

Best Practices for Offshore Wind Development: Monitoring and Research



This document was developed by the Massachusetts Office of Coastal Zone Management on behalf of the [Habitat Working Group on Offshore Wind Energy](#) and in consultation with the Massachusetts Clean Energy Center, Division of Marine Fisheries, and Division of Fisheries and Wildlife. The purpose is to summarize the working group's discussions and recommendations and provide guidance to developers on monitoring and research plans developed for studying and assessing the impacts of offshore wind projects on wildlife and habitat.

The first step to avoiding, minimizing, or mitigating impacts of offshore wind development is anticipating them. Offshore wind is a new and rapidly developing industry, and consequently many impacts may be difficult to anticipate because they are not yet well understood. Significant data gaps also limit the current understanding of baseline wildlife activity within wind energy areas. At the same time, new monitoring and mitigation technology and techniques are being developed and existing mitigation measures are still being refined. In this context, early and extensive project-level monitoring, as well as coordinated regional research, are needed to understand baseline wildlife activity, wind development impacts, and mitigation efficacy.

Some best practices for wildlife monitoring and research include:

- Robust monitoring at the project level, coordinated with other regional data collection efforts, should begin before construction and continue throughout construction and operations.
- Ecosystem monitoring plans should be based on valid experimental designs that include sufficient replication over time and space to provide the statistical power needed to detect biologically relevant impacts. Without sufficient statistical power, it may not be possible to test whether an ecosystem has fully returned to its baseline condition or continues to be impacted to a small yet biologically meaningful degree.
- Ecosystem monitoring plans should include appropriate control or reference sites. When the nature or scale of the impact being monitored makes it difficult to establish or identify independent control sites, as is often the case with offshore wind, the Before-After-Gradient (BAG) design may be appropriate. In other cases, the simpler and more traditional Before-After-Control-Impact (BACI) design may be possible. (See "[Monitoring fisheries resources at offshore wind farms: BACI vs. BAG designs](#)" in the *ICES Journal of Marine Science* for details.) For any experimental design, control sites or BAG impact gradients should be

placed in such a way that construction from neighboring wind (or other) projects will not affect the study.

- Monitoring plans should be designed to facilitate adaptive management. For example, plans could include measurable, biologically relevant thresholds that will trigger additional mitigation or monitoring or a change in mitigation or monitoring strategy. Reasonable threshold values, biologically meaningful differences, and time frames for recovery will vary by species, parameter, and location and should be established in consultation with subject matter experts at relevant agencies or organizations.
- Data gathered during monitoring programs and during geophysical surveys should be shared as soon as possible and according to best practices to facilitate scientific research and adaptive management. Developers should enter into memoranda of understanding with regional data portals to make data publicly available in centralized locations.
- Power purchase contracts in Massachusetts (and some other states) require financial or technical support of regional research. Comprehensive regional wildlife research should be coordinated across developers and with help from entities such as the [Regional Wildlife Science Collaborative for Offshore Wind](#) and the [National Offshore Wind Research & Development Consortium](#).
- Research directly addressing wildlife and offshore wind should also be coordinated with research that focuses on impacts to related resources (e.g., fisheries via the [Responsible Offshore Science Alliance](#)) and with research into other sources of changes in the marine environment.
- Centralized third-party administration of research funds should be used where possible to coordinate data collection and research efforts at regional scales and ensure that scientific knowledge of offshore wind impacts and mitigation continues to advance along with the offshore wind industry.



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