# Summary of Discussions from the Marine Mammal Specialist Committee of the Environmental Technical Working Group (E-TWG)

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# Introduction and Guiding Principles

Marine ecosystems are dynamic, with substantial temporal variation in environmental conditions and in wildlife distributions. Many marine areas in the eastern United States are heavily used for transportation, resource extraction, military exercises, and other activities (Halpern et al. 2008, Industrial Economics Inc. 2012). Land-based human activities also impact marine ecosystems, such as coastal development and pollutants that make their way into oceans. Offshore wind energy is a relatively new industry in the United States that is being introduced into this highly dynamic and human-influenced system. Federal regulations were only established for the Outer Continental Shelf Renewable Energy Program in 2009, and a variety of regulatory and non-regulatory processes are still in development for the industry. Although a great deal of attention has been given to understanding and mitigating environmental effects of offshore wind energy development during site assessment and site characterization of lease areas, similar practices for the construction and operation of wind farms have in many cases not yet been fully defined.

As directed by the Environmental Technical Working Group for New York, in April 2019 a volunteer Specialist Committee (hereafter 'Committee'; Appendix A) was formed to provide stakeholder input on practices to measure, understand, and mitigate (avoid, minimize, reduce, or offset) the effects of offshore wind energy development on marine mammals. Committee goals are to (1) develop recommended practices for environmentally responsible development with the purpose of informing a range of offshore wind-related efforts by developers, regulators, and other stakeholders, and (2) promote regional collaboration around environmental mitigation and monitoring for wildlife at offshore wind projects. The Committee is focused on developing recommendations that:

- Are applicable to a range of development locations. Recommendations may include variable levels of detail, depending on the degree of site-specific variation that must be considered for implementation.
- Are designed to inform decisions for a range of stakeholders involved with the offshore wind energy development process.
- May go beyond what is mandated in current regulations, while providing flexibility to ensure that recommendations can be reconciled with future changes to regulation and other guidance.

Committee discussions and written products could inform a range of state, federal, and stakeholder efforts to understand and mitigate the potential effects of offshore wind energy development. An initial objective of Committee efforts is to inform the New York State Public Service Commission's (PSC) decision about recommended wildlife mitigation and monitoring practices to include in New York State's Phase 2 offshore wind energy procurement order. In its Order Establishing Offshore Wind Standard and Framework for Phase I Procurement, the PSC stated that it would consider "best practices" developed by the E-TWG[1], and Department of Public Service (DPS) staff have more recently reiterated the willingness of the PSC to consider recommendations put forward by the E-TWG (and the group's Specialist Committees) for inclusion in future procurements. Thus, recommendations from the Committee may eventually be mandated (for example, if they are implemented in New York's Phase 2 Procurement) or may remain as voluntary guidelines. This document summarizes Committee input and degree of consensus on a range of potential mitigation and monitoring measures, and is intended,

[1] http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7b37EE76DF-81B1-47D4-B10A-73E21ABA1549%7d

among other purposes, to support public comments to the PSC that are submitted from the E-TWG or other organizations during the state procurement process.

## Focus of Committee Discussions

Committee discussions have used the term "best management practices," or BMPs, as a convenient shorthand for referring to these recommendations, in part because this terminology was used in the Framework for Phase I Procurement (above). This terminology can be a source of confusion, however, as the term "BMP" is used in a variety of ways in different contexts. As it has no specific policy meaning within the context of future New York procurements, we have largely avoided the term "BMPs" throughout the remainder of this document in favor of "recommendations".

The Committee is focused on mitigation and monitoring for marine mammals in the eastern U.S., which are under the jurisdiction of the National Marine Fisheries Service (NMFS) and are protected under the Endangered Species Act (ESA; 16 U.S.C. §1531 et seq., 1973) and/or the Marine Mammal Protection Act (MMPA; 16 U.S.C. §1361 et seq., 1972). Marine mammals are trust resources for NMFS, and thus the agency is tasked with their protection. The ESA and MMPA, and their implementing regulations, prohibit "take" of protected species, which may include lethal, non-lethal, and habitat impacts to these species. Sea turtles are also trust resources and are protected under the ESA, and are within the remit of this Committee. Though sea turtle mitigation measures have not yet been discussed by the Committee, several of the below recommendations (particularly around reducing collision risk with vessels and reporting injured or entangled animals) may also be applicable to sea turtles, and the Committee has indicated that this taxon will be a focus for future discussions.

As offshore wind leases in federal waters fall under the jurisdiction of the Bureau of Ocean Energy Management (BOEM), there are federal requirements from both NMFS and BOEM that must be followed relating to protected species mitigation for offshore wind development projects. Through the state offshore wind procurement process, New York also has the ability to add stipulations for developers selling power to the state, regardless of where that development activity occurs (NYSERDA 2018), in order to protect the state's natural resources and align with the goals of state leadership. While the state does, in many instances, have the prerogative to create these additional requirements, the requirements cannot conflict with (e.g., contradict) federal regulations and guidance, and any recommendations adopted by the state must have the flexibility to be reconciled with federal regulations and guidance as needed. This reconciliation may occur at multiple points in the contracting and environmental mitigation planning process.

### New York Processes for Procurement and Environmental Mitigation Planning

The PSC issues Orders establishing offshore wind standards and frameworks for offshore wind procurements. This process lays out standards relating to renewable energy requirements for utilities and authorizes the New York State Energy Research and Development Authority (NYSERDA) to carry out offshore wind solicitations, and in turn procure offshore wind renewable energy certificates (ORECs) from offshore wind projects. ORECs are then resold to utilities to reach renewable energy requirements. In authorizing NYSERDA to carry out offshore wind solicitations, the PSC sets requirements for each procurement in their Order, which can include requirements related to environmental protection. In the Phase 1 Procurement Order from 2018[1], environmental requirements that the PSC identified for developers selling ORECs to the state included consultation with state agencies relating to wildlife, environmental data transparency, lighting controls to minimize nighttime visibility, and the submission of an environmental mitigation plan (EMP). NYSERDA then built those requirements into their

procurement request for proposals (RFP)[2]. If NYSERDA concludes that requirements are impractical or inefficient, NYSERDA may omit or modify the requirements, provided it supplies an explanation at the time of the solicitation. During the solicitation process, offshore wind energy developers that are hoping to sell ORECs to the state must identify the ways in which they will meet the solicitation requirements. If selected, developers enter contracting with NYSERDA, at which time there is an opportunity for negotiation related to the requirements laid out in the solicitation.

As established in the Phase 1 solicitation and anticipated to be carried forward into future procurements, developers are required to submit EMPs to the state. Initial EMPs are submitted as part of solicitation proposals and, following negotiations, are incorporated into contracts. As outlined in the Phase 1 Procurement Order, EMPs are further expanded and updated periodically throughout the development process in consultation with the E-TWG. Thus far, the EMP consultation process as laid out for Phase 1 projects includes several meetings per year between developer representatives and non-developer E-TWG members, followed by opportunities for E-TWG members to provide written feedback, with flexibility in timing to ensure review and consultation when significant updates have been made. While developers are required to consult with the E-TWG, they are not required to accept any of their recommendations.

Site-specific implementation of Committee recommendations will generally require consideration of individual project and site conditions. The New York State procurement and EMP consultation processes are designed to ensure sufficient flexibility and opportunities for collaboration among government agencies, selected developers, and other stakeholders such that project-specific implementation decisions are guided by the principles identified below.

## Guiding Principles

Committee discussions are informed by a set of underlying principles, namely that recommended mitigation and monitoring[3] at offshore wind projects should:

**Apply the mitigation hierarchy.** Where possible, *avoid* negative effects on biodiversity and ecosystem services; where avoidance is not possible, *minimize* those effects; and where significant residual effects are predicted to remain, *offset* or *compensate* for those effects (Council on Environmental Quality 2005, Authority 2018). Such efforts could include:

- **Avoid effects through careful planning.** Siting, technology use, and other strategies should be planned in ways that avoid displacement, barrier effects, collision risk, and habitat disturbance when possible. This could include (but is not limited to) strategies such as siting project activities to avoid sensitive areas, or the use of certain foundation types to avoid or minimize noise-induced impacts associated with pile driving.
- **Minimize collision risk.** This may include (though is not limited to) mitigation measures to: minimize interactions between marine species and fast-moving vessels; minimize wildlife attraction to wind facilities, which in turn could lead to collisions; and deter at-risk species when appropriate.
- **Minimize habitat disturbance.** This includes disturbance from sound, light, human activity, structures, and/or visual obstructions, which may lead to physiological, reproductive, or survival impacts.

[2] https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-Solicitations

[3] Monitoring in this context refers to that related to active conservation and adaptive management as well as monitoring to improve scientific understanding (Nichols and Williams 2006)

- **Offset unavoidable effects.** This may include support of additional scientific research to better understand and mitigate effects, or support for the conservation of target populations and habitats by working to reduce negative effects from offshore wind energy or other anthropogenic activities (e.g., other offshore industries).

**Assess potential effects to individuals, populations, and ecosystems.** This includes consideration of direct effects to individuals and populations, such as changes in behavior, injury, or mortality, as well as considerations of indirect effects such as changes to habitat and food web dynamics.

**Use a risk-based approach.** Mitigation and monitoring measures should be focused toward areas of greatest need (e.g., highest risk or impact). This includes the identification of species at highest risk of effects at each development site and stage of development, due to their vulnerability to stressors, population status, or other factors.

**Use adaptive management.** This includes flexibility to suit the needs of each development project based on its location, design, and other considerations. It also includes adjustment of mitigation plans to incorporate new information and modify mitigation and monitoring approaches, as federal guidance is developed and as our collective understanding of best practices and wildlife effects becomes more advanced.

**Advance environmentally responsible development.** The intention for recommendations generated by the Committee is to help ensure the industry is developed in an environmentally responsible, yet practicable, way. This means striking an appropriate balance between the timely development of clean energy and the reduction of environmental risk posed by that development.

**Be transparent.** Transparency in monitoring and mitigation approaches allows others to build on existing work and allows regulators to understand the effectiveness of implemented mitigation measures and adaptively manage across the offshore wind industry. Transparency in decision-making and process also fosters the broader community's trust in outcomes. Transparency should be fostered through peer review, where applicable (ideally through scientific journal articles, technical memoranda, or similar).

**Be collaborative and consider stakeholder input.** Stakeholder engagement and communications ensure that a diversity of values is represented, which can lead to higher quality decisions that are better adapted to local contexts. Collaboration and support of environmental research could also include leveraging third-party environmental research funding or contributing to regional conservation and research efforts.

**Be inclusive of diverse scientific and technical expertise.** Mitigation measures should address conservation objectives, be practicable, be technologically and logistically feasible, and avoid risks to human safety. This balance often requires a range of ecological, engineering, project development, and regulatory expertise.

**Be informed by the best available science.** At the project scale, this includes using existing baseline information and site-specific monitoring data to inform mitigation approaches during each development phase. This also includes ensuring that studies on the effects of development, and the effectiveness of mitigation practices, are designed in scientifically rigorous ways in accordance with the current state of knowledge.

**Address cumulative effects.** Whether at project-specific or regional scales, mitigation and monitoring practices should inform our understanding of cumulative effects associated with the industry, and inform the adaptive management of offshore wind projects to minimize these effects.

As defined by the mitigation hierarchy, the immediate goal of mitigation practices is to avoid impacts. If impacts cannot be avoided, they should be minimized and reduced as much as practical through a combination of project design decisions and operational mitigation at project sites. Unavoidable impacts can be offset by providing off-site conservation support for affected populations or ecosystems. The recommendations below must be considered within this context. For the purposes of these recommendations, the term "mitigate" is defined as avoiding, minimizing, and offsetting negative effects.

## Process for Committee Discussions

This summary document reflects recommendations by the Committee for minimizing effects to marine mammals from offshore wind development. This summary includes:

- Background: relevant information on focal topic areas, including additional input from non-Committee members with relevant expertise.
- Recommendations: recommended mitigation or monitoring practices on topics that have been discussed by the Committee.
- Status: indicates the level to which each recommendation topic has been discussed and the degree of Committee agreement on the specifics of the recommendation (status options are "initial brainstorming", "in progress", "fully drafted" or "agreed upon").
- Level of Committee Agreement: indicates the degree to which Committee members expressed that they agree with the recommendations as currently written.

This summary document is the main product of the Marine Mammal Specialist Committee. It is intended to be a living document that will be updated to include new details and new topics as Committee discussions progress.

Recommendations from this Committee have been developed via a multi-step process. Existing mitigation and monitoring practices (MMPs) for offshore wind and other industries, such as offshore oil and gas, were initially summarized from the literature using the MMP Tool[4] and other sources. The Committee met via phone every few weeks, as well as meeting several times in person, and incorporated input from outside experts to inform discussions around particular topics. The topics in this document are a subset of the list of potential recommendation topics identified by the Committee; the Committee chose to begin discussions on a range of initial topics of varying divisiveness, difficulty, and conservation importance. Thus, the topics currently included in this document are not necessarily those identified by the Committee to be highest priority. Additional high priority topics will be addressed as Committee discussions continue.

*The topics in this document are not a comprehensive list of recommendations and are not necessarily those identified by the Committee to be highest priority. The Committee chose to begin discussions on a range of initial topics of varying divisiveness and conservation importance. Additional high priority topics, including topics focused on sea turtles, will be addressed as Committee discussions continue.*

[4] https://nyfisheriestwg.ene.com/Resources/MMPTool

# Recommendations for Reducing Vessel-related Impacts to Marine Mammals

## Background

While not a risk specific to the offshore wind industry, increased vessel traffic during construction and operations at offshore wind farms can lead to increased collision risk for marine mammals. Collisions with vessels are a significant source of anthropogenic mortality and traumatic injury for many species (Van Waerbeek et al. 2007, Crum et al. 2019). Collisions with vessels are a leading cause of mortality for North Atlantic right whales (also "right whales"; Henry et al. 2017), which are of particular concern in the northwest Atlantic due to their critically endangered status. Other large whales, such as humpback and fin whales, can also have harmful interactions with vessels that lead to strandings and mortality (Laist et al. 2001, Cotton Rockwood et al. 2018). Vessel size and speed both influence risk of collisions (Laist et al. 2001, Vanderlaan and Taggart 2007). NOAA has also declared Unusual Mortality Events (UMEs) for humpback and minke whales on the east coast in recent years, and have assembled teams of scientists to better understand the cause of these strandings; in the case of humpbacks, there is evidence that 50% of mortalities resulted from either ship strike or entanglement[5].

The main mechanisms to reduce risk of vessel-related impacts, in accordance with the mitigation hierarchy, include 1) avoiding collision risk, by reducing vessel activity in locations and/or time periods of higher risk, and 2) minimizing risk through vessel speed restrictions and increased observer vigilance.

There are a range of federal requirements and guidelines designed to help enforce protections for marine mammal species and reduce vessel-related impacts. Under federal law, vessels must stay at least 500 yards (460 m) from North Atlantic right whales. Additional guidelines suggest boats stay at least 100 yards (90 m) from whales and 50 yards (45 m) from dolphins and other non-cetacean marine mammals. Additional requirements may be added to offshore wind-related vessels through BOEM lease stipulations and Incidental Harassment Authorizations under the MMPA. Reporting observations of species such as North Atlantic right whales, as well as animals observed to be in distress (e.g., injured, entangled), can help inform management and conservation efforts. Additional effort can be made to ensure that all vessel crews are aware of protected species regulations, are trained to identify marine mammal species, and are aware of reporting requirements for protected species observations.

*Vessel Speed Restrictions*

Under the auspices of the Endangered Species Act and Marine Mammal Protection Act, over the last few decades NMFS has mandated a range of rules for vessels with the purpose of reducing the likelihood of ship strikes causing serious injury and mortality to endangered North Atlantic right whales. In 1997, NMFS implemented a regulation prohibiting all vessels from approaching North Atlantic right whales closer than 500 yards (460 m). In 2008, the vessel speed restriction rule was implemented based on substantial science indicating that vessel speed is an important factor affecting the likelihood of whale-vessel collision lethality (Laist et al. 2001, Jensen and Silber 2004, Vanderlaan and Taggart 2007). The rule states that all vessels 65 feet or longer must travel at 10 knots or less in certain locations along the U.S. east coast, and at certain times of year, as designated by NOAA; these locations are termed seasonal management areas (SMAs; NOAA 2008). SMAs aim to cover high-risk areas where right whales

[5] https://www.fisheries.noaa.gov/national/marine-life-distress/2016-2019-humpback-whale-unusual-mortality-event-along-atlantic-coast, https://www.fisheries.noaa.gov/national/marine-life-distress/2017-2020-minke-whale-unusual-mortality-event-along-atlantic-coast

consistently occur, including migratory routes and calving grounds. In addition to mandatory SMAs, voluntary dynamic management areas (DMAs) are also designated; mariners are encouraged to avoid these areas if possible, or to reduce speeds to 10 knots or less while transiting through these areas. In general, DMAs are designated when right whales are observed outside of the geographic extent or effective period of SMAs, and specifically when reliable sightings are obtained of three or more right whales within a 75 square nautical mile area (Silber et al. 2012). The size of a DMA is commensurate to the number of whales present and is put in place for two weeks[6]. Recently, NOAA also approved the use of near real-time passive acoustic detections of North Atlantic Right Whales to designate DMAs (North Atlantic Right Whale Recovery Plan Northeast U.S. Implementation Team 2019, Pentony 2020).

The NOAA Office of Protected Resources is currently (as of December 2019) drafting a report to examine the effectiveness of management strategies for reducing ship strikes for large whales in the eastern U.S. This includes an analysis of the effectiveness of the vessel speed rule, as well as the amount of small vessel (<65 feet) traffic in SMAs and the effectiveness of voluntary DMAs. The draft report should be released in winter/spring 2020. NOAA will review the report findings, the data on vessel strikes, and public input on the draft report, and evaluate whether changes to NMFS vessel strike management efforts are needed. Committee members indicated that these sources of information would help inform future discussions on this topic.

BOEM's environmental requirements include lease stipulations (project-specific standard operating conditions) pertaining to vessel speed restrictions for offshore wind projects on the east coast. These stipulations generally require that: 1) all project vessels maintain a separation distance of 500 m from North Atlantic right whales, 100 m from other large whales, and 50 m from all marine mammals; 2) all project vessels monitor the North Atlantic right whale Sighting Advisory System; 3) all project vessels over 65 feet comply with seasonal speed restrictions anywhere they operate (not just SMA boundaries), 4) all project vessels reduce speed to 10 knots or less when mother/calf pairs, pods, or large assemblages of non-delphinoid cetaceans are observed near the vessel, and 5) all project vessels comply with speed restrictions in DMAs, regardless of vessel size[7].

## Recommendation to reduce vessel speeds to minimize collision risk

Status: Initial brainstorming

### Recommendation

*(TBD)*

## Recommendation to use dedicated crew members as lookouts under specific circumstances

Status: Fully Drafted

Level of Committee Agreement: Committee members are agreed that trained crew lookouts should be used to help reduce the risk of collision with marine mammals under certain circumstances. However, there are a range os specific concerns with the recommendation as currently drafted. First, some Committee members are concerned that without more detailed delineation of the specific circumstances under which dedicated crew lookouts would be an appropriate mitigation measure, this recommendation could be taken out of context to imply that crew lookouts are a potential replacement for professional PSOs (which the Committee agreed is not the case). Second, some Committee members

[6] https://www.nefsc.noaa.gov/psb/surveys/SAS.html
[7] https://www.boem.gov/renewable-energy/lease-and-grant-information

feel that dedicated crew lookouts should be used anytime there is not a PSO on duty, regardless of vessel speed. Third, some Committee members feel that crew lookouts should have not have undergo full PSO training, as that level of training is not required to serve as a lookout (though other Committee members feel strongly that PSO training would improve lookout performance). And fourth, there is not full agreement about how best to define "high risk" situations (some Committee members expressed concern with using DMAs, because they feel that DMA boundaries are defined in a relatively coarse way and may include locations that don't truly represent a high risk; other Committee members feel that additional criteria for "high risk" situations should be added to the recommendation).

### Recommendation

*On vessels operating at greater than 10 knots during high risk periods as stipulated below, designated crew lookouts should be used to help reduce vessel collision risk in instances where PSOs for visual monitoring are not employed due to technical or logistical feasibility or human safety concerns. Crew lookouts should complete PSO training, though their role should not be confused with that of contracted, independent PSOs. The tasks of designated crew lookouts should be as follows:*

- *In locations and time periods with higher risk for potential collisions, as identified by DMAs, SMAs, or the detection of species of concern in the vicinity that have the potential to interact with the vessel (with these contemporaneous detections occurring via passive acoustic monitoring, PSO reports, or other means), there should be a dedicated crew member on watch that serves as a marine mammal observer (e.g., that is their sole duty while conducting monitoring).*
- *In locations and time periods with a lower risk of potential collisions, and at vessel speeds lower than 10 knots, designated crew members should still serve as lookouts, but these observers may also have other duties.*

## Recommendation to instruct vessel crews and provide reference materials

Status: Fully Drafted

Level of Committee Agreement: The Committee is in full agreement on this recommendation.

### Recommendation

*All vessel crew members should be briefed in the identification of marine mammals, and in regulations and best practices for avoiding vessel collisions. Reference materials should be available aboard all project vessels for identification of marine mammals. The expectation and process for reporting of marine mammals (including live, entangled, and dead individuals) should be clearly communicated and posted in highly visible locations aboard all project vessels, so that there is an expectation for reporting to the designated vessel contact (such as a PSO or the vessel captain), as well as a communication channel and process for crew members to do so. This requirement does not replace other mitigation methods such as vessel speed restrictions or PSOs, but rather is a complementary method to enhance awareness and further reduce collision risk for marine mammals.*

# Recommendations to Reduce Noise-related Impacts to Marine Mammals

## Background

Underwater noise is produced during site assessment, construction, operation, and decommissioning of wind farms through an array of activities, including vessel traffic, high resolution geophysical (HRG) surveys, turbine installation, trenching, and dredging (Madsen et al. 2006). Of particular concern is the noise created by pile driving during construction, as the activity generates sound of high source level and broad bandwidth (Dolman and Simmonds 2010). Pile driving is currently the most common technique used to secure turbine foundations to the seafloor (Bailey et al. 2014). For acoustically sensitive species, high levels of noise have the potential to cause hearing loss (temporary or permanent) and behavioral impacts including displacement and masking (i.e. interference with the detection of other sounds used for normal behavior such as communication, finding food, and avoiding predators). Potential effects vary by species, life history stage, sound frequency and intensity, and other factors.

Efforts to reduce noise-related construction impacts on marine mammals should be guided by the mitigation hierarchy (e.g., developers should first explore ways to avoid or minimize underwater noise before exploring operational practices to reduce harm). Noise-related impacts from pile driving can be largely avoided through the use of alternative quiet foundation types. When piling is conducted, noise impacts can be minimized through multiple strategies, including soft-start techniques, noise-reducing technologies (see Verfuss et al. 2019 for review of available methods), and monitoring a number of 'zones' prior to commencement of activities to ensure no marine mammals are present in the area. Committee discussions to date have focused on monitoring associated with piling activity, but this should not be interpreted as an assessment of the relative importance or effectiveness of this mitigation strategy relative to quiet foundations, noise reduction technologies, or other impact minimization approaches. The best combination of strategies to reduce impacts to marine mammals will likely vary based on site- and project-specific factors.

*Monitoring, Clearance, and Exclusion Zones*

The following terms have been defined based on input from committee members in order to allow for consistent interpretation of the below recommendations. The size of each type of zone may differ by species or hearing group and sound source. Monitoring may also occur beyond the extent of any of these zones, depending upon the specific activity, target species, site conditions, and other considerations identified in project monitoring plans.

- *Monitoring zone* – area monitored for the presence of animals prior to, during, and immediately after noise-generating activities. This includes the clearance and/or exclusion zone but may be larger than either of these zones. For example, the monitoring zone may be equivalent to a regulatory Level B harassment zone as established by NMFS.
- *Exclusion zone* – area where animals cannot be present during noise-generating activity. If an animal is detected within this zone, this triggers a mitigating action such as a delay in the activity, a shutdown, or other mitigation protocol(s).
- *Clearance zone* – area where animals cannot be present prior to the commencement of noise-generating activity. If an animal is detected within this zone, noise-generating activity cannot commence until the area has been "cleared". The clearance zone may be the same as the monitoring and/or exclusion zone. The clearance zone is sometimes larger than the exclusion

zone to try to avoid a delay or shutdown immediately after noise-generating activity has commenced (e.g., by detecting animals in the vicinity that may be moving toward the exclusion zone).

The MMPA defines Level A and B harassment, and related harassment zones are used to determine take within the regulatory framework of Incidental Harassment Authorizations (IHAs) through NMFS. The focus of the below recommendations is on operational definitions, such as would be communicated to PSOs or passive acoustic monitoring (PAM) technicians and enforced during project activities, rather than on regulatory definitions (e.g., MMPA harassment zones). However, clearance, monitoring, and exclusion zones should at minimum be consistent with what is required by regulation. Monitoring of these zones prior to and during noise-generating activities can be done using a variety of techniques, including visual observers and PAM.

*Visual Observers*

PSOs are trained observers that monitor for protected species through sustained visual observation from a vessel or aerial platform. NMFS and BOEM commonly require PSOs for industry-related activities in aquatic environments. The aim of PSOs is to reduce the potential for injury or behavioral change (collectively defined as harassment under the MMPA) of protected species by ensuring that mitigation and monitoring requirements are followed during industry activities, and to monitor and report any potential take of protected species (Baker et al. 2013). PSOs function as independent data collectors, who generally collect information on the presence and behavior of protected species they observe, including whether animals enter defined zones, and whose observations may be used to trigger specified mitigation actions. Visual detections of protected species require surfacing behavior within the observer field of view, and thus detection probability may vary by species, life history stage, time of day, and a number of environmental and observer-related factors (Barlow et al. 2001). Several factors relate to the setup for observations, including vantage point, field of view, and visual range; for example, it is difficult if not impossible for a single observer to cover 360 degrees reliably (Harwood and Joynt 2009). Despite regular use of PSOs in the U.S., there is some variation in training, performance, and reporting requirements among industries and geographic regions (Baker et al. 2013). Lease conditions generally require that PSOs utilized for offshore wind energy development are approved by NMFS, but as the offshore wind industry is still relatively new to the U.S., industry-specific best management practices (BMPs) for PSOs are still being developed by BOEM and NMFS.

*Passive Acoustic Monitoring*

PAM refers to the use of underwater hydrophones to detect and monitor vocalizing marine mammals. PAM is a suite of tools that can be used both to answer scientific questions and to mitigate for potential impacts (Van Parijs et al. 2009). There are also a range of moored, towed, and autonomous PAM platforms, all of which may have different capabilities under specific conditions and study goals (e.g., Baumgartner et al. 2019, 2020). Passive *archival* recording units can vary in design, but in general are deployed for a period of months to record data and then are retrieved. In contrast, *real-time* passive acoustic sensors can provide near-real-time data transmitted via very high frequency (VHF), satellite or mobile phone signals (Van Parijs et al. 2009). Real-time passive acoustics are required for mitigation monitoring in order to receive information on marine mammal presence on a time scale that allows for action to be taken. The probability of detection using real-time passive acoustics varies by species, season, behavior, vocalization rates, distance of the animal from the recorder, and amount of time receivers are deployed (Verfuss et al. 2018). The distance at which calls can be detected is also dependent on a variety of factors, including species and type of call, water temperature, salinity,

pressure, depth, bathymetry, and presence of anthropogenic noise pollution (Helble et al. 2013). PAM can detect marine mammals further away than visual observations for some species groups (Parks et al. 2011). It is effective at night and during periods of poor visibility, but localization of animals in real time remains a challenge. An additional concern is masking (e.g., interference of other noise in the ability to detect animal calls). Current PAM technology deals reasonably well with vessel traffic and is able to pull out baleen whale calls from background noise (Simard et al. 2008), particularly with the use of human analysts to review automated classifications (Baumgartner et al. 2019), but with other types of continuous noise, or with loud impulsive noise from pile driving, masking may be more of a concern.

*Emerging Technologies*

In addition to PAM and visual observations by PSOs, a range of other potential technological solutions have been identified for monitoring exclusion zones (e.g., drones, autonomous systems, multi-spectral imagery). In particular, there has been some focus on developing technologies for monitoring in low visibility conditions (e.g., at night, poor weather conditions including fog, rain, or high sea state). Technologies include thermal imaging/infrared technologies, night vision technology, and active acoustics (Verfuss et al. 2018). Night vision technology may be relatively ineffective due to reduced field of view (Compton et al. 2008). While the NMFS Office of Protected Resources (OPR) believes night vision equipment can be potentially beneficial and encourages the continued use and development of night vision technologies, NMFS OPR has moved away from requiring the use of specific night vision equipment for monitoring during HRG surveys, due to questions regarding detection capabilities (J. Carduner pers. comm., 12/3/19, and N. Sisson pers. comm., 1/22/20). Shipboard thermal imaging and infrared technologies are in various stages of development; several recent tests of these technologies suggest similar overall detection rates and detection ranges for large whales as compared to PSOs, and indicate these technologies could be useful complementary additions to PSO- and PAM-based monitoring programs (Smith et al. 2020, Zitterbart et al. 2020).

## Recommendation for monitoring during noise-generating activities

Status: Fully Drafted

Level of Committee Agreement: The degree of detail on specific monitoring approaches in this recommendation represents a compromise that most Committee members feel is acceptable, despite differences of opinion about the degree to which specific monitoring approaches could or should be standardized across sites. The remaining area of disagreement is around whether pre-activity timing requirements for "clearing" a zone of animals should be the same for all taxa, or vary depending on species' conservation status. Some Committee members noted that a full "reset" of pre-activity time periods for non-listed species such as dolphins and seals could represent a significant constraint to construction activities, and that federal requirements such as those in Incidental Harassment Authorizations (IHAs) now include different "reset" time periods for different taxonomic groups.

### Recommendation

*To mitigate the potential for noise-related effects to marine mammals from noise-generating activities, and to detect behavioral changes related to noise-generating activities, exclusion, clearance, and monitoring zones should be maintained around noise-generating activities. The probability of detection of protected species within these zones during pre-activity observation periods and during noise-generating activities should be maximized through an integrated monitoring approach, including the use of PAM, NMFS-approved PSOs, and other proven technologies, as appropriate, and while also abiding by other mitigation and monitoring requirements such as those stipulated in BOEM approvals, Incidental*

*Take Authorizations and associated Biological Opinions. Specific recommendations for developing a monitoring and mitigation plan and identifying exclusion and monitoring zones include the following:*

- *Monitoring for marine mammals during pile driving activities will occur for a variety of reasons (e.g., regulatory compliance, impact assessment, improved understanding of impacts for adaptive management of future projects). Industry, NYSERDA, and other state and federal regulators should consider the advice and interests of scientific experts and non-governmental organizations (NGOs) when developing and/or approving monitoring plans (as applicable). Mitigation and monitoring plans should also be developed with input from all stakeholders.*
- *The monitoring techniques used during mitigation monitoring should be designed for the species groups (i.e. hearing groups) likely to be present, as well as the size of the area to be monitored. Methods should be networked or integrated to share information across platforms and, ideally, between lease areas.*
- *The size of the monitoring zone during pile driving should be defined via acoustic modeling that is informed by the best available science. Sound source, the ambient environment, and the functional hearing range and behaviors of species most likely to be affected should be well characterized in model inputs.*
- *Monitoring using visual observers (PSOs) should take place for a minimum of 60 minutes prior to the initiation of pile driving activity and 30 minutes prior to the initiation of HRG surveys that are using regulated sound sources. If animals are detected within the clearance zone during these periods, the pre-activity time period should reset, unless PSOs are confident that an animal has left the clearance zone (e.g., it was visually followed leaving the zone and continuing to move away from the zone).*
- *During active mitigation monitoring (e.g., prior to and during noise-generating activities), PSOs and PAM technicians should have no tasks other than to conduct observations, record observational data/detections, and communicate with and instruct relevant vessel crews with regard to the presence of marine mammals and mitigation requirements.*
- *The number of PSOs and/or monitoring devices used for mitigation monitoring during pile-driving activities should be science-based and ensure sufficient coverage of zones (e.g. monitoring, clearance, exclusion zones) with consideration of angle and field of view, realistic detection distances of species likely to be present, location of observers/devices, and the potential risk of sound masking due to adjacent noise-generating activities.*
- *When monitoring during pile-driving activities, PSOs should conduct observations from the highest possible safe vantage point on their viewing vessel and with a clear field of view for their monitoring area. Individual PSO responsibilities with respect to coverage area must be defined in the monitoring and mitigation plan, but individual PSOs should be responsible for monitoring no more than 180 degrees (i.e. two PSOs are required at any one time to monitor 360 degrees).*

## Recommendation on mitigation approaches for pile driving noise at night and during other periods of poor visibility

Status: Fully drafted

Level of Committee Agreement: Some Committee members feel that as currently drafted, this recommendation is insufficient to minimize noise-related impacts to marine mammals, and that pile driving should either not commence or not occur at all during periods of low visibility. Some Committee members also feel that the recommendation needs additional detail, for example by defining "practicability" in this context as "ensuring that the pile installation event results in a usable foundation

for the wind turbine (e.g., installed to the target penetration depth without refusal and with a horizontal foundation/tower interface flange)."

**Recommendation**

*To the extent compatible with practicability and worker safety, pile driving should not commence when visual mitigation monitoring of exclusion and monitoring zones is not feasible (e.g., at night and during poor visibility conditions such as fog or heavy rain), unless an alternative mitigation monitoring plan has been determined to be effective at detecting and localizing protected species. This determination of effectiveness should be science-based, via hypothesis-driven testing, and accepted by federal agencies.*

# Recommendations for Reporting

## Background

The above recommendations are specific to reducing impacts from vessel-related activities and noise-generating activities. The below recommendations, in contrast, are applicable across impact types and are more generally focused on sharing data and assuring standardization of data collection across projects. Data reporting is required through federal permitting processes as required by the Endangered Species Act, Marine Mammal Protection Act, and BOEM lease stipulations and plans approvals. As data collected by PSOs is invaluable in the decision-making of federal agencies for mitigation and adaptive management, the consistency and quality of PSO data is key; as was recognized in a recent NOAA Technical Memorandum on the topic, "PSO data can be very instrumental in providing species-specific responses to marine activities that are otherwise not easily observed" (Baker et al. 2013). Standardization of data collection would help to minimize discrepancies among data sets and more adequately allow for synthesis and comparison across projects and regions (Baker et al. 2013).

## Recommendation for reporting observations of North Atlantic right whales and dead or distressed individuals

Status: Fully drafted

Level of Committee Agreement: Committee members agreed that observations of all right whales and dead, entangled, or distressed marine mammals should be reported to federal authorities as soon as is practicable, and no later than 24 hours after occurrence. The only area of less than complete agreement was around how soon is "practicable." Some Committee members felt that mentioning two hours as a goal was unnecessarily burdensome, though others noted that this is generally in line with NMFS reporting requirements in IHAs, which are either "immediately" or "within 24 hours" depending on the circumstances.

**Recommendation**

*Within two hours of occurrence when practicable and no later than 24 hours after occurrence, the following types of observations should be reported to NMFS and BOEM: observations of North Atlantic right whales (including all types of visual and acoustic detections); sightings of any dead marine mammal; and sightings of any marine mammal that is entangled or otherwise in distress.*

### Recommendation for PSO data entry and standardization

Status: Initial brainstorming

**Recommendation**

*(TBD)*

## Recommendation for Incorporating Expert Input into Stakeholder Consultations for Environmental Mitigation Plans

### Background

Under New York's Phase 1 offshore wind procurement, proposers (e.g., developers who wanted to sell their power to the state) were required to submit an environmental mitigation plan that details the specific measures that the developer will take to avoid, minimize, or offset potential environmental impacts from the offshore wind development project (NYSERDA 2018). Successful projects are required to further evolve these plans over time in consultation with members of the E-TWG (minus the other developers represented in that group). The aim of this process is to help promote the environmentally responsible development of offshore wind by ensuring that offshore wind developers actively address the interests of environmental stakeholders. For further information, refer to "New York Processes for Procurement and Environmental Mitigation Planning," above.

Status: Fully drafted

Level of Committee Agreement: Committee members were in full agreement on this recommendation, though some Committee members suggested that it should be expanded to also include pre-construction survey work. Some Committee members noted that these State consultations must be coordinated as much as possible with federal processes to avoid potential conflicts.

**Recommendation**

*Environmental mitigation plans for construction and operation should be developed in consultation with knowledgeable stakeholders, including, but not limited to, state and federal agency representatives and environmental non-governmental organizations (eNGOs) with relevant technical expertise. Consultations regarding environmental mitigation plans for construction and operation are required by New York State to occur through the Environmental Technical Working Group (E-TWG) for projects contracted to provide energy to New York; in addition to E-TWG representatives, these consultations should also incorporate external input as needed to inform discussions. Consultations should aim to develop a plan for implementation during construction and operations and ensure that mitigation plans are appropriately designed to be 1) feasible and practicable, and 2) meet the stated objectives to mitigate (e.g., avoid, minimize, and offset) environmental impacts.*

## Other Topics Discussed by the Committee

Several other topics were mentioned during Committee phone calls but have not yet been discussed in depth. These topics included noise thresholds, maximum piling times per pile, ramp-up and soft-start procedures for pile driving, different foundation types, seasonal enhanced mitigation and restrictions for

pile driving, monitoring of sound sources to assess the accuracy of modeled acoustic exposure areas, baseline surveys to understand species' spatiotemporal distributions and abundance, reducing speed and diverting vessels away from animals in close proximity, conservation offsets, PSO reporting to regulatory agencies, and training for PSOs.

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# Appendix A. Specialist Committee Members

This list includes both current and former Committee members who contributed to discussions and the formulation of recommendations in this document.

| | |
|---|---|
| Kyle Baker and Mary Cody | Bureau of Ocean Energy Management |
| Catherine Bowes | National Wildlife Federation |
| Koen Broker, Paul Phifer, and Louis Brzuzy | Shell New Energies |
| Jennifer Daniels | EDF Renewables |
| Martin Goff and Laura Morales | Equinor Wind US |
| Sophie Hartfield Lewis, Laura Morse, and Aileen Kenney | Ørsted |
| Francine Kershaw and Alison Chase | Natural Resources Defense Council |
| Carl Lobue | The Nature Conservancy |
| Catherine McCall | Maryland Dept. of Natural Resources |
| Matthew Robertson | Vineyard Wind |
| Howard Rosenbaum, Melinda Rekdahl, and Anita Murray | Wildlife Conservation Society |
| Nick Sisson | NOAA Fisheries (Integrated Statistics Inc.) |
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