annual cycles of surveys to capture inter-annual variation in counts.	Additional surveys may be needed to fill in temporal or spatial gaps from preliminary investigation (e.g., to complete an annual cycle; to increase spatial certainty; to capture a specific migration period). Additional surveys may also be needed if initial surveys were poorly executed or if conditions have changed since initial surveys were conducted (e.g., El Nino).
Scope	• Surveys should be collected in a manner presentable in a geo-spatial database. • Surveys should be conducted in all seasons in which the species of interest are present. • 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. • Survey area should include the entire proposed survey area and a buffer >1 nmi to reduce edge effects.	
Technical Suggestions	• Use a twin-engine aircraft or other suitable aircraft to ensure safety and endurance (e.g., single engine Kodiaks). Select a high winged aircraft with excellent all around visibility. • Use line-transect sampling method. Transects should be orientated perpendicular to the coast and spaced 3 kilometers (km) apart. Implement measures to minimize glare. • Weather conditions before take-off and at start of survey should be: sea state <3 Beaufort, absence of rain or fog, visibility >10 km. • Ideally, the plane may fly between 150-200 km/hr at an altitude ranging from 75-100 m. However, to satisfy safety concerns, flights at altitudes of 140-180 m may be conducted without impacting the detection of birds >40 centimeters (cm) in body length (Certain & Bretagnolle, 2008). These ranges in altitude and speed may minimize disturbance to birds (Perkins et al., 2004; Certain & Bretagnolle, 2008) while clearing wind turbine blades. • Conduct multiple surveys at different times of day to capture potential peak numbers of birds. To count as independent, surveys of the same location should take place three or more days apart (Kinlan et al., 2012). • Record altitude, cloud cover, sea state, and glare (i.e., % area obscured by glare on the surface of water) every 10 minutes during survey. • Two qualified biologists specializing in seabirds will scan a fixed width 150 m transect on either side of the plane (Certain & Bretagnolle, 2008; Paton et al., 2010). • Collect the appropriate data so distance sampling techniques can be used to correct for birds missed at greater distances from the plane (see Buckland et al., 2001). • At each new sighting along transect, record GPS position, time, number of birds, and behavior (e.g. feeding, flying, or resting). Identify each bird to species, but if this cannot be done, then identify taxonomic group. • Account for detectability. To estimate the density and abundance for each species viewed on water, use distance data collected from line-transect sampling to model a distance function (see Buckland et al., 2001). Analyses should use recent versions of distance software which allows covariates (observer, sea state, etc.) to be incorporated into the estimation of detection functions, and the Akaike Information Criterion values should be used to determine whether it is advantageous to use these covariates (Maclean et al., 2009). Report density estimates, standard errors, and 95% confidence intervals.	
Suggested Presentation of Results	• Provide spatially explicit density estimates and associated variance (95% confidence intervals) by species/taxonomic groups in map and tabular formats.	

Digital Aerial Surveys

Digital aerial survey methods are replacing traditional aerial survey methods for assessing the impact of wind energy on seabirds in United Kingdom waters (Thaxter & Burton, 2009). There are advantages in using digital aerial survey methods over other methods. For example, digital aerial survey methods are much safer to conduct than traditional aerial surveys. The surveys are less likely to disturb birds because the planes fly at a higher altitude (>300 m). Additionally, counts and species identified from digital surveys can be validated. Table 3 provides general guidance for conducting and presenting results from pre- and post-construction digital aerial surveys.

BOEM recommends using similar methodologies for pre- and post-construction surveys to assess impacts, as estimates may vary among methodologies. For example, abundance estimates from traditional aerial surveys can be lower than estimates obtained from digital stills and video (Buckland et al., 2012). See Thaxter and Burton (2009), McCann et al. (2012) Normandeau (2012), Williams et al. (2015), and Zydelis et al. (2019) for comparisons between methodologies.

Table 3
Recommendations for High-Resolution Digital Aerial Surveys for Projects Requiring a COP

Focus	Determine spatial temporal distribution and abundance of avian species.	
Timing	Two annual cycles of surveys to capture inter-annual variation in counts.	Additional surveys may be needed to fill in temporal or spatial gaps from preliminary investigation (e.g., to complete an annual cycle; to increase spatial certainty; to capture a specific migration period). Additional surveys may also be needed if initial surveys were poorly executed or if conditions have changed since initial surveys were conducted (e.g., El Nino).
Scope	• Surveys should be collected in a manner presentable in a geo-spatial database. • Surveys should be conducted in all seasons in which the species of interest are present. • 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. • Survey area should include the entire proposed survey area and a buffer >1 nmi to reduce edge effects.	
Technical Suggestions	• Twin engine aircraft or other suitable aircraft to ensure safety and endurance (e.g., single engine Kodiaks). • Use an appropriate sampling method (e.g., strip-transect or grid) and plan to cover the entire survey area in a single day. • Imaging should cover at least 10-20% of the survey area (Thaxter & Burton, 2009; Normandeau, 2012). • Conduct surveys when the sea state is ≤4 Beaufort, and in absence of rain, low elevation clouds, and fog to ensure birds are not missed and can be identified (Thaxter & Burton, 2009). Implement measures to minimize glare. • The plane may fly between 220-350 km/hr and at minimum flight height of 300-600 m (Thaxter & Burton, 2009; Normandeau, 2012; Ross et al., 2016). • Conduct multiple surveys at different times of day to capture potential peak numbers of birds. • To count as independent, surveys of the same location should take place three or more days apart (Kinlan et al., 2012). • Color images should be used in all surveys with an image resolution of 2 cm Ground Sample Distance, or finer (Normandeau, 2012). • Record altitude, cloud cover, sea state, and glare for each image (see Normandeau, 2012). • Identify each bird to species; if this cannot be done then identify taxonomic group. Qualified biologists specializing in seabirds should assess images independently, and all images must be audited by an expert (see Buckland et al., 2012). • For each target, record the X, Y coordinates, species id, behavior (e.g. feeding, flying, or resting), and for flying targets record flight height and heading.	
Suggested Presentation of Results	• Provide spatially explicit density estimates and associated variance (95% confidence intervals) by species/taxonomic groups in map and tabular formats. • Provide the distribution of flight heights for each species.	

V. Survey Results and Supporting Data

BOEM strongly recommends the lessee provide quarterly and annual progress reports to assist BOEM in tracking the progress and implementation of surveys, and to evaluate the quality of environmental information collected. With these reports, BOEM can ensure survey data and information included is sufficient to meet the information requirements of a COP or other plan. The data contained in these reports may also be used to develop appropriate avoidance, minimization, and mitigation measures to avian species. BOEM may share these reports with other agencies (e.g., FWS, NMFS, and National Park Service).

Quarterly Progress Reports

These progress reports should highlight survey findings and include:

- number of surveys conducted, dates, start and end times, weather conditions;
- number of birds by species/taxonomic group;
- maps and spatial data showing the locations of birds and actual survey route (see Spatial Data Submission Guidelines at http://www.boem.gov/Renewable-Energy-Program/Regulatory-Information/Index.aspx);
- the status of data processing, error checking, and analysis; and
- planning efforts for upcoming avian surveys and related study efforts.

Comprehensive Annual Report

The purpose of the annual report is to present results (trends and patterns) of the cumulative survey efforts from the current and previous years. The report should provide an evaluation of the effectiveness of survey techniques and include any refinements for the coming year. The report should also include a schedule of reports and efforts for the upcoming years. In addition, the report should discuss results of other efforts (previous and current) and how they relate and inform the findings.

Data Collection and Management

BOEM recommends that all data be processed, validated, and made available as needed to BOEM. To improve data standardization among entities collecting data and workflow, BOEM funded the development of the mobile application for collecting data during bird surveys called SeaScribe for Android and iOS platforms (Gilbert et al., 2016). The SeaScribe application can be downloaded from iTunes or Google Play.

BOEM recommends uploading survey data into the Northwest Atlantic Seabird Catalog that is managed by FWS (formally known as the Compendium of Avian Occurrence Information for the Continental Shelf Waters (O'Connell et al., 2009)), the Ocean Biogeographic Information System Spatial Ecological Analysis of Megavertebrate Populations (http://seamap.env.duke.edu/), Avian Knowledge Network (http://www.avianknowledge.net/), the National Oceanographic Data Center (http://www.nodc.noaa.gov/), or other archive for future study.

VI. BOEM Guidance Document Statement

BOEM issues guidance documents to clarify and provide information about legal requirements, related policies, and technical issues, such as recommended data and formats for various submittals. This guidance document sets forth policy on and interpretation of statutory, regulatory, lease, contractual, or plan approval provisions or technical issues to provide additional information regarding BOEM's approach to managing its renewable energy program. Except to the extent that provisions of this guidance document derive from requirements established by statute, regulation, lease, contract, or other binding legal authority, they do not have the force and effect of law and are not meant to bind the public in any way. If you wish to use an alternate approach that you believe is consistent with the governing statute and regulation, we recommend you contact BOEM in advance.

While this guidance document includes recommendations and guidance, the recommendation and guidance provisions may be made mandatory through a lease stipulation or condition of approval from BOEM. If you are issued a plan, permit, or other authorization from BOEM with a condition of approval or a lease with a stipulation requiring compliance with this guidance document or identified portions thereof, you must implement those portions or all aspects of this guidance document, if particular aspects are not singled out in the stipulation or condition of approval. Under such circumstances, you must implement and comply with this guidance document (or identified portions thereof) regardless of whether the terms within the guidance document would otherwise be a recommendation or request (e.g., use of the term "should" in the guidance document will be considered "must" if required by the lease stipulation or condition of approval).

VII. Paperwork Reduction Act Statement

These guidelines provide clarification, description, or interpretation of requirements contained in 30 CFR 585, Subpart F. An agency may not conduct or sponsor a collection of information unless it displays a currently valid OMB Control Number. OMB has approved the information collection requirements in the 30 CFR 585, Subpart F regulations under OMB Control Number 1010-0176, respectively. These guidelines do not impose additional information collection requirements subject to the Paperwork Reduction Act of 1995.

VIII. Contact Information

For further information or inquiries regarding these guidelines, please contact the Office of Renewable Energy Programs at (703) 787-1340 or renewable_reporting@boem.gov.

IX. References

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Appendix 1. Resources for Avian Occurrence on the Atlantic and Pacific OCS. See http://www.boem.gov/Renewable-Energy-Environmental-Studies/ for the most recent list of ongoing and completed studies related renewable energy.

Avian and Bat Distribution	**Links**
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