Ocean Wind
An Ørsted & PSEG project

Appendix AB – Avian and Bat Post-Construction Monitoring Framework

Avian and Bat Post-Construction Monitoring Framework

Introduction

Ocean Wind, LLC (Ocean Wind) is proposing the approximately 1,100 MW Ocean Wind 1 Offshore Wind Farm Project (OCW01, or Project) located in the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0498 (Lease Area). Offshore, the Project will consist of up to 98 wind turbine generators (WTGs), up to three offshore alternating current (AC) substations, array cables linking the individual turbines to the offshore substations, substation interconnector cables linking the substations to each other, and offshore export cables. This OCW01 Avian and Bat Post-Construction Monitoring Framework (hereafter the "Framework") focuses solely on the offshore footprint of the Project within the Lease Area, and does not apply to the offshore export cable, cable landfall, or onshore portions of the Project.

Ocean Wind has developed this Framework to outline an approach to post-construction monitoring that supports advancement of the understanding of how birds and bats utilize offshore areas associated with the wind farm, behavioral changes of ESA-listed birds and bats due to the presence of the turbines, and broadly how these species groups interact with offshore wind farms. The scope of monitoring is designed to meet federal requirements [30 CFR 585.626(b)(15) and 585.633(b)] and is scaled to the size and risk profile of the Project with a focus on species of conservation concern.

The intent of the Framework is to outline overarching monitoring objectives, proposed monitoring elements, and reporting requirements. A detailed adaptive Avian and Bat Post-Construction Monitoring Plan (Monitoring Plan) that extends for the life of the Project, based on this Framework, will be developed before monitoring is initiated in coordination with BOEM, USFWS, and other relevant regulatory agencies. Ocean Wind is committed to *long-term* monitoring that is *adaptive* and *coordinated*, where feasible, with other offshore wind projects in the Mid-Atlantic Region as well as regional efforts such as the Regional Wildlife Science Collaborative and New Jersey's Research and Monitoring Initiative (RMI). For example, Ocean Wind will endeavor to collaborate with Ocean Wind 2 and neighboring lease holders to conduct holistic, behavioral change studies, such as marine bird tagging efforts. The adaptive monitoring process is detailed below; potential adaptive measures will be considered in coordination with regulatory agencies if it is warranted based on initial monitoring results.

Monitoring objectives and associated methods are summarized in Table 1. Technical approaches were selected based on their ability to address monitoring objectives, and their effectiveness in the marine environment, with consideration for offshore logistical constraints. OCW01 initially considered use of radar, but installation of both vertical and horizontal systems, necessary to determine avoidance rates, were not logistically feasible. Emerging technologies, such as multi-sensor (e.g., radar and camera) collision detection systems, are also not proposed under this Framework because they are not logistically feasible for OCW01 and some systems cannot easily detect smaller birds such as terns (Nicholls et al.

2022). Orsted, however, is actively engaged in testing new monitoring technologies in Europe and elsewhere and will continue to evaluate the efficacy of novel monitoring systems.

Table 1. Monitoring objectives, general approaches to be used, and types of data generated.

Taxa	Monitoring Objective	Approach	Initial Monitoring Period*	Target Data Output
Bats	Monitor occurrence of bats	Acoustics	up to 3 years	Presence; activity rates related to weather, temporal patterns, and turbine operational status
Birds	Monitor use by ESA listed birds	Motus (radio) tags	3 years	Presence; activity rates related to weather, temporal patterns, and turbine operational status
		Motus receivers	Project lifetime, revaluated every 5 years	
Birds	Monitor use by nocturnally migrating birds	Acoustics	up to 3 years	Occurrence of nocturnally migrating birds related to weather, temporal patterns, and turbine operational status
Birds	Monitor movement of marine birds around the turbines	Tracking studies	Defined in the Monitoring Plan	Avoidance and attraction rates of marine birds including relationship to turbine operational status
Both	Document fatalities	Incidental observations	Project lifetime	Incidence, identification, photo-documentation when feasible

*Monitoring years may be consecutive or non-consecutive to cover a broader time period as agreed upon with USFW and BOEM. Overall duration will be determined based on the adaptive monitoring process detailed below.

Monitoring Occurrence of Bats

The presence of bats in the marine environment has been documented in the U.S. (Hatch et al. 2013, Solick and Newman 2021). However, there remains uncertainty regarding the extent to which bats occur offshore, particularly within offshore wind farms and in the Mid-Atlantic region. Acoustic detectors are commonly used to study bat presence, which can improve the understanding of movements and migration (Johnson et al. 2011). Ocean Wind will conduct bat acoustic monitoring to assess bat activity around OCW01 wind turbines, targeting key data gaps related to species presence/composition, temporal patterns of activity, and relationship with weather and atmospheric conditions as well as turbine operational status.

Acoustic monitoring of bat presence will be conducted for up to three years post-construction. Ultrasonic bat detector stations will be installed on the offshore substation, wind turbine platforms, and/or buoys. The detectors will record calls of both cave-hibernating bats, including the northern long-eared bat (*Myotis septentrionalis*), and migratory tree bats; the resulting information can be used to identify bats to species. All acoustic data recorded will be processed with approved software to filter out poor quality data and identify the presence of bat calls. Where information is insufficient to make a species identification, calls will be classified to one of two phonic groups: low frequency bats (LoF), or high frequency bats (HiF). The HiF group includes both migratory tree bats and cave hibernating bats. Since the HiF groups includes the ESA-listed northern long-eared bat, they will then be manually vetted by an experienced

acoustician to identify to the highest taxonomic resolution possible (e.g., species or genus).

All bat calls detected and identified will be analyzed to understand relationships with time of day, season, weather/atmospheric conditions, and turbine operational status. The results will provide information on bat presence offshore and the conditions under which they may occur near offshore wind turbines.

Monitoring Use by ESA-listed Birds

Tracking studies indicate that at least some individual ESA-listed Piping Plovers (*Charadrius melodus*) and Red Knots (*Calidris canutus rufa*) pass through the New Jersey Wind Energy Area within which the OCW01 is located (Loring et al. 2018, 2019). Roseate Terns (*Sterna dougallii*) have not been detected in the Wind Energy Area, but some individuals are expected to pass through the region during migration.

However, due to limited coverage of onshore automated telemetry receiving stations and low probability of detecting automated radio telemetry tags (hereafter, Motus receivers and tags) in the offshore environment (Loring et al. 2019), there remains uncertainty related to offshore movements of ESA-listed birds during migration. OCW01 will install offshore Motus receivers and contribute funding to Motus tagging efforts to address this data gap. The results have the potential to support understanding of flight activity and behavioral change of ESA-listed species. The exact species being studied will be determined in consultation with federal agencies and will be dependent on existing, ongoing field efforts. The Motus receivers will also provide opportunistic presence/absence data on other species carrying Motus tags, such as migratory songbirds and bats.

Movements of Motus-tagged ESA-listed birds in the vicinity of the OCW01 will be monitored post-construction by a) supporting tagging studies post-construction, b) installing Motus receivers at OCW01 for a minimum of 5 years and up to the life of the project, evaluated every 5 years for potential continued use, and c) supporting two additional coastal Motus receivers for up to three years. The specific number and location of offshore receiver stations will be selected to optimize study design goals and will be determined using a study design tool currently being developed through a New York State Energy Research and Development Authority (NYSERDA) funded project[1]. In addition, existing Motus receivers at up to two onshore locations near the OCW01 (e.g., Brigantine, Holgate) will be maintained or refurbished to confirm the presence and movements of Motus-tagged ESA-species in areas adjacent to OCW01 (needs will be discussed with USFWS). Ocean Wind will also consider contributing to existing GPS-based tracking efforts for ESA-listed birds. ESA-listed bird presence/absence in the wind farm will be analyzed by comparing detections within the wind farm to coastal Motus receivers. All detections will be analyzed to understand relationships with time of day, season, weather, and turbine operational status.

Monitor Use by Nocturnal Migratory Birds

Nocturnal migrants, including songbirds and shorebirds, are documented to fly offshore (Adams et al. 2015, Loring et al. 2021). However, there is uncertainty around the timing and extent of nocturnal

[1] https://motus.org/groups/atlantic-offshore-wind/

migrant use of the offshore environment. Acoustic detectors are commonly used to study songbird migration (Farnsworth 2005) and have been used to study songbird migrants at offshore wind facilities (Hüppop et al. 2016). They can monitor sound continuously, allowing for documentation of any calling nocturnal migrants passing over a dector. Acoustic detectors installed at the two OCW01 offshore substations (OSSs) will provide information to address three primary questions: (1) what calling species are flying over the OSS; (2) when they are migrating offshore, and (3) under what weather conditions are migrants active around the OSS.

Ocean Wind will use two avian detectors, likely Wildlife Acoustic Song Meter SM4s, to collect acoustic data from the spring to fall during the first three years that OCW01 is operational. Detectors would likely be installed at each of two OSSs rather than turbines, where it is expected that ambient noise levels may interfere with avian acoustic detections. Recordings will be post-processed using filtering software to identify songbird calls, and then a qualified avian biologist will conduct a species group identification for each call. Results will be assessed along with factors related to time of year and weather conditions to advance our understanding of how nocturnal migrants utilize the offshore airspace and when they may be at greater risk of interacting with OCW01 WTGs. Specific methods to monitor nocturnal migrants using acoustic detectors will be detailed in the Monitoring Plan based on current technology, logistical constraints, and ongoing coordination efforts (e.g., agencies, regional stakeholders).

Monitor Movement of Marine Birds Around the Turbines

Marine birds, particularly loons, sea ducks, auks, and the Northern Gannet (Morus bassanus), have been documented to avoid offshore wind farms, potentially leading to displacement from habitat (Goodale and Milman 2016). However, there remains uncertainty on how birds will respond to larger more widely spaced turbines, like those proposed for OCW01. Ocean Wind plans to support a tagging effort of marine birds to track their movements around OCW01 once it becomes operational to support understanding of flight activity and avoidance rates. Data from the tagging studies will be used to assess macro (and potentially meso) avoidance rates, to advance understanding of how marine birds utilize the offshore environment, and to assess when they may be at greater risk of interacting with OCW01 WTGs. Specific methods, including the number of tags, duration of tagging and tracking effort, and data analysis approach, will be detailed in the Monitoring Plan based on current technology, logistical constraints, and ongoing coordination efforts.

Documentation of Dead and Injured Birds and Bats

Ocean Wind, or its designated operator, will implement a reporting system to document dead or injured birds or bats found incidentally on vessels and project structures during construction, operation, and decommissioning. The location will be marked using GPS, an Incident Reporting Form will be filled out, and digital photographs taken. Any animals detected that could be ESA-listed will have their identity confirmed by consulting biologists, and a report will be submitted to the designated staff at Ocean Wind who will then report it to BOEM, USFWS, and other relevant regulatory agencies. Carcasses with federal or research bands or tags will be reported to the U.S. Geological Survey (USGS) Bird Band Laboratory, BOEM, and USFWS. Ocean Wind acknowledges that this approach of documenting incidental bird and

bat fatalities is not designed to estimate fatality rates occurring at OCW01, and that an apparent lack of incidental fatalities does not preclude the occurrence of actual fatalities.

Adaptive Monitoring

Adaptive monitoring is an important principle underlying Ocean Wind's post-construction monitoring Framework. The primary goal of the approach will be to reduce scientific uncertainties, particularly those that can inform future offshore wind planning (i.e., double loop learning; Copping et al. 2019). Over the course of monitoring, Ocean Wind will work with BOEM, USFWS, and other relevant regulatory agencies to determine the need for adjustments to monitoring approaches, consideration of new monitoring technologies, and/or additional periods of monitoring, based on an ongoing assessment of monitoring outcomes. The adaptive monitoring process will include:

- *Annual meetings*: Ocean Wind will present the results of the prior year to USFWS and BOEM in an annual meeting.
- *Potential triggers*: After three years of monitoring, Ocean Wind will assess findings in coordination with USFWS and BOEM to determine the potential need for revisions to the Monitoring Plan. Potential triggers for adaptive monitoring may include, but are not limited to, the need for refined estimates of parameters for collision risk models to improve estimates and reduce uncertainty in model outputs; equipment failure; impacts and risks to birds or bats, identified through monitoring, that substantially deviate from the impact analysis included in the FEIS and BO; and new opportunities to collaborate with other projects or entities in the region.
- *Potential response measures*: In coordination with USFWS and BOEM, changes to the Monitoring Plan could include, additional Project-level monitoring, change in monitoring duration or intensity, participation in broad-scale collaborative studies, or use of emerging technologies (e.g., collision monitoring systems or new tracking methods).

The Monitoring Plan will include a series of potential adaptive monitoring actions, developed in coordination with BOEM, USFWS, and other relevant regulatory agencies, to be considered as appropriate. The plan will take a non-prescriptive approach, to allow for adequate flexibility to support a hypothesis-driven approach to monitoring.

Reporting

Ocean Wind will submit an annual report to BOEM and USFWS summarizing post-construction monitoring activities, preliminary results including how the results may improve collision risk modeling estimates, and any proposed changes in the monitoring program. Every three years a synthesis report will be developed to support the adaptive monitoring process. Ocean Wind will participate in an annual meeting with BOEM and USFWS to review the results of the annual or synthetic report and discuss potential adjustments to the monitoring plan, including the duration of monitoring for ESA species.

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