Environmental and Wildlife Working Group

Final Recommendations

Submitted to Maine Offshore Wind Roadmap

Advisory Committee

July 8, 2022

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Executive Summary and Acknowledgements

Since July 2021, the Environment and Wildlife Working Group (EWWG) has worked to develop the following recommendations in support of the overall framework of the Offshore Wind Roadmap for the State of Maine (State or SOM). These recommendations build on more than a decade of responsible OSW planning, investment, and innovation in Maine, in conjunction with the State's continued commitment to sustaining existing ocean users and the environment. The Group brought considerable expertise and knowledge bases to examine both known and unknown effects and impacts from offshore wind development to wildlife and the ecosystems they rely on to meet their life history requirements, including pelagic and benthic habitats. The following recommendations for Maine's Offshore Wind Roadmap Advisory Committee build upon knowledge and lessons learned from knowledge of the Gulf of Maine along with ongoing work in New York State, Rhode Island, and elsewhere in the United States and around the world, and represent the current needs and data gaps necessary to inform environmentally-sound offshore wind development in the Gulf of Maine (GOM). The EWWG emphasizes the need for the State to encourage the Bureau of Ocean Energy Management (BOEM) to utilize the best available strategies to avoid and minimize impacts, relying on the future state of the best science through the next decade and beyond, while ensuring ever-growing energy demands are fulfilled by clean renewable offshore wind sources.

The EWWG has organized our recommendations to strategically address immediate mapping deficiencies and data needs to identify potentially high-risk areas within the GOM (Tier 1 Recommendations), as well as intermediate and long term lease-scale and individual project-level considerations (Tiers 2 and 3 Recommendations) that the Group has tried to anticipate over the next several years as offshore wind development is realized in the GOM.

The EWWG met 13 times via Zoom and was comprised of representatives from State and Federal agencies, universities, non-governmental organizations, and other institutions including:

- Bigelow Laboratory for Ocean Sciences
- Biodiversity Research Institute
- College of the Atlantic
- Friends of Casco Bay
- Gulf of Maine Research Institute
- Maine Audubon
- Maine Department of Environmental Protection
- Maine Department of Fish and Wildlife
- Maine Department of Marine Resources
- National Audubon
- National Wildlife Federation
- NOAA Fisheries
- The Nature Conservancy
- University of Maine
- US Fish and Wildlife Service
- Maine Sea Grant/University of Maine

Thank you to all the members of the EWWG who volunteered their time to make this document what it is—the People of the State of Maine owe a debt of gratitude to your dedication in striving for environmentally-sound wind energy development in the Gulf of Maine.

Wing Goodale, Biodiversity Research Institute, Inc.
John Perry, Maine Department of Inland Fisheries and Wildlife
Co-Chairs, Environment and Wildlife Working Group

1. Introduction

The Environment and Wildlife Working Group (EWWG) has developed recommendations in support of the overall framework of the Offshore Wind (OSW) Roadmap for the State of Maine (State or SOM). These recommendations build on more than a decade of responsible OSW planning, investment, and innovation in Maine, in conjunction with the State's continued commitment to sustaining existing ocean users and the environment.

1.1. Maine Offshore Wind Roadmap

The overall goal of the Governor's Energy Office (GEO) for the Roadmap is to foster a renewable OSW industry that helps Maine become a leader in floating technology while meeting the following four goals of the Maine OSW Initiative:

1. Fight Climate Change
2. Harness Renewable Energy
3. Create Jobs and Economic Growth
4. Sustain Maine's Maritime Heritage, wildlife and fisheries, and the Gulf of Maine Environment

Climate driven changes to the Gulf of Maine (GOM) have already altered marine productivity and the abundance and distribution of marine species. These changes are expected to continue, resulting in ecological shifts in the GOM. The EWWG recommendations address two of the eight Roadmap objectives detailed in Table 1.

Table 1. Relevant Maine Offshore Wind Roadmap objectives

Objective Title	***Objective Subtitle***	***Objective Realized***
3. Establish Maine as a World Class Leader in OSW Cooperative Research and Monitoring	Develop and Implement Monitoring and Research to Optimize Co-Existence of OSW with Existing Ocean Users, Wildlife, and the Environment	Work with permitting agencies, researchers, and developers to develop cost-effective, innovative monitoring strategies to effectively inform strategies to avoid and minimize impacts to natural resources
4. Avoid, Minimize, or Mitigate Potential Impacts of OSW on Maine's Existing Ocean Users, Wildlife, and the Environment	Improve Decision-Making and Development Practices to Avoid, Minimize or Mitigate the Impacts of OSW on Maine's Current Ocean Users, Wildlife, and Environment.	Establish a process to ensure early and continued coordination and collaboration between DMR, MDIFW, pertinent scientists and researchers, prospective OSW developers, federal agencies, states and NGOs

1.2. Supporting Environmentally Responsible Development

The EWWG recognizes the need to develop a clean, renewable energy source, as well as the significance of the offshore environment to a variety of commercial and non-commercial wildlife species. With the uncertainties of the impacts of climate change and the current and predicted impacts it will have on the GOM, the importance of developing renewable energy cannot be overstated. However, the need to develop renewable energy must be balanced with the need to preserve the intrinsically valuable natural resources of the GOM.

It is important to recognize the unique opportunity Maine has to lead the development and operation of floating offshore wind with the least impact to wildlife and the environment. This is only possible if the State pursues gathering the critical data needed to better inform the decision-making process. Data collection should begin as soon as possible to advise environmentally sound siting, and to create a baseline for evaluating effects of offshore wind through time, which will ultimately put Maine in the best position to lead the nation in low-impact floating offshore wind development.

1.3. Coordination with the Fisheries Working Group

The EWWG is keenly aware of the ongoing concerns of Maine's commercial fishing industry which are being addressed by the Fisheries Working Group. In some cases, the data and mapping needs for both Working Groups overlap which further emphasizes the critical data gaps that need to be addressed. Where they do not overlap, recommendations specific to each Working Group will need to be considered in the context of the environmental, economic, and social-cultural significance of the GOM as a whole.

1.4. Impacts on Maine People

The EWWG has sought to establish recommendations to protect and preserve the Gulf of Maine's rich and varied marine species, habitats, and ecosystems while allowing for the orderly development of offshore wind technology. These recommendations seek to recognize the intrinsic value of natural systems to the people of Maine and the importance of these resources to Maine's identity and economy. Maine enjoys and benefits from a rich and diverse ecosystem that provides for activities such as boating, birding, fishing, lobstering, and whale watching. These natural resources are also the legacy of and inextricably intertwined with the culture of Maine's tribal communities.

The Gulf of Maine's natural resources are essential to the health and vitality of many of Maine's coastal rural economies. Small communities along Maine's coast have established sustainable economies that rely on a healthy marine environment and sustainable wildlife to provide a diversity of income for Maine's families and small business owners. Tourism, commercial and recreational fishing, aquaculture, and many other industries are built around the Gulf of

Maine's natural resources. Protecting the Gulf of Maine's natural resources while allowing for the growth of a new industry ensures the sustainability of Maine's existing economies and culture while adding in the additional value of offshore wind along with the jobs and clean energy it can provide to the region.

Although not addressed directly in the EWWG's recommendations, the potential disproportionate impacts of shoreside development on coastal communities, particularly rural communities with a high reliance on a healthy and productive Gulf of Maine ecosystem, bear further consideration and attention as Maine's OSW industry comes into focus.

1.5. Acknowledging Climate Change

Based on the most recent models, climate change is predicted to cause ecological shifts in the Gulf of Maine. The historical and current data used to evaluate both appropriate locations for offshore wind development and potential impacts should be considered within this context and should consider potential regime shifts. Robust modeling within a range of possible futures can be used to guide the future of offshore wind development as long as these are done with clear definitions of uncertainty or confidence on which to base recommendations and decisions.

1.6. Effects of Floating Offshore Wind on Wildlife

How the ecosystem, including fish and wildlife, responds to fixed bottom offshore wind turbines has been well studied in Europe at both the individual foundation/turbine level and within a configured array. Research has found that some species may collide with turbines, while other species avoid the turbines altogether.[1] Avoidance has the potential to cause a barrier to migration or cause individuals to be displaced from valuable habitat. Some species are attracted to turbines.[2] These effects can be seen both above and below water with fish, marine mammals, birds, and bats. The new hard substrate of fixed bottom turbines has also been shown to change the habitat and cause a "reef effect". Marine life can potentially respond to electromagnetic fields (EMF), operational noise, increased vessel traffic in the area, and secondary entanglement (Figure 1).[3] While much research has been conducted to date on

[1] Goodale, M. W., & A. Milman. 2016. Cumulative adverse effects of offshore wind energy development on wildlife. J. Environ. Plan. Manag. 59: 1–21.

[2] Fox, A. D., M. Desholm, J. Kahlert, T. K. Christensen, & I. K. Petersen. 2006. Information needs to support environmental impact assessment of the effects of European marine offshore wind farms on birds. Ibis (Lond. 1859). 148: 129–144.

[3] Farr, H., B. Ruttenberg, R. K. Walter, Y.-H. Wang, & C. White. 2021. Potential environmental effects of deepwater floating offshore wind energy facilities. Ocean Coast. Manag. 207: 105611. Available at https://www.sciencedirect.com/science/article/pii/S096456912100096X.

fixed-bottom turbines, with much more research still needed, little research has been conducted on floating platform technology. [4,5]

Additionally, the cumulative impacts of multiple offshore wind projects on wildlife and the environment over time and space, including project level effects in the short term and population-level impacts over time need to be assessed. This includes analysis of impacts to wildlife utilizing the Gulf of Maine that may be incurred from offshore wind energy projects outside the Gulf of Maine.

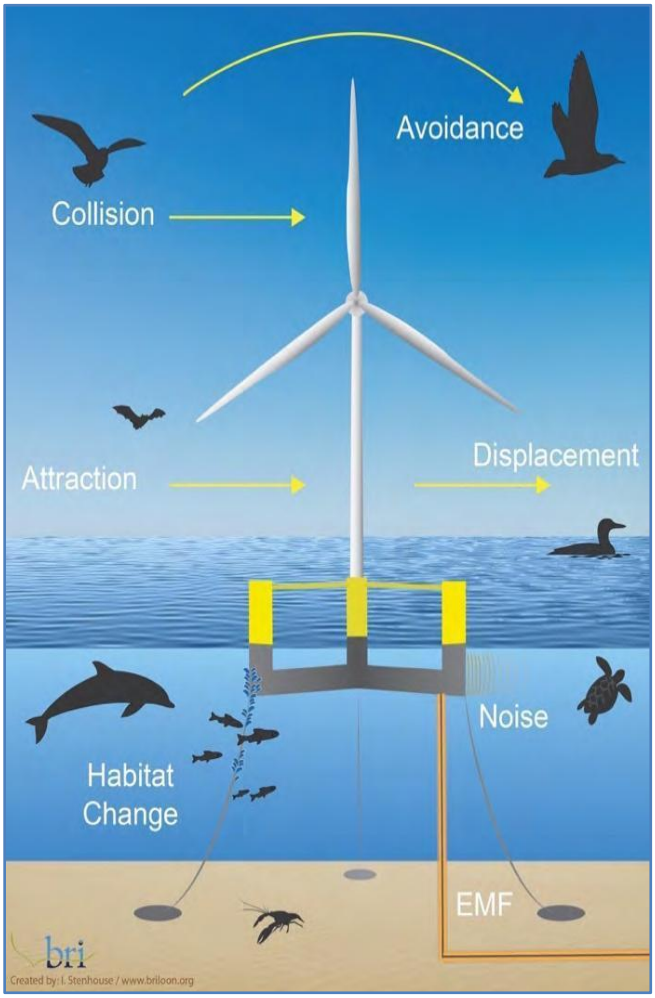

Figure 1. The Potential Effects of Floating Offshore Wind on Ecosystems (Graphic credit: Biodiversity Research Institute. Used with permission.)

[4] Ibid.

[5] Maxwell, S.M., Kershaw, F., Locke, C.C., Conners, M.G., Dawson, C., Aylesworth, S., Loomis, R. and Johnson, A.F., 2022. Potential impacts of floating wind turbine technology for marine species and habitats. Journal of Environmental Management, 307, p.114577.

1.7. How Recommendations are Organized

The Bureau of Ocean Energy Management (BOEM) has developed a multi-year process for identifying, studying, and leasing areas, and for development of offshore wind in the GOM[6]. To summarize, the BOEM process is as follows:

1. Planning and Analysis - Identification of potential lease areas, starting with identification of Wind Energy Areas (WEAs). BOEM has established Intergovernmental Renewable Energy Task Forces, including the Gulf of Maine, in response to states that have expressed interest in the development of offshore renewable energy. The role of each Task Force is to collect and share relevant information that would be useful to BOEM during its decision-making process.
2. Leasing - Conduct a competitive sale process culminating in lease issuance. BOEM has indicated the goal of holding a commercial lease sale within the GOM in 2024.
3. Site Assessment – Environmental site assessment of the individual lease, including BOEM review of lessee's proposed Site Assessment Plan (SAP) and scientific studies and monitoring studies.
4. Construction and Operations - Review of lessee's Construction and Operations Plan (COP), including conducting an Environmental Impact Statement (EIS), followed by subsequent construction and operations of wind projects (pending approval of COP). This is not anticipated to begin in the GOM before 2030.

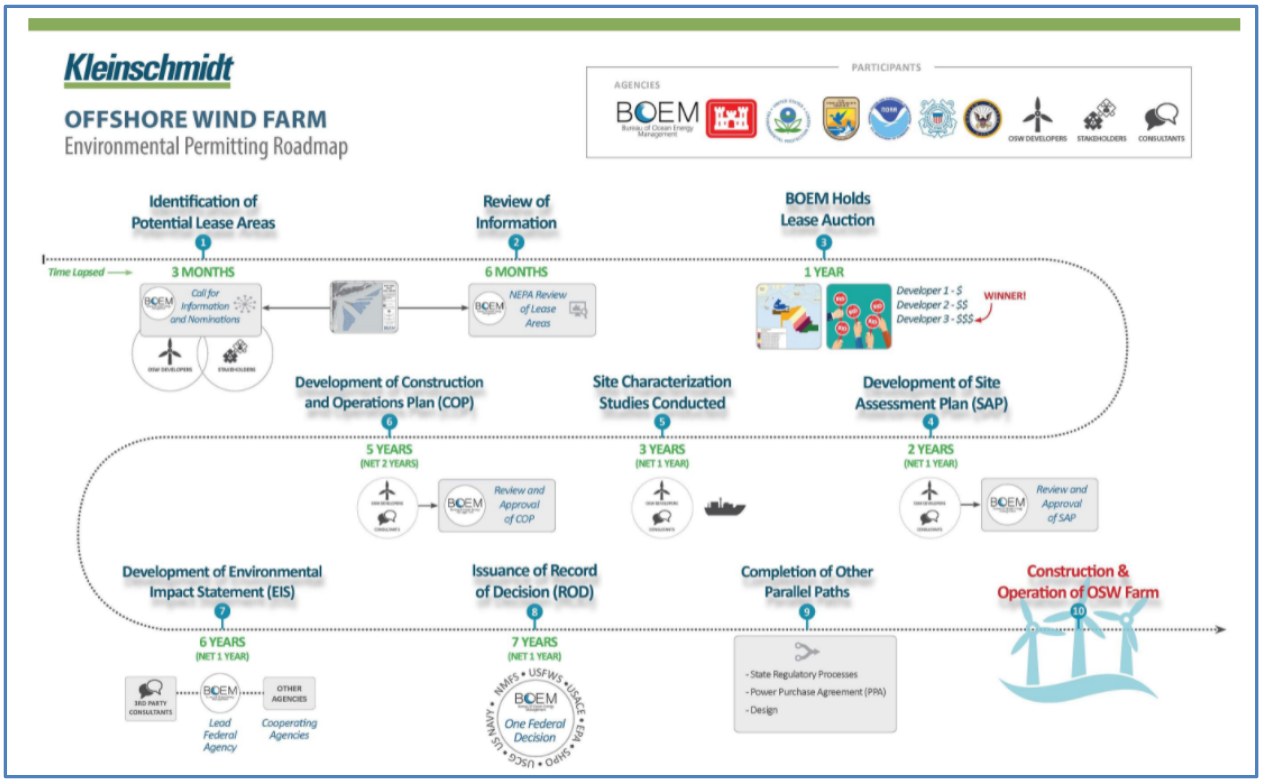

Figure 2. Schematic of the BOEM Lease Process (Graphic credit: Kleinschmidt Associates. Used with permission.)

[6] https://www.boem.gov/renewable-energy

The Environment and Wildlife Working Group recommendations were formulated with the following questions in mind:

1. *What are the key wildlife and ecological impacts we are concerned about in the Gulf of Maine?*
2. *What species are most vulnerable to offshore wind development and/or at greatest risk?*
3. *What pre-construction (i.e., pre-deployment of floating turbines, which will be towed to the location and moored) monitoring is needed to determine how to avoid or minimize impacts and understand pre-construction conditions at a lease site?*
4. *What monitoring needs to happen post-construction to determine if an impact is occurring as a result of the project?*
5. *What measures need to be put in place to 1) avoid impacts, 2) minimize impacts, or 3) mitigate impacts when constructing and operating an OSW project?*

To answer these questions, the EWWG developed a tiered approach to our recommendations, beginning with broad scale, Gulf of Maine data needs prior to the leasing of offshore wind development areas, down to turbine-level recommendations that could be appropriate as conditions of a project construction and operations plan[7].

While we emphasize to the State that our first set of recommendations should be considered as soon as possible in the Roadmap Process, the State should also make BOEM and prospective developers aware that the lease and turbine-level (Tier 2 and Tier 3) recommendations are forthcoming. This would help create predictability for the industry and ensure that the recommendations are adopted and initiated early in the Roadmap Process. The actions provided within each recommendation are presented with general timeframes: Immediate Term (0-2 years), Medium Term (2-5 years) or Long Term (5+).

2. Tier 1 Recommendations for Immediate Consideration (Prior to Leasing)

The Tier 1 Recommendations for Immediate Consideration are initial recommendations to be undertaken in 2022, prior to the leasing of sites in the GOM. The initial recommendations for the State's immediate consideration consist of ***Gulf of Maine-scale recommendations,*** which

[7] Given the current BOEM process, actual turbine deployment in the GOM is not anticipated prior to 2030 at the earliest. The EWWG realizes that given ongoing research of deterrents and other minimization efforts, these recommendations are expected to evolve in the coming years. However, in an effort to promote awareness to both BOEM and prospective developers, the EWWG felt it prudent to include current, turbine-level minimization strategies at this time.

the EWWG concluded were crucial for BOEM to implement prior to wind energy development, that are protective of the unique ecosystems and wildlife resources in the GOM. These Recommendations identify critical data gaps and the need to map critical areas to inform siting of environmentally-sound offshore wind in the GOM. Concurrently, we also recommend that the State investigate possible regulatory options under the federal consistency provisions of the Coastal Zone Management Act.

The major goal of the Tier 1 Recommendations is to identify areas of significant wildlife and fisheries use, presence of rare species, and ecologically sensitive habitats that should be excluded from OSW development as well as support identifying data gaps. By identifying areas of highest potential conflict as early as possible in the Roadmap Process, the State could petition BOEM to identify these as Restricted Areas to OSW development. In particular, proximity to significant ecological features, such as coastal islands, upwelling zones, or shallow areas which may be associated with higher concentrations of vulnerable wildlife and endangered species and therefore, should be given special consideration as Restricted Areas. Details of the Tier 1 Recommendations can be found in Appendices.

The recommendations below target specific measures that the State of Maine can take to avoid, minimize or mitigate adverse impacts to the environment and wildlife while pursuing offshore wind energy development in the Gulf of Maine. Specific agencies responsible for executing each of the recommendations will be further defined through the State's Maine OSW Initiative, a multi-agency effort led by the Governor's Energy Office (www.maineoffshorewind.org).

Recommendation (a)1 – Map Existing Data[8]

Conduct a mapping exercise in mid 2022[9] that collates existing data available in the GOM to identify where areas of greatest conflict between offshore wind energy development and wildlife may currently exist in GOM federal waters and identify data gaps that need to be filled to inform offshore wind leasing.

Rationale: BOEM has announced its intention to lease commercial scale offshore wind areas in the Gulf of Maine by mid-2024. This will require the identification of wind energy areas (WEAs) by BOEM in consultation with the Gulf of Maine Intergovernmental Task Force, and Maine's representatives on the Task Force need to be prepared to fully engage in these conversations

[8] It is important to note that while summarizing the existing data is very valuable, data for the Gulf of Maine is currently extremely limited. Projections of areas with fewer conflicts and assessments of impacts to a given species are less certain than those for elsewhere (e.g., south of Cape Cod). See Recommendations #2-#4.

[9] Under contract with the State, the mapping process has been initiated by the Northeast Regional Ocean Council (March 2022).

and represent the interests of Maine's citizens in the appropriate siting of wind energy lease areas. Therefore, Maine should seek data and input from scientists, commercial fishermen, and other stakeholders with expertise in wildlife, fisheries, and the offshore environment to compile and map the areas of known concentration of priority species, habitats, and commercial fishing activity. This mapping exercise and subsequent engagement process with stakeholders would be of great benefit to the State of Maine and the BOEM process overall by identifying and prioritizing high conflict areas early, as well as identifying gaps in the current data for future research priorities. This exercise should include the following:

Actions:

1. Aggregate relevant data layers from the Northeast Ocean Data Portal for the Gulf of Maine into an interactive product to identify existing data gaps.[10] (Immediate Term)
    a. Collate and analyze existing data from publicly available datasets for seabirds, marine mammals, bats, turtles, pelagic and benthic fish, invertebrate species, zooplankton, and oceanographic variables and processes.
2. Identify and map areas of high use by the fishing industry through the process outlined by the Fisheries Working Group. (Immediate Term)
    a. Concurrently, use fisheries data to identify areas of high marine productivity and potential commercial and pelagic fish species and marine bird and mammal foraging areas.
    b. Conduct a literature review to identify the key criteria that drive primary and secondary productivity that contribute to areas of high biodiversity of fishes, invertebrates, marine mammals, and seabirds in the GOM.
3. Hold a series of workshops with Gulf of Maine science experts and commercial fishermen, including Environment and Wildlife and Fisheries Working Group members, to jointly inform the mapping process and identify any information that may not have been identified but is readily available and accessible. (Immediate Term)
    a. Concurrently, conduct an interdisciplinary desktop analysis with oceanographers, benthic habitat experts, marine mammal experts, marine and anadromous fish experts, and marine bird and bat experts.
    b. Consider seeking funding and advancing partnerships to continue a series of stakeholder workshops.

[10] See Appendix 2: Critical Areas for Mapping

4. Maintain an iterative mapping process to integrate new data and stakeholder information as it becomes available to assist the state in comments throughout the BOEM process. (Immediate Term)
    a. Consider equity options for continued engagement from all stakeholders (e.g., travel/other relief to be able to participate).
5. Explore options for funding to support additional data enhancements and map products identified through workshops. (Immediate Term)

Recommendation (a)2 – Collect GOM habitat data

Coordinate with regional and federal partners to improve seafloor habitat characterization in the Gulf of Maine through the collection of hydrographic quality multibeam echosounder data to improve bathymetry and seafloor hardness information, sediment sampling, and benthic fauna characterization. This information should be used to create detailed sediment and habitat maps of the Gulf of Maine.

Rationale: The Gulf of Maine has limited bathymetric data of complex habitats which drives species habitat use and distribution. Complex habitats are important for a number of species in the Gulf of Maine and are critically important for vulnerable commercial species such as Atlantic cod and American lobster. This information will provide comprehensive, multi-species information critical to informing offshore wind siting considerations at both the lease and project level.

The National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey has recently updated a bathymetry model. This model could be greatly improved by the collection of additional multibeam echosounder data at 2-m, 4-m, 8-m, and 16-m resolution (resolution depending on seafloor depth) in areas where there currently exists either no digital bathymetry information or where existing data were collected using outdated survey methods and no bathymetry attributed grid data exist. Areas to target for bathymetry surveys can be identified using National Centers for Environmental Information (NCEI) Bathymetric Data Viewer[11]. In recent years (2000-present), multibeam echosounder data has been collected in the Gulf of Maine by the Center for Coastal and Ocean Mapping/NOAA-UNH Joint Hydrographic Center, Woods Hole Coastal and Marine Science Center, the University of Maine, Maine Coastal Program's Mapping Initiative, the Maine Department of Marine Resources (DMR) through commercial fishermen, and private survey companies. This effort should be expanded through coordination with all relevant state and federal partners. Bathymetry data should be collected

[11] NCEI: https://www.ncei.noaa.gov/maps/bathymetry/

following NOAA Hydrographic Survey Specifications and Deliverables[12] to the extent possible, and data should be made publicly available through the NCEI.

Further, seafloor habitat characterization should be expanded to collect sediment and benthic community information. Multiple methods exist to collect this information; some of these include surficial sediment grab samples and grain size analysis, sediment cores, seafloor video and still photos to characterize epifauna communities, benthic infauna collection and identification, water quality at the seafloor and water column profiles, and soft coral habitat identification. All benthic habitat information should be classified using the Coastal and Marine Ecological Classification Standard (CMECS)[13].

Finally, we recognize that to map the entire Gulf of Maine is a daunting effort; therefore, the State should collaborate with scientists, commercial fishermen, and other partners to identify critical areas in the GOM most at-risk from floating offshore wind development (Action Item #1).

Actions:

1. Establish a GOM marine mapping initiative with NOAA, DMR-Maine Coastal Program, NH, MA and other academic and non-profit partners and commercial fishermen to prioritize mapping areas to identify critical areas in the GOM most at-risk. (Immediate Term)
2. Explore Federal, State, and other funding sources to support regional mapping efforts and sediment core sampling. (Medium - Long Term)
3. Request NOAA mapping efforts in identified areas within the GOM. (Medium - Long Term)

[12] NOAA Hydrographic Survey Specifications and Deliverables: https://nauticalcharts.noaa.gov/publications/docs/standards-and-requirements/specs/HSSD_2021.pdf

[13] CMECS: https://iocm.noaa.gov/standards/cmecs-home.html

Recommendation (a)3 – Collect information on current conditions in the Gulf of Maine

Initiate a coordinated below and above water ecological baseline[14] monitoring study in identified areas of the Gulf of Maine. To provide a baseline for meaningful assessment of the impacts of offshore wind development on the ecosystem, wildlife, and fishes of the Gulf of Maine, monitoring should be initiated at the earliest possible opportunity. These surveys should focus on potential wind energy areas (as/when they are made available) and surrounding waters to refine the mapping exercise described above.

Rationale: Current information is needed on the distribution and abundance and movement patterns of bird, bat, marine mammal, turtle, and fish species, as well as the underlying ecosystem to assist in the siting and environmental review of areas in the Gulf of Maine for potential offshore wind development. Despite previous efforts in the Gulf of Maine (e.g., Atlantic Marine Assessment Program for Protected Species [AMAPPS]), ecological data of wildlife species in the Gulf of Maine remains limited. Given the variability in marine wildlife distributions, a comprehensive regional survey similar to those conducted in the South Atlantic (South Atlantic Baseline) and Gulf of Mexico Mid-Atlantic (GoMMAPS) that is focused on the Gulf of Maine area is a critical immediate need to inform BOEM's planning process, National Environmental Policy Act (NEPA) analyses (including Gulf of Maine and regional cumulative effects), regional-specific environmental assessments, and future review of applications for permits and necessary ESA consultations. In addition to siting, broadscale surveys of species and the broader ecosystem are necessary to put potential impacts due to construction or operation of offshore wind into the perspective of system wide change and to assess cumulative impacts of multiple offshore wind projects over time and space. For example, baseline soundscape information is needed to detect changes during and after construction.

Actions:

1. Develop a below/above water integrated survey design to determine the exposure risk of organisms to offshore wind development. (Medium – Long Term)
    a. Ensure that the designation of Wind Energy Areas and the subsequent NEPA processes have sufficient data to make sound siting decisions that avoid or minimize impacts.
    b. Provide ecosystem and broad scale data to provide context for potential impacts from offshore wind when compared to underlying system wide change and the

[14] The term baseline is used to establish current conditions in the Gulf of Maine. However, the EWWG acknowledges that the GOM is warming, which will impact future conditions and shift what is established as the current baseline.

impacts of climate change on the GOM and for cumulative impacts of multiple offshore wind projects over time and space.

c. This process may include methods that will be habitat and species group specific, as outlined in Appendix 3.

2. Model species/habitat distribution in the GOM based on environmental covariates. (Short – Medium Term)
    a. Evaluate species distributions based on historical conditions, current conditions and downscaled[15] climate projections.

Recommendation (a)4 – Conduct tracking studies

Conduct tracking studies on ESA-listed species in the GOM, including marine and non-marine birds, bats, marine mammals, and fish species especially vulnerable to impacts from offshore wind energy development.

Rationale: Due to their inherently low or declining populations, ESA-listed species may be especially at risk from offshore wind development in the GOM from the possibility of collision, displacement, secondary entanglement, and changes in habitat conditions. While costly, tracking studies via GPS, acoustics, radiotelemetry, or similar techniques are proven methodologies to accurately and specifically determine movements, migration timing and specific paths, feeding and loafing habitat areas of priority, use of the water column, vocalization rates, and other life history activities (e.g. reproduction) for Endangered, Threatened, and Species of Greatest Conservation Need. Very limited tracking data exists for certain species (e.g. Peregrine Falcons) and is completely absent for most species. There may be some technology limitations to tagging certain species (e.g., Roseate Terns) and we may need to use surrogate species. Some species, such as North Atlantic right whales, may need consideration for appropriate methodology to answer a particular question and stay within the confines of current permitting restrictions (e.g. utilize limpet tagging in particular areas where short term attachments may be appropriate, suction cup tags to document water column use or vocalization rates in particular habitats, or track vocalizing individuals within an area using passive acoustic arrays). Specific potential tracking studies are outlined in Appendix 4.

Actions:

1. Advocate for additional resources to understand coastal wildlife habitat use and forage/migratory routes through the Gulf of Maine, with an emphasis on species listed under the Endangered Species Act, Maine Endangered Species Act, Marine Mammal Act,

[15] Downscaling of climate change models is the procedure of using large-scale climate models to make climate predictions at finer temporal and spatial scales to fit the purpose of local level analysis and planning. See https://www.ctc-n.org/technologies/downscaling-climate-model-projections

and Species of Greatest Conservation Need, to understand critical threats and inform regulatory changes to Maine laws. (Immediate Term)

2. Develop specific focus groups[16] to identify target species, tracking priorities and study goals including:
    a. Avian focus group consisting of MDIFW, USFWS, and regional-based scientific groups to develop target species and study goals. (Immediate Term)
    b. Marine mammal focus group consisting of DMR, NMFS, and other collaborative scientific partners in the GOM region to develop tracking priorities and appropriate methodologies for targeting North Atlantic right and other Endangered large whales. (Short Term)
    c. Fish focus group consisting of DMR, NMFS, and other collaborative scientific partners in the GOM region to develop target species and tracking priorities for Endangered and Threatened fish species.
3. Secure funding and implement tracking studies based on outcomes of focus groups. (Medium – Long Term)

Recommendation (a)5 – Explore use of federal consistency

Investigate the potential benefits of, and process by which, the State of Maine may use its federal consistency review authority under the federal Coastal Zone Management Act (CZMA) to address issues of concern regarding offshore wind energy development in federal waters, including potential changes to state laws and rules.

Rationale: The federal consistency provisions of the CZMA may offer an opportunity for Maine to influence how offshore wind is developed if applicable regulations are incorporated as part of Maine's enforceable policies. For example, Rhode Island has been able to use its enforceable policies under the federal consistency review provisions to influence the process and request specific monitoring requirements for activities in federal waters affecting Rhode Island's coastal zone. Although the Rhode Island example is unique due to their Special Area Management Plan (SAMP) process, Maine should explore the possibility of federal consistency as a tool. The process for updating Maine's enforceable policies under CZMA is lengthy and complex, so an initial evaluation and plan should be initiated immediately to determine if and how this tool could be used to benefit Maine's interests.

[16] As envisioned, the focus groups would consist of members from the Environment and Wildlife Advisory Body. See Recommendation (b)1 – Formation of Standing Environment and Wildlife Advisory Body on p. 17.

Actions:

1. Continue to explore the process and options for Maine, including potential establishment of a Geographic Location Description (GLD), to utilize federal consistency review for OSW projects. (Immediate Term)
2. Maintain dialogue with neighboring states along the Atlantic coast regarding their efforts to review and implement the use of federal consistency provisions to influence offshore wind development in federal waters. (Immediate – Long Term)
3. When reviewing whether changes are needed to Maine's regulations to effectively review offshore wind development, including transmission cabling, under LD 1619, the State should use information generated from recommendations of the Roadmap, and specifically include consideration of coastal and wildlife resources and their foraging/migratory routes. (Immediate Term)
4. Seek input and provide updates to the Environment and Wildlife Advisory Body[17] on progress and recommended actions the State could take. (Immediate – Medium Term)

Recommendation (a)6 – Regional Collaboration

Maintain and enhance regional collaboration in the Gulf of Maine among resource managers, scientists from Federal and State agencies, universities, non-governmental entities, and developers, through leadership and financial support.

Rationale: The GOM is a shared resource and while there are several current regional initiatives focused on science and OSW, none have the direct focus on coordinating within the GOM. This would ensure that there are coordinated efforts in the GOM and avoid duplication of efforts and foster regional cooperation and joint learning as OSW continues to be developed along the east coast. The New England states also have an opportunity to take the lead role in jointly identifying key resources that are important to avoid during the BOEM siting process and to identify and address cumulative impacts of multiple offshore wind energy development on wildlife and the environment over time and space.

In addition, Maine has a long-standing history of collaborating with ocean users to develop and successfully execute research and monitoring in the Gulf of Maine. The State should continue and enhance these partnerships and encourage other regional entities and developers to work collaboratively with existing ocean users from inception of project ideas.

Actions:

[17] See Recommendation (b)1 – Formation of Standing Environment and Wildlife Advisory Body on p. 17.

1. Continue to be an active member and provide funding toward the Maine Offshore Research Consortium (Research Consortium), Regional Wildlife Science Collaborative, and other entities as applicable. (Immediate – Long Term)
2. Continue to encourage state-to-state regional approaches to inform BOEM siting process such as the newly initiated GOM portal work through the Northeast Ocean Data Portal. (Immediate – Long Term)
3. Consider a role for the Research Consortium to coordinate offshore wind ecological research and monitoring in the Gulf of Maine, including monitoring on projects, federal surveys, state surveys, and research at the University of Maine and other GOM institutions. (Immediate Term)
4. Work with regional and national agencies and organizations to identify collaborative opportunities to identify and address cumulative impacts over time and across the U.S. Eastern Seaboard. (Medium – Long Term)

Recommendation (a)7 - Funding Opportunities

Explore funding opportunities for monitoring and research to support environmentally responsible offshore wind development and mitigate impacts to wildlife, natural resources, and ecosystems.

Rationale: Broad-scale monitoring in the GOM has been extremely limited to date, and collecting baseline information on wildlife species and the oceanic environments has been identified as a pressing need by the EWWG. These studies will not only help inform the leasing process and allow for longer time series of information, but will put any potential impacts to species or the environment from offshore wind into the context of broader, system wide change. However, funding to begin this endeavor needs to be secured. The bipartisan RISEE Act would amend the Gulf of Mexico Energy Security Act (GOMESA) and create a new dedicated stream of funding from future offshore wind development for coastal protection and resiliency. This legislation will also allow for more equitable resource sharing between states, the federal government, and conservation programs.

Finally, commercial offshore wind site characterization surveys and post-construction monitoring efforts will necessarily be limited to specific project areas and will be limited in effort and duration. A standing fund would allow long-term research on questions that cannot be addressed within a standard development spatial scope or timeline, as well as provide key context for change within the ecosystem as a whole and communities that are dependent on them.

Actions:

1. Aggressively pursue federal funds from NOAA and BOEM for pre-development monitoring, research, and characterization of designated Wind Energy Areas (WEAs) prior to lease auction. (Immediate Term)
2. Encourage joint funding with New Hampshire, Massachusetts, and other regional states and stakeholders. (Immediate – Long Term)
3. Continue working with Maine's Congressional delegation to support the Reinvesting in Shoreline Economies and Ecosystems (RISEE Act of 2021, S.2130) or legislation of similar intent in order to protect impacted communities, including GOM Tribal Nations. (Immediate Term)
4. Maintain or increase the $2M state appropriation to Maine Department of Marine Resources for OSW research to allow long-term research on questions that cannot be addressed within a standard development spatial scope or timeline as offshore wind site characterization surveys and post-construction monitoring efforts will necessarily be limited in effort and duration at specific project areas. (Medium Term)
5. Pursue state or other funding sources for the Research Consortium. (Immediate – Medium Term)
6. Consider establishing a Coastal Fund as a provision of any Power Purchase Agreements and other mechanisms[18] to support regional monitoring and environmentally responsible offshore wind development and mitigate impacts to wildlife, natural resources, and ecosystems. The fund could potentially be administered by the Research Consortium. (Long Term)
    a. The Coastal Fund is envisioned to be modeled after the Maine Department of Environmental Protection's (DEP) In Lieu Fee Compensation Program, allowing developers that impact Maine's near-shore coastal and coastal shoreline resources[19] to make a payment into the program. Funds are ultimately allocated to specific biophysical regions in which the impacts occurred.
7. Consider establishing a fund across multiple states to support research efforts into identifying and addressing cumulative impacts of multiple offshore wind projects over time and space. The impacts of offshore wind energy development are not one-time

[18] For example, New York's 2022 OSW solicitation required bidders to agree to provide financial and technical support to regional monitoring of wildlife and key commercial fish stocks through a minimum contribution of $10,000 per MW (see https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations/2022-Solicitation)

[19] Currently, Maine's In Lieu Fee Compensation Program is applicable to freshwater wetland impacts only.

localized impacts, they accumulate over time and are compounded over space. Many species regularly travel along the entire U.S. Eastern Seaboard and would therefore be subject to impacts of multiple offshore wind projects adjacent to multiple states. Only through coordination and cooperation can the complicated issue of cumulative impacts assessment be addressed. (Long Term)

Recommendation (a)8 – Stakeholder Engagement with BOEM Process

Explore ways to provide an ongoing process for Maine stakeholders to engage in the broader siting process during the GOM Interagency Task Force Meeting with BOEM around potential wind energy areas.

Rationale: Concern has been raised that during the BOEM Wind Energy Area (WEA) siting stage for OSW development in other regions of the country, the BOEM process in the past has made it difficult for non-State entities to have a voice in WEA siting. As such, some environmental impact concerns raised by non-State entities were not able to be incorporated into siting decisions. A State process would specifically allow the input of Maine stakeholders to be expressed through representatives of Maine. The Environment and Wildlife Working Group (EWWG) has representatives from a cross-section of disciplines and stakeholders who have become more familiar with the issues concerning OSW and the potential environment and wildlife impacts. Given the aggressive timeline outlined by BOEM for designating wind energy areas, the EWWG may be appropriate to use as an ad hoc stakeholder advisory body for Maine Task Force members to seek feedback from when developing input into the BOEM process.

Actions:

1. Explore additional methods for stakeholders to submit recommendations for consideration by the State of Maine early in the BOEM process and in advance of Task Force meetings (Immediate term).
2. Continue to support work of the EWWG and convene on an ad hoc basis to provide feedback on environmental and wildlife stakeholder considerations prior to the establishment of a Standing Environmental and Wildlife Advisory Body[20]. (Immediate Term)
3. Hold stakeholder meetings with EWWG and other interested parties prior to official Interagency Task Force meetings to solicit input and share progress on BOEM Task Force. (Immediate Term)

[20] See Recommendation (b)1 - Formation of Standing Environment and Wildlife Advisory Body on p. 17.

3. Tier 2 and Tier 3 Recommendations for Consideration (Pre-construction, Permitting and Construction)

This second set of Recommendations (Tier 2 and Tier 3 Recommendations) ***generally apply to after WEAs have been defined and a lease is issued by BOEM, during the pre-construction and permitting phase.*** These recommendations are drafted to be dynamic and may be directed by the results of Tier 1 Recommendations, the location of a particular lease or cluster of leases (Tier 2 Recommendations), and available monitoring technology at the time of development. We recommend the State begin implementing these recommendations well ahead of a lease auction in the GOM to be fully prepared for engaging thoughtfully and with due consideration for protecting the environment and wildlife as the OSW development advances.

Project-specific Recommendations (Tier 3 Recommendations) include monitoring techniques and BMPs that encompass all phases of development (site characterization through post-construction) and are outlined in Table 1 of Appendices. This information can be used as an initial ***guide to environmentally responsible development at the project and/or turbine-scale*** that is protective of the local resources and environments in the GOM and should be expanded upon in future work.

Recommendation (b)1 – Formation of Standing Environment and Wildlife Advisory Body

Establish a formal Standing Environmental and Wildlife Advisory Body to further develop pre- and post-construction monitoring recommendations and environmentally responsible development methodology to avoid, minimize, or mitigate impacts.

Rationale: While Maine will have the most influence on OSW projects where the power comes ashore in Maine, the need for an in-depth, coordinated, and cohesive assessment from a variety of disciplines will be absolutely critical in the development environmentally-sound offshore wind in the GOM. The Environment and Wildlife Working has identified numerous examples of pre-and post-construction monitoring, Best Management Practices, and research needs, much of which is based on the work of the NYSERDA Environmental Technical Working Group (E-TWG) and others (see Table 1 of Appendices). The State will need to continue to refine these ideas and incorporate them into language used by the Public Utilities Commission (PUC) for renewable energy procurements. A standing body of environment and wildlife experts could also explore the feasibility of novel monitoring methods and encourage new technological innovations.

The standing body will allow to iteratively make and adjust guidance through time based on the latest technology and science, similar to New York's E-TWG[21]. This body would not review anything related to individual projects, but would work with State and Federal agencies in advocating for and developing broader policy documents.

Actions:

1. Establish and continue to support work of the Environment and Wildlife Advisory Body (EWAB) and convene on an *ad hoc* basis to provide feedback on environmental and wildlife stakeholder considerations. (Immediate Term)
2. EWAB to review recent efforts by EWWG to develop a list of basic recommendations to minimize potential impacts of floating offshore, including transmission infrastructure, wind in wildlife and the environment. (Medium Term)
3. EWAB to continue to develop and refine pre-and post-construction monitoring and Best Management Practices, and work with the State to incorporate language as criteria for procurements by the PUC[22]. (Medium - Long Term)
4. EWAB will identify BMPs to be included in Power Purchase Agreements developed by the PUC. (Long Term)
5. EWAB to iteratively make and adjust guidance through time based on the latest technology and science including assessments of cumulative impacts of multiple projects. (Medium – Long Term)
6. EWAB will interface with the Research Consortium in reviewing, advising, and supporting research on offshore wind power projects in the Gulf of Maine, including the proposed Research Array. (Medium – Long Term)

Recommendation (b)2 – Data Accessibility and Standardization

Work with BOEM, RWSC and other partners to ensure developers provide natural resource data as it pertains to potential impacts to wildlife, fisheries and the ecosystem in a publicly available and publicly usable format. Raw data collected (to the extent practical) and all analytical efforts should be made available to the public in a timely manner; in an open-source format that is readily accessed. Reporting requirements should be established to

[21] https://www.nyetwg.com

[22] For an example, see the appendices E and F at the bottom of this page: https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/Offshore-Wind-Solicitations/2022-Solicitation

ensure timely dissemination of data, with quarterly or seasonal reporting requirements, as applicable (see NYSERDA Data Standardization and Sharing as an example).

Rationale: Publicly available data can be used to assess broad-scale questions and potential cumulative impacts and other research questions, but the public data needs to be augmented by project specific data to refine our understanding of impacts in the GOM. However, the EWWG recognizes the practicalities and IT needed to make this work.

To the extent practical, data collection should be standardized, aggregated across regions and projects, and made publicly available in order to maximize learning, understand regional impacts, and create transparency. For example, NOAA is developing an Essential Fish Habitat (EFH) monitoring framework that will be prescriptive in how data are collected and reported to make EFH consultations more meaningful and to truly understand impacts.

Actions:

1. Establish a Data Subcommittee under the Research Consortium to explore the feasibility of storing and disseminating vast quantities of data sets specific to the GOM. (Medium Term)
2. In coordination with regional efforts, the Data Subcommittee will determine existing data repositories, data types, standards, formatting, and public platform. (Medium Term)
3. Work with developers on processes to ensure data is publicly available and accessible as part of any Purchase Power Agreement. (Long Term)

Recommendation (b)3 – Coordinated NEPA Review

Develop a coordinated comment and engagement process for Maine's state agencies to effectively communicate with BOEM and other federal agencies during the NEPA Environmental Assessment and project specific Environmental Impact Statement processes.

Rationale: This would provide clear and coordinated engagement from the State of Maine during the federal permitting process and provide a consistent input to developers.

Actions:

1. Develop a process for coordinating comments by state agencies. (Immediate Term)
2. Develop a process for the State engagement with BOEM to be informed by input from the Environment and Wildlife Advisory Body. (Immediate Term)

Recommendation (b)4 – Best Available Technology

Encourage BOEM to require all developers to utilize the latest technologies to monitor and minimize impacts to wildlife and the GOM ecosystem to the extent practicable.

Rationale: Technology is advancing rapidly, and new tools could be available to avoid, monitor, and minimize potential impacts over the next decade as commercial scale OSW projects are developed in the GOM. Maine should be advocating for the continued use of the best available technology and encouraging new research into technological advances. Because offshore floating wind is a relatively new industry in the U.S., planning and development must

be dynamic and allow for the active integration of emerging research and guidelines for environmental impact reduction.

Actions:

1. At regular intervals, the Standing Environmental and Wildlife Advisory Group[23] should review the existing technology and recommend feasible technologies to monitor and minimize impacts to wildlife. (Long Term)

Recommendation (b)5 – Cable Laying and Transmission Infrastructure

Work with BOEM and developers to encourage the use of current best practices specific to cabling and transmission:

1. **Conduct early consultations with State natural resources agencies to gather the most current spatial data that depict nearshore habitats, sensitive species distributions, and other areas of concern to facilitate informed planning for OSW transmission siting.**
2. **The Environment and Wildlife Advisory Body should work with State natural resources agencies to develop BMPs for cabling and transmission, including the consideration of the following:**
    a. **Scaling BMPs to the duration and spatial extent of potential impacts**
    b. **Laying of cable should avoid the greatest disruption to the marine environment and wildlife.**
        i. Nearshore cable laying should follow applicable Time of Year (TOY) restrictions (i.e., November to April) to protect local species and habitats.
        ii. Offshore cable laying should take into consideration spawning/juvenile habitat protections, migration, avian habitat use and other impacts to marine and wildlife. Where TOY conflicts may arise, the State natural

[23] See Recommendation (b)1 – Formation of Standing Environment and Wildlife Advisory Body on p. 17.

resource agencies, in conjunction with guidance from EWAB, will determine the appropriate TOY window.

iii. Use of trenchless methods (e.g., horizontal directional drilling) for cable burial should be utilized to provide the least habitat disruption[24].

c. When planning for cable installation and methods, developers should consider the following siting considerations:

i. Complex habitats, including coral habitats, and hard substrate benthic habitat[25] should be avoided to the extent feasible.

ii. Cables should be buried whenever possible to reduce EMF (currently 6 feet minimum is standard).

iii. If not buried, then consult with appropriate state agencies to minimize adverse habitat impacts and select materials to maximize habitat benefit.

iv. Analysis should be conducted to understand ecosystem impacts, costs and benefits of mattressing options.

3. Explore opportunities for development of transmission "backbones", corridors or other co-location strategies, where widening those corridors would not significantly increase adverse impact to high value marine or wildlife habitat, to allow for interconnection of multiple projects with fewer cable routes to shore to reduce or minimize adverse impacts to benthic habitat and wildlife. Planned offshore transmission infrastructure can significantly reduce impacts to wildlife and the environment as well as costs[26].

4. Cable landfall should be targeted to utilize already existing high use areas (i.e. parking lots, etc.) so minimal habitat is disturbed and avoid areas of sensitive wildlife habitat, (particularly for federally protected Piping Plover and Roseate Tern), and river outlets used by diadromous fish species (notably, federally-protected Atlantic sturgeon, shortnose sturgeon and Atlantic salmon)[27]

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[24] See DNV's 2022 Offshore Wind Transmission Technical Review (https://www.maineoffshorewind.org/technical-studies/)

[25] Ibid

[26] See Brattle study on a planned offshore wind transmission system for New York (https://www.brattle.com/insights-events/publications/planned-offshore-wind-transmission-system-for-new-york-could-provide-cost-savings-of-over-500-million-according-to-study-by-brattle-economists/)

[27] See DNV's 2022 Offshore Wind Transmission Technical Review (https://www.maineoffshorewind.org/technical-studies/)

5. **To the extent practicable, cable should be co-located with linear development (i.e. roads and transmission lines) to minimize disruption.**

6. **To the extent practicable, existing substations should be used.**

Rationale: Since the potential impacts of cabling will be limited through time and space, depend upon routing, and relate to installation technology, the Environment and Wildlife Advisory Group should develop BMPs that are complementary to existing State permitting process and scaled to the risk. Taken as a whole, these best practices would avoid the areas of greatest potential negative impact on the most sensitive environment and wildlife, and, to the extent feasible, minimize adverse impacts through time of year restrictions, co-location with existing development, and use of installation methods that reduce habitat disturbance.

APPENDICES & TABLE

Appendix 1: Definitions

Best Management Practices

Best Management Practices (BMPs) are construction and operational measures intended to reduce or avoid impacts to natural resources of concern within an OSW array. These recommendations should include associated cables, substation, the onshore interconnection, and transmission system. In the context of this document, BMPs should be considered recommendations.

Monitoring

Site Characterization: Surveys designed to determine the habitat conditions and seasonal occurrence of species within an offshore wind project design envelope. The surveys follow the Bureau of Ocean Energy Management (BOEM) guidance and are designed to support developing Construction and Operation (COP) plans, support National Environmental Policy (NEPA) Review, Endangered Species Act (ESA) Section 7 consultation, Marine Mammal Protection Act (MMPA) review, Coastal Zone Management Act (CZMA) consistency review, and other relevant federal laws.

Regional Baseline Study: A study conducted prior to offshore wind activities that covers the proposed development area plus surrounding waters to provide context for the Site Characterization surveys. These surveys will help to document any changes in species distribution that may be occurring due to factors unrelated to the development. If regional surveys cover development areas at a resolution matching or exceeding BOEM guidelines, they can be used in lieu of the Site Characterization surveys.

Pre- and post-construction Monitoring: Studies conducted prior to construction and after construction to document changes associated with the OSW development. Methods and study design may differ from Site Characterization surveys.

Mitigation

For purposes of this document, "mitigation" encompasses the full suite of activities to avoid, minimize, and compensate for adverse impacts. This concept is reflected in the Council of Environmental Quality's definition of mitigation:

Mitigation includes avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance

operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments.'' As a practical matter, the five mitigation elements in the CEQ definition are categorized into three general types: avoidance, minimization (including rectifying and reducing), and compensatory mitigation. (Council on Environmental Quality (CEQ) National Environmental Policy Act regulations (40 CFR 1508.20)

Background - Appendix 2-4 and Table 1:

The following Appendices and Tables summarize the Environment and Wildlife Working Group's (EWWG) collective expertise, comments, recommendations, reasoning for certain recommendations, and some preliminary thoughts, from over the previous twelve months of Working Group meetings. We felt it critical to capture comments, individual member's thought processes, and supporting information as background that led to the development of the Group's formal *Recommendations and Potential Actions for Offshore Wind in the Gulf of Maine*. We also felt this summary would not only provide a foundational reference source for the future Environment and Wildlife Advisory Group[28], but also help to capture the complexity, existing possible data sources and extensive known data gaps, and overall complexity of the environment and wildlife concerns within the Gulf of Maine as they relate to offshore wind development. Future research and monitoring needs, based on our best understanding of the science at the time of this writing, have been captured in Table 1. While outside the scope of this document, it is our hopes that the future Environment and Wildlife Advisory Group, in conjunction with state and federal agencies and interested stakeholder groups within the Northeast, will be able to examine future cumulative impacts as offshore wind is expanded through the Gulf of Maine and elsewhere in the Northeast.

Appendix 2: Critical Areas for Mapping

The following critical areas for wildlife and fishes that should be mapped as part of the GOM mapping exercise[29] as part of Recommendation (a) 1[30]:

1. *Important foraging and habitat areas for marine and non-marine birds, benthic and pelagic fishes, marine mammals and turtles throughout the annual cycle, that have vulnerability to impacts from offshore wind development, including Species of Greatest Conservation Need (SGCN).*

   Data available to map these areas: Physical and biological oceanographic data, including but not limited to bathymetry, sea-surface temperature, primary

[28] If established. Refer to Recommendation (b)1 – Formation of Standing Environment and Wildlife Advisory Body

[29] Under contract with the State, the mapping process has been initiated by the Northeast Regional Ocean Council (March 2022).

[30] The data used to evaluate appropriate locations for offshore wind development and potential impacts should consider climate change and potential regime shifts within the region. Modeling efforts must consider a range of potential environmental conditions if they are to guide offshore wind development in an environmentally sensitive manner.

productivity (chlorophyll) and secondary productivity (zooplankton), ocean currents, frontal features, and upwelling indices.

- Some data are already available and organized at various spatial scales and resolutions.
- Tracking data is already available specifically for bird species: tern nanotag data, Common Tern satellite tagging data, Arctic Tern and Common Tern GPS tagging data, Leach's Storm-Petrel GPS data, Herring Gull GPS data, Great Shearwater satellite tags, Atlantic Puffin GPS tagging, RAZO satellite tagging, Northern Saw-Whet Owl nanotagging, Semipalmated Plovers nanotagging, Common Eider satellite tagging, Passerines and bat nanotagging

Uncertainty/data need:

- On a GOM scale, environmental data are available at larger spatial scales, which are not always at appropriate resolution for project scale analyses.
- Substantial uncertainty and variability between species and between years in foraging habitats. This has been accentuated in recent years with habitat shifts documented in some species, including North Atlantic right whales. Some basic constraints on oceanographic drivers for feeding, such as water temperature and stratification, relevant foraging depth by species (e.g., sea ducks) could be used to identify likely foraging areas and key habitat.
- Some species, such as terns, can forage close to colonies if food is available, but can also commute longer distances. Other species, such as storm petrels, can conduct multi-day foraging flights that can take them to the continental shelf edge and beyond.
- Lacking tracking data on species, including North Atlantic right whales, migratory seabirds, and waterfowl.

2. *Areas between coastal islands where migratory pathways for bird and bat species vulnerable to collision and displacement often occur.*

Data available to map these areas: Motus[31] tracking efforts, GPS and Argos tracking efforts, geographic features, radar data, and island banding data.

- Passerine banding data from islands is available from USFWS, NAS, NPS and UMO projects
- 10 years of Northern Saw-Whet Owl old banding data on Petit Manan Point is available through research conducted by Dave Brinker

[31] The Motus Wildlife Tracking System (Motus) is an international collaborative research network that uses coordinated automated radio telemetry to simultaneously track hundreds of individuals of numerous species of birds, bats, and insects (https://motus.org).

Uncertainty/data need: Migratory movement patterns for most species are uncertain.

- Must identify how migrants are using airspace farther offshore, especially in and around the proposed Research Array.
- Limited historic (anecdotal) and some acoustic and thermal imaging data on migratory bats in the GOM.

3. *Migratory routes and foraging areas used by species under both the Endangered Species Act (ESA), Maine Endangered Species Act (MESA), and the Marine Mammal Protection Act including Roseate Tern, North Atlantic right whale, and leatherback sea turtle. Also, include the migratory paths of Red Knot, Piping Plover, Atlantic salmon, and Atlantic and shortnose sturgeons. Other important species, such as* peregrine falcons, are known to be using the offshore islands during migration and are often observed throughout the seabird nesting season.

Data available to map these areas:

- Colonial nesting data: tracking studies conducted in Massachusetts and New York (while these studies do not cover the GOM, they can support an understanding of tern movement in general) and some data from Maine
- MDIFW/USFWS mid-winter waterfowl aerial survey data
- Gull and cormorant data aerial surveys completed in 2019 and colony-based info (1960-2021)
- Shorebird observations from various seabird nesting seasons over 20 years.
- Results from some limited tracking studies on North Atlantic right whales and leatherback sea turtles are available.
- Passive acoustic detections of North Atlantic right and other large whale species.
- Aerial survey data for North Atlantic right whales, other large whales, and leatherback sea turtles. These are available through standardized NOAA surveys, as well as some opportunistic sightings. The Right Whale Consortium database houses many relevant species.

Uncertainty/data need (not inclusive):

- High uncertainty on Roseate Tern movement and habitat in GOM.
- Little (some shorebird survey data from seabird restoration islands) to no data available on the Red Knot and Piping Plover movements during migration.
- While much data exists on shorebird migration along the immediate coast of Maine, little to no movement data is available in the GOM waters. Extrapolation of the little existing data (two Semipalmated Plover nanotag efforts; one in Downeast and one in southern ME/MA) and what is generally known about shorebird migration in the GOM would need to be applied.
- Changes in habitat use in the Gulf of Maine by right whales since 2010.

- Limited information on other endangered large whales, such as fin whales.
- Limited data on leatherback sea turtles.
- Limited data on GOM use by Atlantic and shortnose sturgeon. Some modeling data available for Atlantic salmon migratory corridors in the GOM. Additional tagging and tracking would be needed to better characterize GOM use of all three endangered fish species.
- Some limited data (e.g., Stantec) on migratory bats in the GOM (nanotag tracking of bat migration from a PhD project).

4. *Areas with deep-sea corals, as well as other complex habitats important for a number of species in the Gulf of Maine that are critically important for vulnerable species such as Atlantic cod and American lobster.*

   Data available to map these areas:

   - Coral habitat has been identified in the New England Fisheries Management Council Coral Omnibus Amendment.
   - Data collected by NOAA and DMR – Maine Coastal Program

   Uncertainty/data need: As not all areas of the GOM have been accurately mapped, additional benthic habitat mapping is necessary.

5. *Areas of known spawning and feeding aggregations of high priority managed and other protected species (e.g., groundfish, lobster, herring, scallop, marine mammals, etc.) in coordination with the Fisheries Working Group. Several species of marine birds are dependent on these areas as well.*

   Data available to map this criterion:

   - Trawl and longline surveys
   - Tagging and acoustic telemetry
   - Herring fleet sampling
   - Scallop surveys
   - Sea sampling and ventless trap surveys, lobster tagging
   - Halibut tagging work

   Uncertainty/data need:

   - Many datasets are limited spatially
   - Herring data is fishery dependent
   - Trawl and longline survey data are limited spatially in the federal survey

6. *Areas of aggregation and/or diapausing late stage* Calanus *copepods as an indicator of highly productive areas of importance to other species of fish and marine mammals*

   Data available to map this criterion:

   - Zooplankton monitoring stations in Midcoast Maine and Wilkinson's Basin
   - CPR and ECOMON data

- Physical and biological oceanographic data as listed above in #1

Uncertainty/data need:

- More comprehensive coverage of zooplankton monitoring stations, including at least one monitoring station in Downeast Maine.

Appendix 3: Baseline Data Collection Methods

- Research nocturnal use of offshore airspace by songbird and shorebird migrants potentially through the use of nanotag technology and expanded Motus network, ideally with birds trapped, tagged, and released from a coastal island site(s) in GOM.
- Broadscale digital aerial surveys with higher intensity in the proposed Research Array and other areas where offshore wind development is most likely to occur.
- Boat-based and aerial wildlife surveys.
- Broadscale plankton monitoring and surveys.
- Collection of eDNA to establish a baseline of ecosystem conditions.
- Broadscale trawl survey in coordination with NOAA/NMFS and designed cooperatively with the fishing industry. ESA-listed species should be the focus of the survey efforts, followed by SGCN and managed species.
- Passive acoustic monitoring of marine mammals.
- Acoustic telemetry or other tracking systems for endangered and other fish species
- Document the underwater soundscape in areas where offshore wind development is most likely to occur.
- Collaborate with current regional surveys in the GOM focused on oceanography and nutrient availability, plankton diversity and abundance, benthic fish and invertebrate species at both adult and juvenile stages, marine mammals, and marine birds to increase sampling and potentially align the spatial and temporal scales.
- Active acoustic surveys of the pelagic community (to identify potential feeding hotspots and important trophic interactions; biological surveys using active acoustics can also provide information on bottom habitat).
- Documentation of current oceanographic and circulation patterns of strategic areas, as well as down water column structure such as stratification.

Appendix 4: Potential Tracking, Survey, and other Action Items

- Support coastal/offshore Motus network for radiotelemetry of birds and bats and significant tagging effort, with focus on ESA and SGCN species.
- Conduct GPS tracking of Red Knots.
- Conduct tracking studies on marine birds known to be vulnerable to offshore wind to identify important foraging and migration areas.
- Conduct tracking studies on non-marine birds likely to migrate offshore (e.g., songbirds, shorebirds, falcons).
- Use radar systems to support understanding of timing and intensity of bird and bat migrations.
- Conduct bat acoustics studies offshore and, if feasible, tracking studies using the Motus network. (Stantec has limited bat acoustic data from offshore islands.)
- Explore and fund the expansion of the Motus network on remote coastal islands and explore the feasibility of offshore Motus towers on buoys.
- Support tagging and telemetry efforts for benthic and pelagic fishes, including those species that are ESA-listed and/or considered vulnerable to offshore wind, including EMF (e.g., sharks, tunas, salmon, sturgeon, American eels).
- Increase marine mammal surveys to pair visual sightings from boat and aerial efforts with passive acoustic monitoring results.
- Utilize aerial and boat-based surveys to document occurrence of sea turtles in the Gulf of Maine.
- Use passive acoustic arrays to track individual vocalizing whales in an area of interest.
- Use the whale catalog to understand areas of high use by known individuals.
- Advocate for tagging North Atlantic right whales using limpet tagging technologies during times of transition between habitats to document migration routes in the Gulf of Maine, including in the southern part of the Gulf of Maine in the early spring.
- Utilize Dtags (via suction cup attachment) to document call types and rates or large whale species in habitats of concern or importance.
- Create citizen science reporting network and tool to increase knowledge of leatherback sea turtle presence in the Gulf of Maine.

Appendix 6: Table 1 - Initial Monitoring Methods

Monitoring method recommendations for initial Lease Area (L) and Project Area (P) scales[32].

Key Concerns	Specific Impacts	Cause	Monitoring Recommendations	Best Management Practices	Target Species/Taxa	Scale
Species Displacement	Changes to migration routes, homing, and habitat use	Electromagnetic fields	Seasonal monitoring of pre-, during, and post-construction migratory behavior and habitat use around turbines, transmission routes, and substations, direct measurement of EMF	Establish a developer-funded regional monitoring and mitigation fund	Eels, elasmobranchs, Atlantic salmon, sturgeons, alewife, blueback river herring, shad, Mola mola, invertebrates, and sea turtles	L, P
Species Displacement	Changes to fish and marine mammal habitat use	Altered pelagic habitat and changes to currents and upwelling	Seasonal monitoring of pre-, during, and post-construction migratory behavior and habitat use		Sturgeon, tuna, sharks, eel, cod, marine mammals	L, P
Species Displacement	Changes to fish habitat use	Altered benthic habitat	Pre-construction benthic habitat and species characterization. During and post-construction monitoring of species and life stage abundance and distribution using side-scan sonar, tagging of adults, drop cameras, and ROVs for post construction impacts		Sand lance, wolffish, Atlantic cod, cusk, sculpins, sedentary invertebrates, deep-sea corals, juvenile life stages of fished species	L

[32] While not specifically mentioned, many of these recommendations are directly applicable to the assessment of cumulative impacts of multiple offshore wind projects on wildlife and the environment over time and space.

Key Concerns	Specific Impacts	Cause	Monitoring Recommendations	Best Management Practices	Target Species/Taxa	Scale
Species Displacement	Displacement of birds	Avoidance of turbines and altered aerodynamics around turbines	Pre-, during, and post-construction monitoring of movement and distribution of species of conservation concern within the array footprint and a buffer[33], measurement of aerodynamics		Gulls, diving birds, nesting boreal species[34], bats	L, P
Species Displacement	Displacement of underwater species	Noise impacts associated with construction and operation including increased vessel traffic	Monitoring noise levels and sound characteristics before, during, and after construction with passive acoustic monitoring and hydrophone arrays and evaluate changes during operation of the wind farms[35]	Establish the time of year for construction that minimizes potential interaction with high priority and sensitive species, explore methods and technologies to limit underwater noise such as separating motor in nacelle from the base	Diving birds, fish, and marine mammals	P

[33] Red-throated loons can start avoiding as far as 16km.

[34] Studies at wind farms in Europe have shown alcids to be particularly sensitive to displacement.

[35] Operational wind farms in Europe have been shown to increase ambient noise levels. Understanding the cumulative noise increase in the GOM and how this may impact species communication is important.

Species Displacement	Displacement of underwater species	Avoidance of infrastructure	Pre-, during, and post-construction monitoring of species abundance and distribution with particular attention across foraging and biologically important areas using visual surveys, long-term passive acoustic monitoring, and tagging		Whales (including North Atlantic right whales and other ESA listed whale species), dolphins, turtles (particularly ESA listed species)	L, P
Key Concerns	**Specific Impacts**	**Cause**	**Monitoring Recommendations**	**Best Management Practices**	**Target Species/Taxa**	**Scale**
Physical impacts to species	Vessel strikes	Increased boat traffic or modified traffic patterns	Monitor major transit routes to and from OSW areas for species such as North Atlantic right whale presence	Require speed restrictions for vessels operating to and from project site to reduce potential collisions	Protected marine mammals	P
Physical impacts to species	Secondary entanglement	Debris and ghost gear caught on anchoring systems and cables	Continuous monitoring and alert systems for removal, explore use of diverters (similar to what is used to divert birds for transmission lines)	Employ systems and protocols to remove debris from cable systems; BMPs (highly visible cables?), PCM for entanglement (seasonal?), explore use of diverters (similar to what is used to divert birds for transmission lines)	Marine mammals, sea birds, fish, turtles	P

Physical impacts to species	Collisions—bats	Attraction to turbines	Finer-scale acoustic monitoring to detect bat species presence, movements, and risk under various conditions pre- and post-construction, monitor pre-sunset to post-sunrise, plus diurnal activity[4]	Installation of MOTUS receiver on turbines, incorporate seasonal cut-in speed changes utilizing guidelines from MDFIW onshore wind projects and/or adaptive management; Collision detection systems to document take and inform mitigation - thermal imaging for bats	Bats	L, P

Key Concerns	Specific Impacts	Cause	Monitoring Recommendations	Best Management Practices	Target Species/Taxa	Scale
Physical impacts to species	Collisions—birds	Low visibility, attraction to turbines including platforms for perching and loafing	Boat/aerial surveys, buoy-mounted radar, conduct standard vertical/horizontal radar scans to detect magnitude and flight heights of spring/fall nocturnal migrants. Determine offshore flight patterns, heights, interactions, and risk under various conditions. Include monitoring of water surface and structure base[36,37] Monitoring should be conducted at each OSW development to determine if there is a need for perching-related deterrents	Require Aircraft Detection Lighting Systems (ADLS) on OSW turbines; explore use of different blade colors (minimal information available). Explore use of Dark Sky compliant lighting (assuming some lighting for safety). Collision detection systems to document take and inform mitigation - thermal imaging for birds. If perching and roosting are a common occurrence, physical deterrents such as spikes and netting or BMPs should be implemented to the extent that they do not represent a human safety hazard	Birds	L, P

[36] There is currently no viable monitoring equipment that can effectively monitor for collisions; consider implementation of testing and support of R&D of these systems.

[37] Turbine-mounted radars are unlikely to be feasible—possibly on the substations. Offshore radar studies to start at $600k and go up.

Habitat conversion and ecosystem changes	Destruction of sensitive (benthic) habitats	Increased turbidity and sedimentation from anchoring systems and cabling and scour from anchor and anchoring lines	Benthic habitat and species characterization, fine scale assessment of distribution of corals and other significant ecological features	Avoidance of corals, other significant ecological features; horizontal drilling as possible minimization effort	Deep sea corals, crustaceans, mollusks, worms, and fish (particularly juvenile stages)	L, P
Key Concerns	**Specific Impacts**	**Cause**	**Monitoring Recommendations**	**Best Management Practices**	**Target Species/Taxa**	**Scale**
Habitat conversion and ecosystem changes	Creation of new benthic habitat	Physical structure created by anchors, anchoring lines, cables, and cable mattresses	Benthic habitat and species characterization, fine scale assessment of distribution of corals and other significant ecological features		Deep sea corals, crustaceans, mollusks, worms, and fish (particularly juvenile stages)	P
Habitat conversion and ecosystem changes	Changes to settlement, recruitment, and connectivity	Altered hydrodynamics and stratification from turbines, anchoring lines, and cables	Measure current speed and direction, temperature at different depths, and run hydrodynamic model predictions. Conduct plankton tows.		Plankton	L, P

Appendix 5: Stakeholder Input - Summary of Feedback Received & Working Group Response

Maine Offshore Wind Roadmap - Environment and Wildlife Working Group Summary of Feedback on Initial Draft Recommendations March – April, 2022

Overview

Maine's Offshore Wind Roadmap initiative undertook proactive engagement with a range of interested groups in March and April to raise awareness about the process and gather input on draft initial recommendations.

Outreach

Outreach and feedback occurred in three main pathways:

- **Webinars and panel discussions:** More than 550 participants joined eight events hosted by diverse partner organizations:
    - Friends of Casco Bay
    - Maine Center for Coastal Fisheries
    - Maine Conservation Voters
    - Maine Audubon
    - Gulf of Maine Seabird Working Group
    - Maine Municipal Association
    - NECEC - Northeast Clean Energy Council
- **Small Group Meetings:** In addition, discussions occurred in smaller groups, including with:
    - SEAMaine – Executive Committee
    - Island Institute – Fishermen's Climate Roundtable
    - Tribal historic preservation officers
    - Tribal environmental and natural resource officers
    - Climate youth advocates
    - Maine AARP staff

- **Inputs via the website and email:**
    - *Website:* Since March 1st, there have been 1,900 new visitors to the website, a significant jump from prior months. On average, people are spending just under 2 minutes on the site, which, for web traffic, signals they are engaged in the content. The Working group draft recommendations page has been the most viewed. Despite this traffic, people only completed 44 feedback forms (29 Environment and Wildlife WG, 6 Fisheries WG, 5 Energy WG, 4 Supply Chain + WG). Overall, there were 284 downloads of the full working group recommendations.
    - *Other inputs*: Groups and individuals also submitted comments via email, including Mainers for Offshore Wind, The Nature Conservancy, Maine Audubon, NOAA/NMFS, New England Fishery Management Council, Maine Renewable Energy Association & RENEW Northeast, and two individuals. The Mainers for Offshore Wind comments were signed by the following organizations:
        - Acadia Center
        - BlueGreen Alliance
        - Conservation Law Foundation
        - GrowSmart Maine
        - International Brotherhood of
        - Electrical Workers, Local 1253
        - International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers, Local 7
        - Maine Audubon
        - Maine Climate Action NOW!
        - Maine Composites Alliance
        - Maine Conservation Voters
        - Maine State Building & Construction Trades Council
        - Maine Youth for Climate Justice
        - Natural Resources Council of Maine
        - North Atlantic States Regional Council of Carpenters, Locals 349 and 352
        - Maine Physicians for Social Responsibility
        - Southern Maine Conservation Collaborative
        - Sierra Club Maine
        - RESTORE: The North Woods
        - Union of Concerned Scientists

Summary:

The proactive engagement sought to raise awareness and gather feedback. It did not attempt to provide a quantitative analysis of Mainer's views towards offshore wind or the Roadmap's draft initial recommendations.

Broadly speaking, themes emerged in the conversations, such as

- Interest in exploring offshore wind to bring new jobs to the state and help transform Maine's energy mix to renewable sources.
    - There were questions about how offshore wind fits in to this future energy supply and how much is really needed
    - Some shared a sense of urgency to "speed up the timeline" while others expressed caution to changes. Others did not support the idea of offshore wind in the Gulf of Maine.

- Concerns about potential impacts to the Gulf of Maine and existing ocean users, and a sense of deep appreciation and reverence for the Gulf of Maine ecosystem and the fisheries and other wildlife that depend on it.
- Tribal representatives and youth voices expressed concern about their representation in the process.

Detailed Feedback for Environment and Wildlife Working Group

Feedback via website

The Environment and Wildlife initial draft recommendation drove the highest number of submitted feedback forms with 29 in total. Of these, 12 were consistent with comments submitted by Maine Audubon.

Written feedback submitted

Additional comments were submitted directly via email covering a variety of issues and suggestions. Written comments specific to the Environment and Wildlife Recommendations are included below from two individuals and Friends of Casco Bay, The Nature Conservancy, Maine Audubon, New England Fishery Management Council, informal feedback from NOAA Fisheries and a multi-organization coalition, Mainers for Offshore Wind.

Questions Raised at Public Outreach Events

There were also several public events held on-line in which the EWWG recommendations were presented. These included Friends of Casco Bay, Maine Conservation Voters, Maine Center for Coastal Fisheries, and Maine Audubon. The questions relevant to environment and wildlife issues are included below. A variety of other questions about Maine's renewable energy needs, energy costs and offshore wind technology were also raised at the events and included in a separate summary document.

Comments on Specific Recommendations:

1. MAPPING EXISTING DATA

In general, comments asked for more strong emphasis on climate change in the mapping work and to consider the scale/resolution of the data used. Additionally, mapping should directly mention species and habitats of concern (i.e., MMPA listed species and rocky and deep mud habitats). A suggestion was also made to tie the mapping work to federal consistency.

- TNC encourages the EWWG to also consider how climate and species projections could be used in siting considerations. One way to rephrase Recommendation 1 to capture climate projections is, "Map existing data to identify where areas of greatest conflict between OSW energy development and wildlife may currently exist and potentially exist in the future

(based on published climate projections) in the Gulf of Maine federal waters and identify data gaps that need to be filled to inform offshore wind area identification and leasing conditions."

- Under #3 for recommendation 1 on page 39 should mention the Marine Mammal Protection Act (MMPA), and particularly strategic stocks under the MMPA.
- Under #1 it is recommended to use existing data to identify conflicts and data gaps. However, there is very limited data available and the scale/resolution of the existing data may be just as, or more, important than data gaps. Consideration of both data gaps and resolution will be important for interpreting the existing data and identifying areas where baseline data collection may be more beneficial. The issue of resolution is touched upon in the rationale section, however it is not clear how data resolution should be considered or addressed.
- There is also no mention of more vulnerable habitat types (e.g. rocky habitats, deep mud habitats) that are particularly vulnerable to impacts and provide important habitat functions for finfish and other species. While deep sea corals are mentioned specifically, it would be beneficial to also include rocky habitats and deep mud habitats.
- Should we add a recommendation that the mapping focus on species of concern to Maine that might trigger federal consistency review (FCR)? Can we use the mapping of species and habitats to identify areas where wind development in federal waters might result in effects in the coastal zone that triggers FCR? Should we recommend that the mapping be used to inform whether the State seeks a geographic location description (GLD)? Should this mapping be complemented by a request to BOEM to conduct a PEIS specific to the GOM or to consider Maine's mapping when it determines what areas of the GOM are suitable for OSW development?
- Recommendation #1
  - should be discussing how the working group might draw up a table of needed studies, who can do them, the time lengths, source of funds, etc.
  - Define nanotag, or give a reference.
  - Define "Motus: or give a reference that does.
- For rapid access to view sea level rise scenarios, flood zones (the current/effective, preliminary, and pending products), and hydrography layers during the MAP EXISTING DATA and COLLECT GOM BASELINE INFORMATION recommendation, the technical working group can use these public web maps developed by Tetra Tech, Inc. These maps draw from the best available State and National ArcGIS Rest Services and compile them in one place for easy viewing. From FEMA NFHL, to USGS NHD and NHDPlus HR, to USFWS Wetlands, to current Maine Geological Survey products like the Highest Astronomical Tide (HAT) line and 2018 Sea Level Rise Storm Surge Scenarios, visit https://arcg.is/0W9ezO. Legend-toggling and printing functionality is enabled. Visit https://arcg.is/1zKiHm0 for a version that includes just FEMA NFHL and Hydrography (Maine SLR scenarios excluded).

2. COLLECT GOM HABITAT DATA

Comments again recommended adding more context around scale/resolution and suggesting a potential link to federal consistency. A question was also raised about why Maine should be taking the lead in this work.

- Similar to data scale/resolution comment on Rec #1, it would be beneficial to discuss/add something about resolution here (e.g. what is meant by "poor") in the summary bullet for the recommendation. While the full recommendation mentions resolution, the rationale and action items for this recommendation focus on data gap/low coverage areas and bathymetry. It would be beneficial to further expand on data resolution issues, and provide more specificity related to "the collection of high resolution multibeam mapping and ground truthing of the data through sediment sampling and benthic fauna characterization."
- Same comments as above (reference to federal consistency). Plus, why should Maine take the lead on this? If we should, rather than pushing for a federal PEIS or other federal mechanisms to do this work, we should articulate our reasons for Maine taking the lead.
- Recommendation #2
    - It needs to be stated who will "initiate and lead" - state, federal, or some NPO?
    - Rationale “The National Oceanic and Atmospheric Administration (NOAA) Office of Coast Survey has recently updated a bathymetry model that can be used to show areas with no/poor quality data.” If this model is available on the web, please give the URL.
- NEFMC supports the recommendations on benthic habitat surveys (#2) and ecological baseline monitoring (#3). Based on our own work on habitat management in the Gulf of Maine, existing data will not be sufficient for siting wind energy areas, or estimating or minimizing impacts to habitats and fisheries.

3. COLLECT GOM BASELINE INFORMATION

A suggestion was made to discuss post-baseline monitoring as well and to be more specific about the questions to be answered and the details of who, when, etc.

- The full recommendation includes mention of "monitoring" and discusses the importance of baseline data collection. It would be beneficial to discuss post-baseline monitoring in relation to habitats as well as the species groups highlighted in the rationale.
- Recommendation #3
    - Explain "identified areas". Not sure what this means here. Who, when, etc.
    - There needs to be a layout of the questions to be answered by past, present, and future research before leasing is underway. We need to define the minimum baseline of knowledge that would allow us to rationally go forward with OSW in Gulf of Maine. Not all data needs enumerated below may be necessary. Shouldn't a ranking be made? And shouldn't we quickly seek critical information from already installed OSW facilities with regard to environmental impacts and also from the numerous, extant oil and gas platforms across the globe (roughly 4,000 in the Gulf of Mexico alone)?

4. CONDUCT TRACKING STUDIES

Comments recommended additional focus on marine mammals and endangered fish.

- Tagging for marine mammals and endangered fish (and sea turtles as appropriate) should also be considered. This could include large whales, small cetaceans, seals, sturgeon, and salmon. Seals, fish, and sea turtles in particular could be tagged with either traditional satellite tags or tags that could be picked up with a VEMCO-type acoustic system. In general, the recommendations for #4 are very bird-focused.
- Under Conducting Tracking Studies (section g) I encourage you to increase all methods of surveying for marine mammals off the state of Maine. Be aware that each method has its drawbacks so using all three would provide the best information.
- Under Conducting Tracking Studies (section h) I am concerned that the committee does not understand the limits of tracking whales, especially right whales. They cannot be tagged! Any effective tag will cause health problems for the whales. So knowing an individual's habitats will be hard. Increased surveys is the best method to get a general idea of where marine mammals are likely to be.

5. EXPLORE FEDERAL CONSISTENCY

Feedback from two organizations suggested more specificity be included in this recommendation, in particular that the preparation of Geographic Location Description under the Maine Coastal Program be added.

- TNC encourages the EWWG to rephrase Recommendation 5 to: “Identify and amend key laws to develop NOAA-approved enforceable policies, and to prepare a Geographic Location Description (GLD) so that offshore wind activities occurring in federal waters may be evaluated by Maine for their potential impact and consistency with state enforceable policies according to the Federal Consistency Review process.”
- Maine has authority to review certain federal actions that affect coastal uses or resources to ensure that these activities are consistent with the Program’s “enforceable policies.” The Coastal Zone Management Act requires certain federal actions affecting Maine’s coastal uses or resources to be consistent with the “enforceable policies” contained in the Maine Coastal Program. If an activity or effect is not addressed by one of the enforceable policies, the federal action is presumed to be consistent with the Maine Coastal Program, and a federal consistency review is not necessary. LD1619 requires a "review of applicable state laws and rules to determine whether the existing offshore wind power regulatory framework adequately protects Maine's coastal resources in a manner that avoids or minimizes adverse effects on coastal resources and users”. We hope this evaluation will clarify if existing and approved enforceable policies are adequate to support consistency review through either a Geographic Location Description program change or through an unlisted activity request. TNC believes that fully incorporating effects-based policies that capture the scope of impacts associated with offshore wind into Maine’s approved coastal program is important to Maine’s coastal interests. Although there are a number of ways for Maine to be granted consistency review authority, TNC supports the preparation of a Geographic Location Description (GLD) as the more efficient mechanism as the State would automatically be granted review and not have to request on a project-by-project basis, which can be inefficient and time consuming. TNC also believes that having the advanced knowledge about the reasonably foreseeable effects that

offshore wind may have on the State's coastal uses and resources afforded by the preparation of a GLD may put the State in a better position to engage with offshore wind developers and the federal agencies about the proposed projects.

- This recommendation should evolve to include specific recommendations. FOCB would volunteer to work with a subcommittee that reviews our current list of laws and regulations that trigger FCR and draft recommendations for the EWWG to consider as possible recommendations to the Roadmap Advisory Group. This would be similar to the work the Community Resilience Working Group of the MCC did.

General Comments:

Format and Approach

Suggestions were made to add more detail to the timing of the recommendations and the specific data necessary to understand prior to OSW development. It was also suggested that policy suggestions be more integrated into these recommendations.

- While the document touches on a number of important points, providing more specifics on how and when these recommendations should be implemented with respect to offshore development would go a long way to ensuring these studies, etc. take place at the right time. Possibly this is coming in later version.
- The document mentions that we should get as much baseline data prior to development as we can. This should be spelled out with more detail. Are there specific data that we should have and fully understand prior to development, before which development should not occur?
- Our general observation is that it would be helpful to integrate policy suggestions into our first set of recommendations. For example, we could review existing policies that trigger federal consistency review to determine if that list is adequate or if we want to suggest revisions or expansions.
- Introduction could focus more on the tasks assigned to the EWWG rather than broad language supporting OSW. Could we add or replace the very general introductory language with the following or an abridged version of the following (cited EWWG Approach document)?

Additional Impacts, Habitats and Processes to Evaluate

A variety of additional impacts to consider and items to include were mentioned by both individuals and organizations. These included more emphasis on pelagic habitat (e.g., physical and biological oceanography), processes driving animal distribution, and noise pollution impacts. Suggestions were also made to add more about the importance of climate change and shifting weather patterns to the recommendations. Finally, one person encouraged more work on addressing the nearshore and shoreside impacts of developing offshore wind.

- There is a specific recommendation for benthic habitat; I would suggest one for ***pelagic habitat.*** There is a large gap in knowledge of how installation of wind turbines could impact physical and biological oceanography, whether for turbines are floating or not.
- Much of the suggestions for studies, etc. focus on surveying where and when animals use a particular area. However, to truly understand (and possibly predict) potential impacts, the

mechanisms/processes driving animal distribution should be better understood. More effort should be dedicated to understanding why an animal is using a particular habitat so that we could better understand likely potential impacts.

- Omission of consideration of ***noise pollution impacts***. There should be an open transparent environmental impact assessment of OSW noise emissions in Maine and Federal waters on fishing and endangered species, including potential for species avoidance and impacts on migration and breeding.
- Add studies of ***effects of changing weather patterns***, some of which are likely to occur along with climate changes, on routes and altitudes of travel of birds and bats to supplement OSW siting to minimize negative effects on migratory species.
- The ***importance of climate change*** is mentioned on page 36, yet it does not appear to factor in to the individual recommendations. Assessing likely ***shifts in habitat and distribution*** should be directly addressed in recommendations. For example, what is the likely habitat in for right whales and their prey in 10, 20, 30 years under different climate scenarios? How about consideration of species that may not currently be occupying the Gulf of Maine in large numbers that may shift there? Given that development may not start on a large scale for at least a few years, and any projects would likely have a 30-year life span, these considerations seem important to spell out rather than just generally acknowledging them.
- The E&WWG recommendations do not address the ***ecological and environmental impacts on State waters or on nearshore land***. Such impacts will occur through construction and operation of the industrial facilities necessary for importing, fabricating, assembling, and launching offshore wind turbines and other equipment. The State, through Maine Department of Transportation, is apparently focused on siting these facilities in upper Penobscot Bay, and particularly, on Sears Island. Such impacts will also occur in Penobscot Bay and State waters that extend to Federal waters. The E&WWG needs to revise its recommendations to address these issues, as do other working groups.

Cumulative Impacts

Several comments highlighted the need to include cumulative impacts in the planning for offshore wind.

- Cumulative impacts from offshore wind development must be routinely assessed, addressed, and planned for to the greatest extent practicable. Impacts must be measured across the Eastern seaboard, because many impacted species' habitats span the entire coast.
- There is no discussion of cumulative effects or using an integrated ecosystem assessment approach.
- Locate Wind Energy Areas, individual projects, and associated infrastructure (including transmission and port development) in areas that avoid and minimize impacts to wildlife and habitat, including cumulative wildlife and habitat impacts along the Eastern seaboard.

Regional Collaboration

Coordination and collaboration within the GOM region was highlighted by several organizations, including the suggestion of a formal MOU with neighboring states and working jointly on transmissions needs for offshore wind in the region.

- Collaboration with neighboring states is not included in the list of recommendations, but interstate collaboration will be essential for wind energy area identification and in minimizing environmental impacts in the Gulf of Maine. Coordination around a planned ocean grid and an area of mutual interest between the three states could guide federal wind energy area identification, ensuring significant consideration of how best to minimize potential user conflicts and how to avoid and minimize ecosystem impacts.
    - We recommend combining efforts in Recommendation 1 and regional collaboration with neighboring states to identify shared cable corridors and an area of mutual interest for OSW development in the Gulf of Maine. The State of Maine should simultaneously proceed with Recommendation # 5 so that the state is positioned to evaluate projects within the WEA as they are proposed.
    - TNC encourages Maine to work closely with neighboring Gulf of Maine States to identify lease areas in collaboration with other state resource managers, essentially identifying an area of mutual interest to bring forward in the BOEM process. This should also be done with significant stakeholder outreach to find ways to minimize impacts to the ecosystem and existing users while also working to meet renewable energy goals.
- Regional Collaboration. Should the Working Group discuss whether to recommend that Maine explore entering into MOUs, similar to what MA and RI did for OSW, with other states?
- Transmission planning, including landfall and ocean cabling, must be coordinated across the region and co-located or use other strategies to minimize impacts.

Environmental Criteria for Procurement

A few comments focused on the use of the procurement process of offshore wind energy by Maine to establish clear criteria in competitive solicitations that avoid and minimize impacts to the environment and wildlife.

- The Offshore Wind Roadmap should explicitly addressed key decision points and incorporated recommendations from the EWWG and FWG, including federal consistency review, scoring criteria for procurement and regional collaboration on determining WEAs.
- The siting and design layout of offshore wind can also be influenced by scoring criteria included in the solicitations for offshore wind energy. Maine should consider legislation that outlines environmental scoring criteria, a scoring mechanism, and a weight associated with satisfying the criteria that is reflective of the recommendations from the EWWG and FWG. Additionally, the procurement and selection process should be transparent and accountable to Maine's citizens. The recommendations from the EWWG, FWG, and EWG can be merged to meet this objective.
- In competitive solicitations for offshore wind projects, provide preference for proposals that seek to avoid and minimize impacts to wildlife and the environment.

Monitoring and Data Prioritization, Sharing and Transparency

Many of the comments supported standardization, aggregation and publicly available data throughout the OSW development process. Specific suggestions were made to the length of time necessary for pre-construction monitoring activities.

- Data collection should be standardized, aggregated across regions and projects, and made publicly available in order to maximize learning, understand regional impacts, and create transparency.
- The most important data would be which species can adapt to the impacts of OSW infrastructure and which can't.
- There is no mention of post-baseline data needs (e.g. habitat or species monitoring). This is included as a recommendation for the Fisheries section and it would seem to be an important priority for the Environment and Wildlife section as well. While the Fisheries section recommendation (#4) includes mention of benthic habitat, it is primarily trawl driven and does not fully consider the environmental parameters that may affect all habitat types (e.g. pelagic) that maybe affected from OSW development.
- Invest in gathering comprehensive data to aid in siting offshore wind project and associated infrastructure that avoids and minimizes impacts to wildlife and habitat.
- Monitoring data must be aggregated across projects and regions and made publicly available. Project management must be adapted based on the analysis of this information.
- Conduct year-round monitoring surveys at least three years in advance of commercial project construction, during project construction, and regularly after construction to measure wildlife interactions over time, including possible changes in wildlife interactions because of additional projects and habitat shifts. Data collection must be standardized across projects and location.

Use of Best Available Technology

More than one comment advocated for researching and utilizing the latest technology available.

- As new wildlife and habitat impact reduction technologies and information become available, it should be utilized in all planning, permitting, and new projects, as well as existing projects, to the extent possible.

Evaluating Trade-Offs

A few comments highlighted the need to identify the more vulnerable species as part of the recommendations and the evaluation of trade-offs regarding impacts with any energy production.

- Not all species or natural resources will have equal vulnerability and the aspects of OSW development to which they are vulnerable will vary widely. These need to be characterized to inform BMPs and standards in siting and operations and assist in the judging inevitable tradeoffs.
- Real or potential negative effects are present for all major forms of energy production. The approach should be to accept that fact, choose those forms with minimal effects, and try to further minimize them.

Additional Topics to Include

Comments were also received suggesting a variety of other topics to be considered by the Working Group including how the Maine Research Array will inform this work, the potential impact of future commercial OSW projects on the regional GOM NMFS surveys, advocating for Programmatic Environmental Impact Statement (PEIS), as well as issues of compensation and decommissioning considerations.

- We do not see any specific information about how the ***Maine Research Array*** will inform performance of other projects advanced through the Env/Wildlife or Fisheries recommendations.
- There is no mention of the potential impacts to ***regional GOM NMFS surveys*** that would be disrupted by development of offshore wind energy in the Gulf of Maine. The loss of these valuable time series would have profound management implications on Gulf of Maine resources, stakeholders, interests, and the public. While recommendation #3 provides an excellent suggestion to conduct more detailed GOM baseline data collections without the ability to link fine scale data collections to regional time series the power of such efforts would be diminished. As the Maine offshore roadmap calls for the advancement of offshore wind energy in the GOM it would be recommended that such development does not result in the degradation of the GOM scientific enterprise. As such, we suggest some language that recognizes the importance of NOAA Fisheries surveys, the scientific advice that is supported, and the risks of impacts to fisheries and wildlife of not instituting the required mitigation measures. As such, NMFS recommends that full implementation of a federal survey mitigation program for Science Center surveys precede the development of offshore wind in the GOM.
- BOEM's 2007 OCS Alternative Energy ***Programmatic Environmental Impact Statement***, meant to cover renewable energy development in coastal waters, does not mention "floating platforms", or similar, for use in deep waters such as the Gulf of Maine. It seems incumbent that some analysis be done to judge whether that PEIS indeed covers the activities contemplated with using floating platforms for wind turbines in deep waters. This is not the task of the working groups, but it should be one of their recommendations.
- When impacts from offshore wind projects and associated infrastructure cannot be avoided, they should be minimized, and any remaining ***impacts must be compensated for***. Funds should be aggregated, and their use must be directed by scientific experts, such as the Regional Wildlife Science Entity.
- Any ***decommissioning plans*** must be made with wildlife and habitat impacts in mind.

Communication, Messaging and Engagement

Advice was offered on ways to better communicate with the public about OSW and the clear need for robust stakeholder engagement throughout the process.

- Conduct online town meetings with conservation insights
- Information to reduce fear of the technology. I believe OWS is "Clean" renewable whereas hydroelectric is generally very environmentally harmful except in a few cases.
- Encourage media coverage at your meetings to educate the public

- PR - especially for wildlife impacts
- We have to be able to show the Fishing and Lobstering industry that these turbine's will not affect their fishing. This is all I have heard since that has started and it is a shame because climate change is here and we have to protect our air and our environment.
- Consistent and accessible opportunities for robust and informed stakeholder engagement should be provided throughout regulatory processes.

General Feedback

Finally, a variety of comments were offered that reflected the strong desire to include all the current recommendations and expand into additional topics that are currently being discussed by the Working Group. Perhaps paradoxically, there were several people who encouraged the state to move quickly with OSW as a means to generate renewable energy and confront climate change while an equal number of people cautioned the Working Group to go slowly and fully consider the environmental and wildlife implications of development in the GOM.

- There are no low priority actions for Maine; all recommendations should be actively pursued.
- Include recommendations on the topics slated for future discussion in the final product. These topics, including Best Management Practices for pre- and post-construction monitoring and mitigation requirements, are essential for understanding how offshore wind development can coexist with wildlife in the Gulf.
- Construct, maintain, and operate offshore wind projects and associated infrastructure in a manner that minimizes impacts to wildlife and habitat.
- If OSW is going to work, it needs to work for all Maine people. That means protecting Maine's valuable natural resources that we all depend on, Maine jobs, reasonable electricity rates, and utilizing the technology developed by UMaine.
- OSW must be studied with wildlife in mind as well as being cost effective. Keep in mind the opportunities for Mainers in terms of jobs and low electricity rates.
- Consider OSW areas as biological set aside areas, good for the fishing industry.
- I am putting my trust in the expertise and experience represented on the EWWG and their ability to develop recommendations that embrace the critical role offshore wind will play in our climate future, as well as the necessity of conserving the Gulf's wildlife and environment.
- I'm grateful for all the diverse experts who are working on the challenge of protecting marine wildlife while deploying novel offshore wind technologies. It is important to make information about this work widely publicly available. Benefits to Maine workers and residents must be made clear.
- ***Be Cautious***
    - Once these things are in, they will be permanent and then we will be stuck will any and all consequences/damages they create. So we need to know as much as possible about potential impacts beforehand. Therefore, ALL of the recommendations are strategically important.

- Encourage a carefully studied offshore wind project that respects wildlife, habitat, our working waterfronts, sea farmers and fishers, and the shoreline human occupants nearest to the wind towers.
- I am very concerned about climate change and the future of this planet and have been for decades. But, I cannot get behind locating wind turbines in the middle of the Atlantic Flyway. This is going to kill thousands of birds (and bats) every year (those numbers to increase as more farms are added.)
- Please include some assessment/mention in your final reports of the environmental impacts that would come from offshore solar. Offshore solar could serve as a viable and maybe even better alternative to wind turbines. Consider, solar panels do not give off noise or electro-static charges and have no bird/bat strikes.

- ***Sense of Urgency***
  - Evaluate how to accelerate sound offshore energy supply
  - Maine should move promptly to (not recklessly) to achieve elec. security and reduce the harms of the GHG and hydroelectric generators. Also, since the resource is in federal waters, Maine could easily get left out.
  - It is past time for Maine people and decision-makers to move quickly toward embracing offshore wind that is sited, operated, and studied with wildlife and habitat in mind, but that is also cost-effective and that utilizes the skills and resources of Maine workers.
  - Move swiftly toward embracing offshore wind
  - Maine Audubon encourages Maine people and decision-makers to move swiftly toward embracing offshore wind that not only is sited, operated, and studied with wildlife and habitat in mind, but that is also cost-effective and that utilizes the skills and resources of Maine people.
  - Time is very important, it is VERY IMPORTANT to move forward with this project
  - Act swiftly with technology used by UME. Time is running out for shorelines and native habitat.
  - I hope that decision-makers move swiftly toward embracing offshore wind that not only is sited, operated, and studied with wildlife and habitat in mind, but that is also cost-effective and that utilizes the skills and resources of Maine workers. I'm excited about the role that OSW can play in helping Maine meet its renewable energy goals. We know that if OSW is going to work, it needs to work for all Maine people. That means Maine jobs, reasonable electricity rates, and utilizing the technology developed by UMaine.

Questions Raised at Public Forums Specific to Environment and Wildlife:

- What happens if all this mapping and testing shows this resource to be infeasible and unsafe?
- I think it makes sense that wildlife and fisheries areas of importance would covary in many instances (if I understood Wing correctly). Are there some important groups or species that might not covary for ecological or other reasons, and might need more focused research to understand their spatial needs?
- What is a plausible max speed of the turbine wings (e.g. are outermost wing speeds dangerous for birds, or is the gearing such, that this is of lesser concern)?
- What are the important research questions?
- What do we know from other offshore wind installations (especially in Europe) about the potential impact on migrating birds?
- Could you provide more details about how birds will be monitored in potential offshore turbine sites? For example, will human observers in boats anchor in those places for lengthy intervals to identify and count birds?
- Are there underwater noise issues or underwater "hum" from transmission lines that could upset migration patterns and feeding for whales and other sea mammals? Have there been comprehensive tests that can be pointed to?
- Can situating turbines close or distant from attractive landing places (e.g., islands), or providing landing platforms away from turbines, help to minimize collisions of birds with turbines?
- What impact will that cable have on the underwater environment and fishing regulations?
- What is the impact on the shoreside areas where the cables make landfall? What facilities need to be created?
- The new, larger wind turbines that could be installed offshore in the Gulf of Maine move more slowly and steadily than the old on-shore wind turbines. Are these newer turbines really a threat to birds? Is that threat at all close to the threats to birds of 1) climate change and air pollution, 2) habitat loss, 3) tall glass buildings without bird repelling visual treatments, 4) domestic cats?
- General concern about the impact of OSW on marine mammals and questions about whether and how this is being addressed.
- With all the unknowns on how this impacts the ocean ecosystem, this feels like a very big gamble

Working Group Response to Feedback on Draft Initial Recommendations

The Working Group reviewed the feedback from the March/April engagement efforts and integrated many of the suggestions into the final recommendations. Suggestions specific to each recommendation were considered and included where appropriate. Many of the comments are wanting the recommendations to be more specific and detailed. While the EWWG appreciates that sentiment, that level of specificity was beyond the scope of the EWWG. An additional recommendation has been added to establish a formal Standing Environment and Wildlife Advisory Group that could be tasked with developing additional detail and continue to develop and refine guidance on Maine's offshore wind efforts. A few comments focused on the use of the procurement process of offshore wind energy by Maine to establish clear criteria in competitive solicitations that avoid and minimize impacts to the environment and wildlife. It is envisioned that this Advisory Group could help develop that criteria.

Several of the comments were addressed in the second round of recommendations that were developed by the EWWG, including more discussion of transmission and minimizing nearshore impacts (Recommendation (b)5), data accessibility (Recommendation (b)2), utilizing the best available technology (Recommendation (b)4) and regional collaboration (Recommendation (a)6).

Impacts of port development were not considered by the EWWG as they are being covered by the Offshore Wind Port Advisory Group.

In general, comments asked for more strong emphasis on climate change and cumulative impacts. These themes were more fully integrated throughout the recommendations.

Comments regarding the mapping work were brought forward in discussions during a mapping workshop with the Northeast Ocean Data Portal hosted by the Governor's Energy Office.

A variety of additional impacts to consider and items to include were mentioned by both individuals and organizations. These impacts will be important to consider in future research and these ideas have been forwarded to the contractors working to develop the Research Consortium.

Environment and Wildlife Working Group

Offshore Wind Roadmap: Charting a Course for Maine

WORKING GROUP MEMBERS

John Perry, Maine Department of Inland Fisheries and Wildlife, Co-Chair

Wing Goodale, Biodiversity Research Institute, Co-Chair

Erik Blomberg, University of Maine

Zach Cockrum, National Wildlife Federation

Damian Brady, University of Maine

Amanda Cross, US Fish and Wildlife

Sarah Haggerty, Maine Audubon

Dawn Hallowell, Maine Department of Environmental Protection

Shilo Felton, National Audubon Society (through May 2022)

Ivy Frignoca, Friends of Casco Bay

Don Lyons, National Audubon Society

Doug Rasher, Bigelow Laboratory for Ocean Sciences

Nicolas Record, Bigelow Laboratory for Ocean Sciences

Jocelyn Runnebaum, The Nature Conservancy

Graham Sherwood, Gulf of Maine Research Institute

Erin Summers, Maine Department of Marine Resources

Sean Todd, College of the Atlantic

Sofie Van Parijs, NOAA Fisheries

Linda Welch, US Fish and Wildlife Service

Carl Wilson, Maine Department of Marine Resources

Gayle Zydlewski, Maine Sea Grant/University of Maine