Guidance for Pre- and Post-Construction Monitoring to Detect Changes in Marine Bird Distributions and Habitat Use Related to Offshore Wind Energy Development

February 2024

As the offshore wind (OSW) industry develops in the U.S. Atlantic, effective monitoring is needed to detect potential effects to wildlife. A Specialist Committee was convened by New York's Offshore Wind Environmental Technical Working Group (chaired by the Bureau of Ocean Energy Management and U.S. Fish and Wildlife Service) to advance recommendations for the effective detection and characterization of changes in the distributions and habitat use of marine birds in relation to OSW energy development.

These recommendations are specifically focused on:

- Marine birds and OSW development in the U.S. Atlantic, though many of the recommendations are broadly relevant to other geographies.
- Studies of changes in movement behavior, distributions, and habitat use, namely displacement, attraction, and macro-to meso-scale avoidance.
- Studies intended to detect effects from OSW development, not assess risk or characterize avian resources prior to construction.
- Informing project-specific monitoring as encouraged by the U.S. regulatory framework, although many recommendations are also applicable to studies at larger scales.

While there are various potential effects from OSW development on marine birds, and all deserve dedicated research recommendations, understanding displacement-related effects is a key research priority. The deliberative process used to develop these recommendations brought together experts to reach consensus on the best available science to conduct studies of marine birds at OSW facilities. This Specialist Committee firmly recommends that:

1. Statistically robust monitoring should be conducted at all OSW lease areas to detect and characterize changes in distributions and habitat use, and
2. This guidance forms the basis for federal guidelines focused on how to conduct pre- and post-construction monitoring at individual OSW facilities in the U.S. Atlantic.

The guidance includes:

- General study design recommendations for all types of displacement, avoidance, and attraction studies;
- Recommendations for conducting observational surveys, a key method for displacement studies; and
- Recommendations for future guidance and research.

More information and the full guidance document can be found at nyetwg.com/avian-displacement-guidance

General Study Design Recommendations

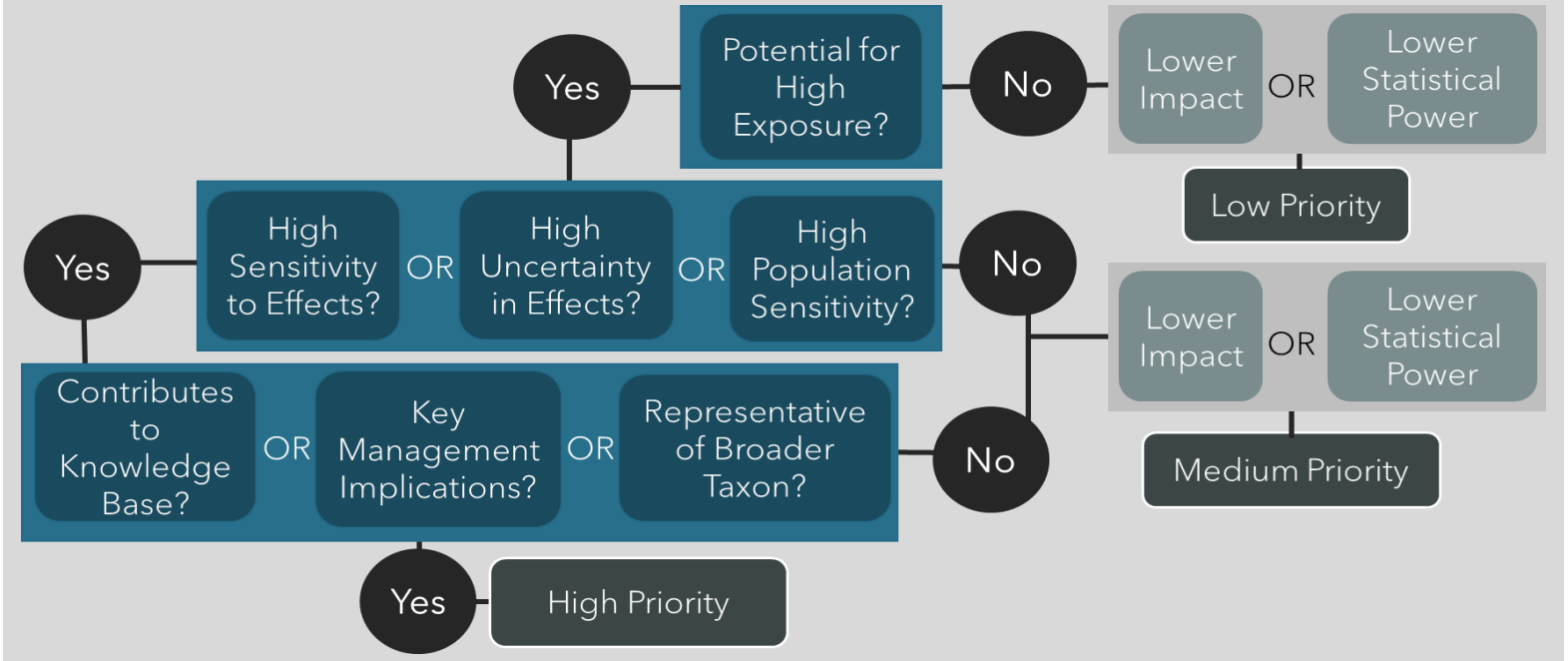
Studies to detect displacement, attraction, and macro- to meso-scale avoidance of marine birds should include the identification of clear research questions, selection of focal taxa, and choice of appropriate methods, followed by the development of an effective study design. Data and reporting should be made publicly available.

Key Research Questions

- Are changes in habitat use (e.g., displacement/ attraction) occurring, and if so, what is the magnitude and distance from the offshore wind facility at which they occur?
- Does the occurrence, magnitude, and distance of habitat change vary temporally (e.g., does habituation occur)?
- Are there changes in foraging or roosting activities of marine birds in relation to the wind facility?
- Is there nocturnal attraction of marine birds (e.g., to offshore wind related lighting)?
- Are macro-scale changes in movement behavior of marine birds occurring, and if so, at what magnitude and distance from the offshore wind farm does this behavior extend?
- Are meso-scale changes in movement behavior of marine birds occurring, and if so, at what magnitude and distance from the turbines does this behavior extend?

The guidance identifies the strengths and weaknesses of potential study methods, including observational surveys, individual tracking, behavioral observations, radar, and remote visual imagery. The guidance also notes considerations for method selection that may be specific to focal taxa (e.g., body size, scale of expected response) or nonspecific (e.g., considerations regarding sampling bias, logistics, and feasibility).

Selecting Focal Taxa



Developing and implementing an effective study design includes the definition of clear objectives and identification of appropriate spatial and temporal scales to estimate acceptable statistical power and effect size. Collection of data should be standardized and conducted in as transparent a manner as possible. This should include coordination with federal agencies and other researchers, standardized public reporting (including information on data collection methods, spatial and temporal coverage, effect size, uncertainty, and analytical assumptions), making data publicly available, contributing derived analytical products to data portals, and publishing results.

Recommendations for Observational Surveys

Observational surveys are a key method for detecting displacement. The committee developed detailed guidance on the use of observational survey methods for pre- and post-construction monitoring. **The committee recommends that separate surveys be conducted for site assessment vs. surveys to detect effects (e.g., pre- and post-construction).** This is due to differences in the objectives for each survey type, which can lead to different optimal study designs, as well as challenges associated with coordinating these respective surveys under current permitting timelines.

These recommendations are therefore specific to conducting observational surveys (e.g., boat-based surveys and digital aerial surveys) to detect effects from OSW development on marine birds.

Study Design Recommendations for Surveys

- **Study Design** – Use Before-After-Gradient (BAG) study designs.
- **Power Analysis** – Existing data should be used in site-specific power analyses to inform the choice of spatial and temporal coverage of surveys based on the focal taxa at each site. For focal species where potential effect size is unknown, effect size should be estimated conservatively to ensure the study is designed with a higher chance of detecting effects, should they occur.
- **Survey area** – The choice of survey area should be informed by the spatial extent at which changes are predicted to occur, such that the total survey area includes the wind farm footprint, as well as a buffer zone that incorporates the predicted effect distance for focal taxa plus 10%. In other words, buffer size should be based on species present at the site and the expected sensitivity of focal species to displacement. This means that the buffer zone should be 4-20 km around the OSW project footprint, with a consistent buffer distance in all directions.
- **Coordination** – For adjacent lease areas, we encourage coordinated survey efforts, to the degree feasible given differences in construction timelines, to maximize efficiency and treat the area as a continuous habitat.
- **Spatial coverage** – We recommend at least 20% spatial coverage of the survey area, calculated based on effective strip width for focal species, to ensure sufficient statistical power to detect effects if they occur.
- **Transects** – Transect lines should be a distance apart that is >2 times the effective strip width and placed/oriented such that important environmental gradients are fully represented within sampling designs.
- **Temporal scale** – For studies to detect effects, 12–16 surveys per year for at least two years pre-construction should be conducted to adequately capture variation in distributions. The duration and frequency of post-construction surveys should depend on the research question and levels of variability in site-level data, but should include no less than 3 years of 12–16 surveys per year. Post-construction surveys should be initiated within five years of the completion of pre-construction surveys.
- **Seasonal distribution** – The distribution of surveys within a particular year should take into consideration seasonal patterns of focal species, as increases in power can be achieved if effort is concentrated in seasons in which species of interest are most abundant.

Data Collection, Analysis, and Reporting Recommendations for Surveys

- **Consistent methods** – Survey methods, including data collection methods, should be consistent across pre- and post-construction surveys so as not to introduce biases. Unavoidable changes should be assessed via calibration studies.
- **Sampling method** – Line transects with distance-sampling methods should be used for boat-based surveys while strip-transect or grid sampling should be used for digital aerial surveys.
- **Platform** – The same platform should be used for pre- and post-construction surveys, traveling at consistent speeds (boat-based 7–10 knots, digital aerial 220–350 km/hr). For boat-based surveys, observers must have an adequate position above sea level to detect birds within a minimum of 300 m of the trackline for focal taxa, have a clear 90° field of degree view, and be safe and stable. For digital aerial methods, surveys should be flown at a consistent altitude (500 m minimum), with optimal flight height chosen to balance image resolution, disturbance to wildlife, and safety.
- **Surveyor qualifications** – Observers/biologists conducting surveys must have documented experience with identifying and counting seabirds (50–100 hours training minimum) and demonstrated ability to rapidly identify seabirds in the region in various conditions.
- **Survey conditions** – Surveys should be conducted in a sea state of Beaufort 4 or less, in conditions with enough light to identify birds to species. Survey transects should be designed to minimize glare.
- **Data collection** – Survey data should include effort data and information on environmental conditions, as well as observations (see Section 10.4 for full list of data), collected in a standardized way for incorporation in the Northwest Atlantic Seabird Catalog and other repositories. Birds should be identified to species wherever possible (with high confidence). Color images should be captured at adequate resolution (from a boat, where possible with telephoto lens; via digital aerial surveys, minimum 2 cm image resolution).
- **In-situ environmental data** – Careful consideration should be given to the collection of in situ environmental and prey data in conjunction with bird observations, continuously or at regular intervals.
- **Review of data** – Data should be summarized and reviewed by observers for errors (boat) or 20% of data should be independently audited by an expert during detection and identification (digital aerial).
- **Data analysis** – Development of a clearly defined analysis plan should include specific models and statistical tests, methods to account for biases (e.g., detectability, availability), choice of an appropriate modeling framework, methods to account for spatial and temporal autocorrelation in the data, and a comprehensive identification of covariates.
- **Data reporting** – Standardized reporting should include information on data collection, spatial and temporal coverage (e.g., % spatial coverage, buffer size, distance between transects, overall survey area, timing of surveys), spatially-explicit density estimates and associated variance by species/taxonomic group, and information on site characteristics (e.g., latitude and longitude, footprint size, number, height, and spacing of turbines, water depth, and distance to shore).
- **Public availability** – Observational survey datasets from effects studies should be made publicly available as soon as possible (maximum of two years following collection, if feasible) via the Northwest Atlantic Seabird Catalog and/or OBIS-SEAMAP. This should include the final processed dataset, co-collected environmental covariate data, complete effort data, and comprehensive metadata. Reports and analysis code should also be public and easily accessible.

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