

Attachment 14.A

Empire Wind Phase 2 Environmental Mitigation Plan



Environmental Mitigation Plan
for
Empire Wind 2
Version 1.0

Prepared pursuant to [contract number, date (TBD)]

with

New York State Energy Research and Development Authority
Albany, NY

Prepared by

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October 20, 2020

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Links to project information:

Project website: www.empirewind.com

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1. Environmental Mitigation Plan Summary

1.1. Overall philosophy and principles

This section should describe the overall philosophy and principles the Developer will follow to avoid, minimize, restore, and off-set potential impacts to environmental resources.

- Equinor Wind believes that from the outset, measures to avoid or mitigate adverse environmental impacts, while maximizing the positive beneficial environmental impacts of an offshore wind energy project, should be:
 - Identified and developed in consultation and coordination with the relevant stakeholders;
 - Based on robust baseline characterization that has been developed in consultation with relevant stakeholders;
 - Evidence based and founded on the latest science;
 - Where data gaps exist or the receptor-effect interactions are unknown, information gaps are satisfied through targeted data collection, monitoring and/or research;
 - Incorporated into spatial planning, for example project siting and design; and
 - Applied to how the project is implemented, for example surveys, construction methods and operations and maintenance activities.
- Equinor Wind recognizes the importance of adaptive management and will continue to evolve its procedures for the evaluation and mitigation of environmental resources.
 - For example, the Plan described herein is an update to the details described in the original Empire Wind bid submittal, reviewed and commented on by NYSERDA, and subsequently presented to the E-TWG on November 20, 2019.

1.2. Overall approach to incorporating data and stakeholder feedback

This section should describe how the Developer will use research, data, and stakeholder feedback to update the EMP and support decision-making throughout the life cycle of the project (pre-construction, surveys, site design, construction, operations, and decommissioning).

- Equinor Wind will seek consultation and coordinate with relevant stakeholders.
- Equinor Wind will review existing research and data and seek input from stakeholders regarding data gaps to inform decisions made throughout the project life cycle.
- Equinor Wind will review and seek input from stakeholders on proposed and conducted survey rationales and methodologies as well as design, construction and operation, and decommissioning plans for the Project.
- Pre- and post-construction monitoring will be designed to improve the understanding of impacts of offshore wind energy development and operations on wildlife.
- Additionally:

- Equinor Wind believes consultation and coordination with relevant stakeholders is important as a means of identifying potential risks or opportunities for sufficiently avoiding and mitigating environmental impacts.
- Equinor Wind has identified proven steps to consult with the relevant stakeholder groups to get feedback on plans, data, mitigation, and buy in on decisions in advance of the regulatory process – a “no surprises” approach.

1.3. Existing guidance and best practices that will be followed

This section should present a list of existing guidance documents, publications, tools, and/or plans that will be followed to support the EMP. Include links, if available, for all references.

- Equinor Wind will follow the following guidance documents, updating the guidance documents list as appropriate:
 - NOAA NMFS. 2018. 2018 Revision to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing: Underwater Acoustic Thresholds for Onset of Permanent and Temporary Threshold Shifts, April 1, 2018. Available at: <https://www.fisheries.noaa.gov/resource/document/technical-guidance-assessing-effectsanthropogenic-sound-marine-mammal-hearing>
 - NMFS GARFO. 2020. Recommendations for Mapping Fish Habitat. NMFS GARFO Habitat Conservation and Ecosystem Services Division.
 - BOEM. 2019. Guidelines for Providing Information on Marine Mammals and Sea Turtles for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585 Subpart F. Available online at: <https://www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Marine-Mammals-and-Sea-Turtles-Guidelines.pdf>.
 - BOEM. 2019. Guidelines for Providing Information on Fisheries for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. Fisheries Study Guidelines. Available at <https://www.boem.gov/sites/default/files/renewable-energy-program/BOEM-Fishery-Guidelines.pdf>
 - BOEM. 2019. Guidelines for Providing Benthic Habitat Survey Information for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. Available at <https://www.boem.gov/sites/default/files/renewable-energy-program/Regulatory-Information/BOEM-Renewable-Benthic-Habitat-Guidelines.pdf>. The guidance recommends that the NMFS EFH mapper tool (<http://www.habitat.noaa.gov/protection/efh/habitatmapper.html>) be used for species identification and habitat characteristics at any particular location (page 7)
 - BOEM. 2020. Guidelines for Providing Information on Fisheries Social and Economic Conditions for Renewable Energy Development on the Atlantic Outer Continental Shelf Pursuant to 30 C.F.R. Part 585. October 20, 2015. Available

at <https://www.boem.gov/sites/default/files/documents/about-boem/Social%20%26amp%3B%20Econ%20Fishing%20Guidelines.pdf>

- BOEM 2020. Guidelines for Providing Avian Survey Information for Renewable Energy Development on the Outer Continental Shelf. United State Department of the Interior – Bureau of Ocean Energy Management, Office of Renewable Energy Programs. May 27, 2020. Available at <https://www.boem.gov/sites/default/files/documents/newsroom/Avian%20Survey%20Guidelines.pdf>

2. Communications and Collaboration Approach

2.1. Overview and communication plan objectives

This section should provide an overview of the communication plan and objectives and its importance in fisheries migration.

- Equinor Wind will seek methods and processes to allow for a two-way flow of information between key stakeholders and Equinor Wind, specifically highlighting how Equinor Wind uses this feedback to inform their decision making.
- Equinor Wind will provide updates to environmental stakeholders in an appropriate manner that would be easily accessed and widely distributed.
- Additionally:
 - Openness is a core value and cornerstone of Equinor Wind’s approach to engaging with and sharing data with stakeholders.
 - Equinor Wind will approach project development and other state and federal permits on a “no surprises” basis. This includes sharing project updates, plans, results and information regularly and at all stages of the project so that all relevant interested parties have had sufficient opportunities to input into these processes, while also being sensitive to the potential for stakeholder fatigue.



2.2. Communication officers/positions, responsibilities, and contact information

This section will provide a list of communication officers, their role, and name and contact information. The list should provide stakeholders with an understanding of who should be called for a particular issue or question. It will also include links to the project website so readers know where to find additional information.

Communication Officers, Contact Information, Links		
Name/Title	Role	Contact Information
Laura Morales Head of Environment & Permitting- NY, Equinor Wind US	Primary point of contact for Equinor Wind US on environmental matters. E-TWG representative (primary)	lmora@equinor.com
Scott Lundin	Secondary point of contact for Equinor Wind US on environmental matters.	sclu@equinor.com

Head of Permitting – New England, Equinor Wind US	F-TWG representative (primary)	
Dave Phillips Environment & Permitting Manager, Equinor Wind US	Point of contact for Equinor Wind US on matters related to wildlife assessment and impacts. E-TWG representative (alternate)	dphi@equinor.com
Julia Lewis Environment & Permitting Manager, Equinor Wind US	Point of contact for Equinor Wind US on matters related to navigation safety.	julew@equinor.com
Julia Bovey Director, External Affairs	Stakeholder Manager	jbov@equinor.com
Elizabeth Marchetti Fisheries Manager, Equinor Wind US	Point of contact for Equinor Wind US on matter related to commercial and recreational fisheries. F-TWG representative (alternate)	emarc@equinor.com

Project website: www.empirewind.com

2.3. Identification of stakeholders

This section should describe the process by which stakeholders will be identified and classified by stakeholder group.

- Equinor Wind will continue to engage with regulatory agencies, Environmental NGOs (“NGOs”), research institutions and relevant stakeholders either via independent meetings or through environmental round tables in order to maximize opportunities to discuss the project and solicit feedback.
- This process will continue throughout the development of all of Equinor Wind’s projects.
- Stakeholder lists, contact details, and correspondence are listed on Equinor Wind’s internal stakeholder tracking tool and classified accordingly.

2.4. Participation in stakeholder and technical working groups

2.4.1. Communication with E-TWG

This should describe the communication and collaboration approach with members of the E-TWG and consultations.

- Equinor Wind will coordinate with the E-TWG (in accordance with Section 12.04 of the Agreement) and stakeholders to address concerns and mitigate impacts to the wildlife and environmental resources.
- Equinor Wind will dedicate project-specific technical resources to the E-TWG.
- Equinor Wind will work with the E-TWG and shall attend E-TWG meetings and workshops.
- Additionally:
 - Equinor Wind has been active in the E-TWG since its inception and is committed to active participation as a means to collaborate on best practices and research for offshore wind energy development, balancing environmental concerns with responsible technically and commercially feasible development, while fostering opportunities for future offshore wind energy development.
 - Equinor Wind will engage with the E-TWG on the basis of the portfolio of projects in development, rather than on a project-by-project basis. This approach is intended to streamline communication by providing a single point of contact for information exchange and consistent message
 - Current representation of Equinor Wind can be found within the Communication Officers table located in Section 2.2 of this document.
 - Equinor Wind considers the ENGOs on E-TWG as a proxy “ENGO steering committee” for engagement with the ENGO community on responsible development and to provide guidance on additional outreach that may be valuable.
 - Equinor Wind will also proactively engage with ENGOs not directly represented on the E-TWG, for example through direct engagement or Environmental Round Tables hosted by Equinor Wind, as appropriate.

2.4.2. Communication with other New York State agencies

This should describe communication with New York State agencies during each phase of the project.

- Equinor Wind will continue to engage with NY State Agencies throughout the project development process, including project updates and plans, environmental data collection, baseline data, potential mitigation options, terrestrial archaeology, historic architecture, and permitting. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

2.4.3. Communication with other stakeholder and working groups

This should describe any relevant participation with other stakeholder groups, such as international fisheries groups that would help inform the EMP.

- Equinor Wind is a member of the Steering Committee that is working with NYSERDA and other partners to stand-up a Regional Wildlife Science Entity (RWSE) that is envisioned to provide support for regional science collaboration focused on studying the potential impacts from offshore wind development on sensitive environmental receptors.
- Equinor Wind is a board member of the Responsible Offshore Science Alliance (ROSA) and active member of the Advisory Council.
- Equinor Wind is a founding member of the Responsible Offshore Development Alliance (RODA) Joint Industry Task Force.
- Equinor Wind's Fisheries Manager is a member of the New England Fisheries Management Council Habitat Advisory Panel
- Equinor Wind will continue to participate in the F-TWG and current representation can be found in Section 2.2 of this document.
- Equinor Wind actively participates in the Massachusetts Habitat Working Group and Fisheries Working Group, which are similar in scope and membership to the E-TWG and F-TWG.
- Equinor Wind will continue to engage with Tribal Nations, including but not limited to the Shinnecock Indian Nation.
- Equinor Wind will continue to engage with federal agencies, including:
 - BOEM as the lead agency to ensure a smooth permitting process and soliciting feedback on baseline data requirements;
 - NOAA's National Marine Fisheries Service ("NMFS") in relation to development of survey plans, baseline characterization data, for example, benthic and fisheries data sources and providing feedback on Equinor Wind's data collection efforts, strategic advice on threatened and endangered species, Incidental Harassment Authorizations ("IHAs") for geophysical surveys and the potential future requirements for IHAs in relation to construction activities.
 - U.S. Fish and Wildlife Service ("USFWS");
 - U.S. Environmental Protection Agency ("EPA");
 - U.S. Coastguard ("USCG") and U.S. Army Corps of Engineers ("USACE"); and
 - National Park Service ("NPS")
- Equinor Wind will continue to engage with the general public, which includes open houses and public hearings to address comments and questions.

2.5. Communication methods and tools by phase

This section should describe the communication and outreach methods and tools that will be employed for each stakeholder group during each phase of the project.

Proposed Outreach Methods/Tools	Phase*			
	1	2	3	4
Public meetings, Open houses	X	X	X	X
Stakeholder workgroups	X	X	X	X
Website promotion	X	X	X	X
Visual simulation tools	X	X	X	X
ENGO Round Tables, in person	X	X	X	X
Federal Agency Meetings, in person, webinars	X	X	X	X
State Agency Meetings, in person, webinars	X	X	X	X
E-TWG and F-TWG Meetings	X	X	X	X
Tribal Meetings; in person, webinars	X	X	X	X
Project Newsletters	X	X	X	X
<i>*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission</i>				

3. Supporting Other Research

3.1. Support of collaborative research

This section should describe how opportunities for developing or investing in collaborative research with environmental and academic entities to collect ecological data will be identified and undertaken. The description must account for the need to coordinate with members of the E-TWG during data gathering and assessment.

- Equinor Wind is committed to collaborating with the scientific community, E-TWG, relevant stakeholders, other offshore wind energy developers and third-party groups to conduct robust and relevant research studies that relate to environmental resources and offshore wind energy developments.
- Equinor Wind is a member of the Steering Committee that is working with NYSDERA and other partners to stand-up a Regional Science Entity that is envisioned to provide support for regional science collaboration focused on studying the potential impacts from offshore wind development on sensitive environmental receptors.
- Equinor Wind is a board member of the ROSA and active member of the Advisory Council.
- Specifically, Equinor Wind will:
 - Consider making existing wind farm related vessels, buoys, or structures available for research opportunities.
 - Explore appropriate monitoring protocols, for example monitoring of potential behavioral responses or changes in spatial and temporal distribution of biological resources as a direct result of the offshore wind energy development.
- Equinor Wind advocates that technical experts conduct statistical power analyses up front in the planning process before implementing any future studies. In addition, F-TWG and/or E-TWG are appropriate forums in which to discuss the development of such analyses and should be part of this process.

3.2. Handling/processing requests

This section should describe how requests for coordination with third-party supported scientists will be processed - including providing reasonably-requested Project data and access to the Project area for independent scientists examining environmental and fishery sensitivities and/or the impacts of offshore wind energy development on fish, invertebrates and fisheries for the purpose of publication in peer reviewed journals.

- Equinor Wind will make an effort to meet with any interested parties when contacted to discuss prospective research.
- Equinor Wind is willing to consider requests to access Equinor Wind's existing operating offshore wind energy developments in Europe to conduct research and monitoring.

3.3. Data availability

This section should describe how data will be made available in accordance with Section 2.2.5 of the RFP.

- Equinor Wind is committed to make publicly available relevant information or data and supporting metadata that is developed across our portfolio of projects to enhance the understanding of environmental characteristics, or use by wildlife, of any offshore, nearshore or onshore areas, so long as it is not considered proprietary in nature.
- 2017 to 2018 digital aerial survey images, monthly and quarterly reports of avian species, marine mammals, sea turtles and large bony fish assemblages as observed from the 12 x monthly digital aerial surveys carried out from November 2017 to October 2018. These data and reports are currently or will be made available at the following website:
https://remote.normandean.com/ewind_overview.php;
- The following studies are currently available for download from the Empire Wind website:
 - 2018 benthic survey report covering the “SAP” related survey locations within the lease area (benthic grab samples with grain size and macro fauna analysis, drop down video stills, habitat description);
 - 2018 benthic survey report covering “COP” related survey locations within the lease area totaling 67 sample locations (benthic grab samples with grain size and macro fauna analysis, drop down video stills, habitat description).
 - 2019 benthic survey report covering “COP” related survey locations within the proposed export cable corridors (sampling included Sediment Profile Imaging (SPI) and Plan View (PV) imaging at 157 sample stations, with 15 reference stations and sediment grab samples for sediment grain size analysis and macrofaunal analysis for verification).
- The following data can be obtained by contacting the Equinor Wind representative indicated below:
 - Oceanographic data, not deemed proprietary, for example seawater temperature and salinity, from the “Metocean Facilities” deployed within the lease area. Requests to be made directly to Dave Phillips at dphi@equinor.com ;
 - Non-commercially sensitive data from metocean buoys. Requests to be made directly to Dave Phillips at dphi@equinor.com;
 - Protected Species Observer (PSO) observation reports, as appropriate. Requests to be made directly to Dave Phillips at dphi@equinor.com.
- The following studies and reports will be available to the public once the COP has been issued by BOEM for public comment:
 - Ornithological and Marine Fauna Aerial Survey
 - Avian Impact Assessment for the Proposed Equinor Wind Project in the New York Bight
 - 2018 Bat Survey Report
 - Bat Impact Assessment for the Proposed Equinor Wind Project in the New York Bight

- Benthic Resources Characterization Reports
- Essential Fish Habitat (EFH) Assessment
- Offshore Electric and Magnetic Field Assessment
- Onshore Electric and Magnetic Field Assessment
- In-Air Acoustic Assessment
- Underwater Acoustic Assessment
- Sediment Transport Analysis
- Analysis of Visual Effects to Historic Properties
- Visual Impact Assessment
- Aircraft Detection Lighting System (ADLS)
- Obstruction Evaluation & Airspace Analysis
- Navigation Safety Risk Assessment
- Information for Planning and Conservation (IPaC) Report and New York State Department of Environmental Conservation Natural Heritage Response Letters
- Air Emissions Calculations and Methodology
- Conceptual Project Design Drawings
- Oil Spill Response Plan
- Safety Management System
- Coastal Zone Management Consistency Statements
- Summary of Agency and Stakeholder Engagement
- Prior to any disclosure, data made available by Equinor Wind will undergo final quality assurance/quality control (“QA/QC”) to be performed by Equinor Wind.
- Equinor Wind is open to exploring additional outlets for sharing information (e.g., the E-TWG webpage or other data portals), however, version control will be important.

3.4. Proposed restrictions

This section should describe any restrictions on data provision or access that may be required to protect trade secrets or maintain site security.

- Equinor Wind will restrict confidential, propriety, and commercially sensitive data (as noted above).

3.5. Financial commitment for third party research

This section should provide a level of financial commitment, if elected, that will be appropriated to leverage third-party environmental research funding related to fish, invertebrates and fisheries, including federal or State-supported research. Or, if elected, provide the level of commitment to a general fund for supporting third-party research into relevant fish and invertebrate communities and associated commercial and recreational fisheries and the effects of offshore wind energy development.

- Equinor Wind, contingent upon a winning bid under this Request for Proposals ORECRFP20-1, is committed to support regional monitoring of wildlife and key commercial fish stocks equivalent to the specified value of \$10,000 per MW. Half of this will support regional monitoring of key commercial fish stocks to better understand how offshore wind energy

development is potentially altering the biomass and/or distribution of these stocks; and the other half will support regional monitoring of wildlife to better understand how offshore wind energy development effects distribution and abundance of sensitive species. These monitoring efforts may be committed via regional monitoring organizations (e.g., ROSA, Regional Wildlife Science Entity (RWSE) or similar) or independently by Equinor Wind.

3.6. Proposed or existing commitments/collaborations

This section should describe proposed or existing commitments and collaborations with third-party researchers in support of monitoring activities and assessing impacts.

- Equinor Wind has collaborated with SUNY Stony Brook to attach four fish tag receiver gates to the Empire Wind Metocean Facilities. The receiver gates, used primarily for detecting Atlantic sturgeon but also capable of detecting other tagged species, were part of a previously BOEM-funded study. Equinor Wind has been coordinating with Stony Brook on opportunities to download and service the sensors during scheduled service visits approximately every 6 months. Equinor Wind intends to explore continuing this collaboration.
- Equinor Wind entered into a funding agreement related to a grant with the Wildlife Conservation Society (WCS) and Woods Hole Oceanographic Institute (WHOI) up to 3 years, which consists of two “Blue York” style real-time acoustic whale monitoring buoys spaced appropriately in the lease area to add to the existing data from the buoy on the eastern edge of the lease area which were deployed in January 2020. As a part of this funding, Equinor Wind will explore opportunities to expand these studies further.
- Equinor Wind is committed to continue to participate in the development of the Regional Wildlife Science Entity (RWSE) as it matures, where Laura Morales (Head of Environment and Permitting (NY)) sits on the Steering Committee.
- Equinor Wind was a founding board member of ROSA and is committed to continue supporting ROSA. Scott Lundin (Head of Environment and Permitting – New England) sits on the Board of Directors and is a member of the Advisory Council.
- Equinor Wind has funded and collaborated in the UK Carbon Trust ORJIP One Bird Collision Avoidance Study (ORJIP One), UK Carbon Trust ORJIP Four Acoustic Deterrent Devices (ORJIP Four), and the developer-led DEPONS (Disturbance Effect on the Harbour Porpoise in the North Sea, DEPONS, 2015).

4. Proposed Mitigation of Impacts to Marine Mammals and Sea Turtles

4.1. Baseline characterization

4.1.1. Available information

Describe key existing literature and datasets that are available for baseline characterization.

- Equinor Wind evaluated the extent to which existing and publicly available data sources were suitable for characterizing environmental resources in the relevant area, including evaluation of NYSERDA’s Master Plan (2017).
- Equinor Wind has referenced the NYSERDA Master Plan Marine Mammals and Sea Turtles Study (2017; Appendix L) to characterize baseline conditions. This study reviewed the available data and has provided summaries of “Best Available Data” in the form of comprehensive lists of datasets for marine mammals and sea turtles and notes that current studies will provide reliable species counts when they are complete. Equinor Wind has also referenced NOAA Fisheries Stock Assessment Reports and monitoring surveys conducted for NYSDEC to characterize baseline conditions.
- NOAA Fisheries 2019. Annual Report of a Comprehensive Assessment of Marine Mammal, Marine Turtle, and Seabird Abundance and Spatial Distribution in US waters of the Western North Atlantic Ocean – AMAPPS II. In Press. 2019.
- Tetra Tech and LGL. 2020. Final Comprehensive New York Bight Whale Monitoring Aerial Surveys Years 1-3 Survey Report for March 2017 – February 2020. Technical Report produced By Tetra Tech and LGL for NYSDEC under Tetra Tech contract C009926. May 18, 2020.
- WHOI (Woods Hole Oceanographic Institution). 2018. Autonomous real-time marine mammal detections – New York Bight Buoy. Woods Hole Oceanographic Institution and Wildlife Conservation Society. Available online at: http://dcs.whoi.edu/nyb0218/nyb0218_buoy.shtml.
- Equinor Wind will rely on additional studies to assess the impact of noise on marine mammals and sea turtles, as follows:
 - Popper, A.N., A.D. Hawkins, R.R. Fay, D. Mann, S. Bartol, T. Carlson, S. Coombs, W.T. Ellison, R. Gentry, M.B. Halvorsen, S. Lokkeborg, P. Rogers, B.L. Southall, D.G. Zeddies, and W.N. Tavalga. 2014. ASA S3/SC1.4 TR-2014 Sound Exposure Guidelines for Fishes and Sea Turtles: A Technical Report prepared by ANSI-Accredited Standards Committee S3/SC1 and registered with ANSI, ASA Press. This study found that sea turtles have fairly limited capacity to detect sound, although all results are based on a limited number of individuals and must be interpreted cautiously.
 - Limited research has shown that the upper limit of the hearing range of sea turtles is generally in the range of 1,000 to 1,200 hertz (Hz):

- Tech Environmental, Inc. 2006. Final EIR Underwater Noise Analysis. Tech Environmental, Inc. (Report 5.3.2-2). Waltham, Massachusetts.
- Martin, K.J., S.C. Alessi, J.C. Gaspard, A.D. Tucker, G.B. Bauer, and D.A. Mann. 2012. Underwater hearing in the loggerhead turtle (*Caretta caretta*): a comparison of behavioral and auditory evoked potential audiograms. *The Journal of Experimental Biology* 215:3001-3009.
- McCauley, R.D., J. Fewtrell, A.J. Duncan, C. Jenner, M.N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe. 2000. Marine seismic surveys: A study of environmental implications. *Apnea Journal* 692-706. This study serves as the best available information on the levels of underwater noise that may produce a startle, avoidance, and/or other behavioral or physiological response in sea turtles.
- Noise injury thresholds established by the Fisheries Hydroacoustic Working Group and adopted by NOAA Fisheries.
- Some data covering several years of time-series currently exists on the ambient underwater sound levels within or near to the lease area, collected from noise sensors installed by WCS as part of their 'Blue York' real-time whale monitoring buoy.
- NOAA-established guidance for evaluating noise impacts, which defines harassment thresholds for broad categories of marine species:
 - NOAA Fisheries. 2018a. 2018 Revisions to: Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0): Underwater Thresholds for Onset of Permanent and Temporary Threshold Shifts. U.S. Dept. of Commerce, NOAA. NOAA Technical Memorandum NMFS-OPR-59, 167 p.
- Equinor Wind will comply with BOEM's requirements in 30 C.F.R. § 585.626.
- In consultation with federal agencies, Equinor Wind has concluded that there are sufficient data to appropriately characterize and assess impacts to marine mammals and sea turtles in support of project development.
- Empire Wind COP will provide a detailed review of the available baseline data.

4.1.2. Data Collected

Describe data collected, or will be collected, to support baseline characterization.

- Observations of all right whales and dead, entangled, or distressed marine mammals will be communicated to federal authorities as soon as is practicable, and no later than 24 hours after occurrence.
- Additionally:
 - Data collected during NYSDEC's multi-year, monthly aerial survey data collection effort from March 2017 through February 2020. Reports, including the two annual and final 3-year compendium are available here: <https://www.dec.ny.gov/lands/113818.html>

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- Status: Data collection complete; Synthesis reporting ongoing
- NYSDEC, Schlesinger and Bonacci 2014, NYSERDA, WCS, and the Atlantic Marine Assessment Program for Protected Species (“AMAAPS”) surveys (NOAA NEFSC 2017 and SEFSC 2016).
 - Status: Complete
- NYSERDA quarterly digital aerial survey program to evaluate the NY Bight area and Empire Wind project area.
 - Status: Complete
- WCS/WHOI collection of near real-time acoustic observations of whale species, including North Atlantic right whale, sei whale, humpback whale and fin whale. The data buoys are also recording the ambient sound environment at the eastern end of the lease area. Real time detections are available here: <http://dcs.who.edu/>
 - Status: Active
- Atlantic Marine Assessment Program for Protected Species (“AMAAPS”) surveys (NOAA NEFSC 2017 and SEFSC 2016). Recent reports available here: <https://www.fisheries.noaa.gov/resource/publication-database/atlantic-marine-assessment-program-protected-species>
 - Status: Active. Information is currently available from surveys conducted from 2010-2016.
- Cornell University passive acoustic monitoring survey for 6 large whale species (right, fin, sei, blue, sperm, and humpback) in NY Bight.
 - Status: Active
- The following unpublished reports that could be made available by request of the authors:
 - Bioacoustic Research Program (BRP). 2010. Determining the Seasonal Occurrence of Cetaceans in New York Coastal Waters using Passive Acoustic Monitoring February 2008 – March 2009. Final Report 14 June 2010 Prepared for: State Wildlife Grants Program 205 Funding C/O Bureau of Fisheries New York State Dept. of Environmental Conservation R2 625 Broadway, Albany NY 12233-4753
 - Estabrook, B.J., D.V. Harris, K.B. Hodge, D.P. Salisbury, D. Ponirakis, J. Zeh, S.E. Parks, A.N. Rice. 2019. “Year 1 Annual Survey Report for New York Bight Whale Monitoring Passive Acoustic Surveys October 2017– July 2018.” Contract C009925. New York State Department of Environmental Conservation. East Setauket, NY.
 - Estabrook, B.J., K. B. Hodge, D. P. Salisbury, D. Ponirakis, D. V. Harris, J. M. Zeh, S. E. Parks, A. N. Rice. 2020. “Year 2 Annual Survey Report for the New York Bight Whale Monitoring Passive Acoustic Surveys October 2018 – October 2019. Contract C009925. New York State Department of Environmental Conservation. East Setauket, NY.
- Other data collection efforts include the Georgia Department of Natural Resources’ focus on tagging right whales and Geographic Information Gateway, CetMap, and other efforts to collect spatial data. <https://cetsound.noaa.gov/cda-index>
 - Status: Active

- The following items are representative of additional data being collected by Equinor Wind to address data gaps and support baseline characterization:

█ [REDACTED]

- Equinor Wind completed the following assessments to support the baseline characterization:
 - Offshore site characterization surveys including, oceanographic and meteorological (metocean) measurements, geophysical and geotechnical investigations, sediment & water quality sampling, and benthic sampling;
 - Underwater acoustic modeling;
 - Sediment transport analysis;
 - Navigation Risk Safety Assessment;
 - Tourism and recreation;
 - Offshore cable burial risk assessments (still in progress); and
 - Electromagnetic Field (“EMF”) modeling.
- Equinor Wind contracted APEM supported by Normandeau to conduct monthly digital aerial surveys, which captures digital images and of marine mammals and sea turtles in addition to avian species, large fish assemblages and opportunistic vessel sightings.
 - The Avian Survey Protocol, which included marine mammals and sea turtles, was submitted and approved by BOEM and USFWS.
 - Data and reports from past and future surveys have been and will continue to be made available at: https://remote.normandeau.com/ewind_overview.php
- Equinor Wind will use data and observations from Protected Species Observers (PSOs) onboard project related offshore survey vessels where appropriate. PSOs recorded observations from March 2018 to December 2018, and April 2019 to August 2019 and ongoing surveys initiated in June 2020.

█ [REDACTED]

4.2. Species at risk

Describe which species Equinor Wind believes to be of greatest concern and why.

- Equinor Wind notes that 39 marine mammals and 5 sea turtles are known to occur within the waters of the NY Bight and the lease area. All 39 marine mammals are protected by the MMPA, and some are protected by the ESA or NY State Law.
- Equinor Wind is also aware of the importance of the species categorized with the additional protections mention above. The project’s assessments, design, and mitigations are being

developed in a manner meant to appropriately address the needs and requirements of all of the species known to occur within the Lease Area without having to prioritize some over others.



4.3. Potential impacts and mitigation measures by phase


The table below should list the potential impacts to marine mammals and sea turtles and proposed mitigation measures. To this end, a description of proposed measures to minimize the impacts of sound on marine mammals and sea turtles during all phases of Project development should be included. In addition, provide a description of the minimum size of exclusion zone intended to be monitored during geophysical surveys and construction; planned approaches to understanding marine mammal and sea turtle presence and absence within the development site exclusion zone during site assessment and construction (e.g., a combination of visual monitoring by protected species observers and passive acoustic monitoring, the use of night vision and infra-red cameras during nighttime activities, etc.); proposed temporal constraints on construction activities and geophysical surveys with noise levels that could cause injury or harassment in marine mammals (e.g., seasonal restrictions during periods of heightened vulnerability for priority species; commencing activities during daylight hours and good visibility conditions, dynamic adjustments following the detection of a marine mammal); and proposed equipment and technologies Equinor Wind would use to reduce the amount of sound at the source, if any.

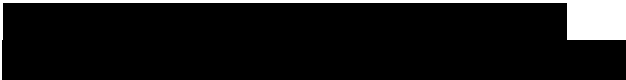
Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Underwater Noise impacts from geophysical survey equipment	<ul style="list-style-type: none"> Exclusion, clearance, and monitoring zones will be maintained as necessary to help measure and mitigate potential effects on marine mammals; Monitoring during noise-generating activities shall be done through an integrated monitoring approach, including the use of PAM, NMFS-approved PSOs, and other proven technologies, as appropriate, to the extent practicable and in compliance with federal regulation; and Noise generating geophysical survey work shall not commence after dark or at other times of low visibility that would prevent sufficient monitoring of exclusion zones, to the extent compatible with practicability and worker safety; Soft starts and shut-down procedures to minimize impacts associated with noise emitting survey equipment, where technically feasible and in accordance with associated authorizations. 	X	X	X	

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Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Underwater noise impacts from construction and installation activities	<p>General:</p> <ul style="list-style-type: none"> Monitoring during construction and installation activities, including those done during times of reduced visibility, will be done through an integrated monitoring approach, including the use of PAM, NMFS-approved PSOs, and other proven technologies, as appropriate, to the extent practicable; <p>[REDACTED]</p>		X		
Vessel strikes on marine mammals	<ul style="list-style-type: none"> Equinor Wind shall ensure that all vessel personnel are trained regarding animal identification and protocols when sightings occur Equinor Wind shall provide reference materials on board all project vessels for identification of marine mammals and sea turtles Appropriate project-related personnel onboard project vessels will be provided marine mammal sighting and reporting procedures training appropriate for each specific phase and its potential 	X	X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>impacts to marine mammal species, as necessary. These monitoring, sighting, and reporting protocols will be outlined in any Incidental Harassment Authorization (IHA) deemed necessary for the Project, in an effort to emphasize individual responsibility for marine mammal awareness and protection.</p> <ul style="list-style-type: none"> • Use of exclusion/safety zones: <ul style="list-style-type: none"> ○ Real-time monitoring systems as appropriate (e.g., visual observations by PSOs, passive acoustic monitoring, use of night vision and infrared during nighttime activities) to facilitate exclusion and monitoring zones for survey and construction vessels; ○ NOAA NMFS approved PSOs and PAMS where appropriate for monitoring during vessel transits • Equinor Wind empowers all personnel onboard a vessel to raise an alert of potential marine mammals and sea turtle risk via the Lead PSO, with the Lead PSO given full mandate for mitigation decisions • Equinor Wind's vessel strike avoidance measures will (and have been) consistent with: (1) NOAA NMFS guidance to avoid ship collision with marine mammals and sea turtles; (2) conditions within the lease area; (3) and any Incidental Take Authorizations issued by NOAA NMFS. • Vessel collision avoidance mitigation measures include: <ul style="list-style-type: none"> ○ Use of dedicated shipping lanes ○ Vessel operators and crew awareness of collision avoidance measures; ○ Project-related vessels will comply with NOAA Fisheries speed restrictions within the Mid-Atlantic U.S. SMA for right whales of 10 knots (18.5 km/h) or less for vessels 65 ft (20 m) or greater during the period of November 1 through April 30. Project-related vessels will also comply with the 10 knot (<18.5 km/h) speed restrictions in any DMA; ○ Reduction of speed to 10 knots or less if mammal identified near an vessel (within 330 ft/100 m) ○ Maintain separation distance of 1,640 ft or greater from North Atlantic right whale. If observed, must move away from whale at 10 				

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>knots or less until separation distance is achieved. If in vessels path, engines must not be engaged until it has moved outside path and beyond 330 ft/100m.</p> <ul style="list-style-type: none"> ○ Maintain separation distance of 300 ft or greater from any sighted non-delphinoid cetacean. If sighted – follow similar procedures for siting North Atlantic right whale. ○ Maintain separation distance of 164 ft (50 m) or greater from any sighted delphinoid cetacean. If sighted – follow similar procedures for siting North Atlantic right whale. ○ Maintain a separation distance of 164 ft (50 m) or greater from any sighted pinniped ● Equinor Wind will adopt vessel collision avoidance measures for project-related vessels working in or in transit to and from the Lease Area, including a 164 ft (50 m) separation distance from all sea turtle species; ● Will adopt vessel speed restrictions associated with seasonal management areas (“SMA”) and dynamic management areas (“DMA”) relevant to the size of the vessels used and other vessel strike avoidance measures; ■  ● Real-time marine mammal monitoring systems for monitoring and exclusion zones, as appropriate; ● Vessel collision avoidance mitigation measures for project-related vessels working in or in transit to and from the Lease Area, including a 328 ft (100 m) separation distance from all marine mammals, except for the right whale, which requires a 1,640 ft (500 m) separation; ● Any vessel larger than 300 gross tonnes moving into right whale habitat will report in as part of the right whale Mandatory Ship Reporting System, where they will be immediately responded to with updated reports of right whale sightings in the area, in addition to reminders of safe vessel speeds and movements within the management area. In the event of contact with a North Atlantic right whale, a 				

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>report must be made immediately to NOAA's National Marine Mammal Stranding Network;</p> <ul style="list-style-type: none"> • Marine mammal observers and/or Project personnel will check NOAA's website for any update on DMAs and will respond with vessel movement strategies or work hours accordingly; • Equinor Wind will consider the use of dedicated trained crew members (independent of PSOs) to help reduce the risk of collision under certain circumstances; and • Equinor Wind will consider the use of a Service Operations Vessel (SOV) concept, supported by a Crew Transfer Vessel (CTV), to reduce vessel traffic associated with Operations and Maintenance for the Project, if technically and commercially feasible. 				
Electromagnetic Fields (EMF), resulting in potential disturbance to marine mammals/sea turtles and/or their prey resource	<ul style="list-style-type: none"> • Equinor Wind shall use proper shielding to reduce EMF impacts, where necessary. • Equinor Wind shall conduct EMF modeling assessments to identify potential mitigation requirements • Electrical cables shall be sufficiently buried where feasible to reduce EMF effects. •  • Surface cable protection where sufficient burial is not possible and where appropriate based on a Cable Burial Risk Assessment (CBRA) and EMF assessments (acting as a further barrier between EMF and receptor). 	X	X	X	
Additional proposed mitigations	<ul style="list-style-type: none"> • Continued engagement with regulatory agencies and ENGOs on potential mitigation and best practices, as appropriate; • Project-related vessels will operate in accordance with laws regulating the at-sea discharges of vessel-generated waste; • During operations and maintenance, Equinor Wind will commit to vessel and structure lighting that minimizes illumination of the sea surface where feasible and subject to approval; • Equinor Wind will consider siting of project-components to avoid and minimize impacts to sensitive benthic habitat and habitat of high value to 	X	X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	marine mammals and sea turtles, directly and indirectly; and <ul style="list-style-type: none"> • Development of a monitoring program to address specific questions, to include identifying key species of interest, and when possible, to contribute to the understanding of long-term project-specific impacts and larger scale efforts to understand cumulative impacts. 				
*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission					

4.4. Monitor for impacts during each phase

Describe how potential impacts will be monitored on these species during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

- Equinor Wind shall seek to collaborate with other regulatory agencies and stakeholder groups to identify research needs and opportunities.

4.4.1. Pre/Post Monitoring to assess and quantify impacts and changes

Describe how changes to environmental resources will be quantified using statistically sound methods

- Ideally, specific questions and focal taxa shall be chosen for the Project either based on site-specific fisheries risk assessment, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to effectively analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.
- Outside expertise will, if practicable, be consulted during study design and data analysis processes.
- Additionally:
 - Equinor Wind will ideally target monitoring and research towards interactions between offshore wind energy developments and the receptors it is being judged against.
 - Equinor Wind, in collaboration with WCS/WHOI, has installed two monitoring buoys to help to further understand the spatial and temporal distribution of the four large whale species within the lease area, including potential for extending deployments to post-construction monitoring.
 - The WCS/WHOI buoys offer an opportunity for real-time monitoring and detection during survey and installation activities.

- Equinor Wind will explore the use of Habitat and Agent Based Modeling to facilitate a better understanding of the spatial and temporal distribution and fine scale movements of key large whale species within the New York Bight, in particular in relation to changes in environmental conditions (e. g., prey resource, seawater temperature).
- Equinor Wind understands that from the outset, any research and monitoring to assess changes and impacts should be statistically robust. However, for some biological monitoring, this level of robustness is not always possible as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (e.g., seawater temperature, nutrient levels, etc.). As such, Equinor Wind is open to sharing or using oceanographic data from the Metocean facilities for a better understanding of these relationships.

4.4.2. Address data gaps

Describe how data gaps will be addressed.

- Equinor Wind shall work with stakeholders, including regulatory agencies and local groups, in the design phase of the project to identify data gaps to be addressed through surveys or permitting applications.
- Additionally:
 - Equinor Wind believes there is sufficient marine mammal and sea turtle data to inform spatial planning and support assessments in the COP and IHA applications. However, Equinor Wind is willing to collaborate on studies, research, and monitoring to supplement what is required under the regulations, to inform mitigation options. For example, the collaboration with WCS/WHOI as described previously.
 - Equinor Wind will engage with relevant stakeholders, for example through the regulatory process and E-TWG to identify areas where data gaps beyond the COP exist for further monitoring and research and will consider proposals for research on a case by case basis.

4.5. Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted marine mammals and sea turtles in an alternative location.

- As necessary, Equinor Wind shall explore this further in consultation with the E-TWG, regulatory agencies, and relevant stakeholders.
- Additionally:

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- Equinor Wind has not finalized a process for alternative protocols, but it is open to exploring this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.
- Equinor Wind will take additional measures to avoid or reduce potential impacts to marine mammal and sea turtle prey resources in consultation with E-TWG and BOEM and other stakeholders, consistent with the EMP.
- Equinor Wind will continue to consult with NOAA NMFS and other key stakeholders throughout the project development process in order to determine if any alternative or additional appropriate and proportionate mitigation measures may be necessary.
- All required mitigation and monitoring measures will be integrated into the project's "Protected Species Mitigation Protocol(s)".
- Equinor Wind is open to consulting with relevant agencies, ENGOs, and the E-TWG on further appropriate and proportionate mitigation options, for example, real-time monitoring or observations of marine mammals when in transit and commitments to monitor daily reports on marine mammal sightings and DMAs.

5. Proposed Mitigation of Impacts to Birds and Bats

5.1. Baseline characterization

Describe how baseline data will be established on the presence of bird and bat assemblages, temporal and spatial use of the site by key species within the area of the proposed Project.

5.1.1. Available information

Describe key existing literature and datasets that are available for baseline characterization.

█ [REDACTED]

- Equinor Wind will rely on the following information for its baseline characterization of birds:
 - NYSERDA-funded digital aerial avian surveys covering the Lease Area over four quarterly surveys and the Offshore Planning Area (OPA) over twelve quarterly surveys (data have been combined with Equinor’s surveys for species abundance modelling). Data and reports are also publicly available on https://remote.normandeau.com/nyserda_overview.php
 - Information on threatened and endangered species and/or their habitat is also available through USFWS IPaC, available at <https://ecos.fws.gov/ipac/>
 - NYSDEC Environmental Resource Mapper, available at <https://www.dec.ny.gov/animals/38801.html>
 - Kinlan, B.P., Menza, C., & F. Huettmann. 2012. Predictive Modeling of Seabird Distribution Patterns in the New York Bight. Chapter 6 in “A biogeographic assessment of seabirds, deep sea corals and ocean habitats of the New York Bight: science to support offshore spatial planning.” NOAA Technical Memorandum NOS NCCOS 141 (2012).
 - NYSERDA 2010a. Pre-development of avian species for the proposed Long Island – New York City Offshore Wind Project Area. Final Report prepared for the New York State Energy Research and Development Authority. October 2010.
 - Kinlan, B.P., Winship, A.J., White, T.P., & J. Christensen. 2016. Modeling At-Sea Occurrence and Abundance of Marine Birds to Support Atlantic Marine Renewable Energy Planning: Phase I Report. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs, Sterling, VA. OCS Study BOEM 2016-039. xvii+113 pp., available at <https://www.data.boem.gov/PI/PDFImages/ESPIS/5/5512.pdf>.
 - NYSERDA 2017. New York State Offshore Wind Master Plan, November 2017, available at <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-in-NewYork-State-Overview/NYS-Offshore-Wind-Master-Plan>
 - Studies funded by BOEM on baseline offshore and near-shore avian studies:

- Paton, P., K. Winiarski, C. Trocki, and C. McWilliams. 2010. Spatial Distribution, Abundance and Flight Ecology of Birds in Nearshore and Offshore Waters in Rhode Island. Chapter 11a in: Rhode Island Ocean Special Area Management Plan (Ocean SAMP) Volume 2. University of Rhode Island, Kingston, RI. 304pp.
- Veit, R.R., T.P. White, S.A. Perkins, and S. Curley. 2016. Abundance and Distribution of Seabirds off Southeastern Massachusetts, 2011-2015. U.S. Department of the Interior, Bureau of Ocean Energy Management, Sterling, Virginia. OCS Study BOEM 2016-067. 82 pp.
- Williams, K.A, I.J. Stenhouse, E.E. Connelly, and S.M. Johnson. 2015. Mid-Atlantic Wildlife Studies: Distribution and Abundance of Wildlife along the Eastern Seaboard 2012-2014. Biodiversity Research Institute. Portland, Maine. Science Communications. Series BRI 2015-19. 32 pp.
- NJDEP 2010a. Ocean/Wind Power Ecological Baseline Studies, Final Report, January 2008 - December 2009. New Jersey Department of Environmental Protection Office of Science, available at <https://www.nj.gov/dep/dsr/ocean-wind/report.htm>
- Cetacean and Seabird Assessment Program (CSAP) database of bird observations from 1980-1988
- Rhode Island Block Island Wind Farm and the Massachusetts Cape Wind Project baseline assessment data
- Carbon Trust ORJIP One Bird Collision Avoidance Study co-funded by Equinor - Skov, H., Heinanen, S. Norman, T., Ward, R.M., Mendez-Roldan, S & Ellis, I. 2018. ORJIP Bird Collision and Avoidance Study. Final Report-April 2018. The Carbon Trust. United Kingdom. 247 pp., available at https://www.carbontrust.com/media/675793/orjip-bird-collision-avoidance-study_april2018.pdf
- Equinor Wind will rely on the following existing information for its baseline characterization of bats:
 - NYSDEC. 2015a. List of Endangered, Threatened and Special Concern Fish & Wildlife Species of New York State. New York State Department of Environmental Conservation. Available at <http://www.dec.ny.gov/animals/7494.html>. NYSDEC. 2015b. New York State Wildlife Action Plan (SWAP) Species of Greatest Conservation Need, available at <http://www.dec.ny.gov/animals/7179.html>
 - NYSERDA 2017. New York State Offshore Wind Master Plan, November 2017, available at <https://www.nyserda.ny.gov/All-Programs/Programs/Offshore-Wind/Offshore-Wind-in-NewYork-State-Overview/NYS-Offshore-Wind-Master-Plan>



5.1.2. Data Collected

Describe data collected, or will be collected, to support baseline characterization.

- Equinor Wind contracted APEM, supported by Normandeau, to conduct monthly digital aerial surveys from November 2017 to October 2018 for the Empire Wind Lease Area, with monthly results, monthly reports, and quarterly and final reports made publicly available on the following webpage:
https://remote.normandeau.com/ewind_overview.php.
 - Status: Completed
- APEM and the methodology chosen was similar to the approach taken by NYSERDA having used APEM and these methods to conduct quarterly digital aerial surveys over the New York Bight and Lease Area. A summary of the scope of the digital aerial survey is as follows:
 - Surveys conducted once per month over a 12-month period;
 - Image resolution at sea surface of 1.5 cm ground sampling distance (“GSD”);
 - Grid survey design;
 - Grid imagery footprint of 310 m by 219 m;
 - A 2.5-mi (4 km) buffer around the lease area;
 - Minimum of 20% of the lease area and buffer imaged, with 10% of area analyzed;
 - Monthly results displayed online; and
 - Monthly, quarterly and annual reporting, also provided online.
- The assessment approach and methods were designed to supplement the substantial body of existing data and to meet BOEM’s data requirements for site characterization studies to evaluate the potential effects of the proposed project. In addition, the supplemental quarterly digital aerial surveys conducted by APEM Ltd. on behalf of NYSERDA provide an excellent spatial and temporal characterization of the lease area.
- The Empire Wind “Avian Survey Protocol” survey plan, which included marine mammals and sea turtles, was submitted and accepted by BOEM and USFWS.
 - Status: Complete
- Equinor Wind installed a passive bat detector onboard the survey vessel RV Ocean Researcher to detect passing bats while the vessel was engaged in other survey activity in the lease area from April 2018 through December 2018.
 - Status: Complete
- Equinor Wind installed a passive bat detector onboard the survey vessel RV Stril Explorer to detect passing bats while the vessel was engaged in other survey activity in the 0520 lease area starting in August 2020.
 - Status: Active
- Equinor Wind has and will continue to share the results of the monitoring with the relevant regulatory authorities and stakeholders, and consider whether there is a further need to collect additional site-specific data offshore.
 - Status: Active

- In addition to the above survey work, Equinor Wind has performed a number of desktop studies to characterize bird and bat baseline conditions.
 - Status: Complete

5.2. Species at risk

Describe which species Empire Wind believes to be of greatest concern and why.

- The Lease Area provides habitat for approximately 40 waterbird species, including seaducks, loons, gulls, scoters, terns, alcids, gannets, and shorebirds (NYSERDA 2010a, Kinlan et al. 2012, Kinlan et al. 2016, NYSERDA 2017d).
[REDACTED]
- Equinor Wind identified the following bats with the greatest potential to migrate through the lease area on their way between breeding and wintering grounds in the spring and fall:
 - eastern red bat,
 - hoary bat, and
 - silver-haired bat.
- Equinor Wind has followed BOEM’s guidelines and has used the Mid-Atlantic Ocean Data Portal’s data of temporal use, abundance, and species distribution by avian species or groups in the Lease Area. The modeling data can also be used to potentially identify species that are high risk for collision or displacement, and species that are protected by federal and/or state laws.

5.3. Potential impacts and mitigation measures by phase

The table below should list the potential impacts and mitigation measures to understand and minimize the Project’s risk to birds and bats. At a minimum this should include the steps the Empire Wind will pursue to minimize risk to birds and bats (e.g. lighting); and identification of technological approaches to assess impacts or any Proposals for other research or mitigations relating to birds or bats planned or under consideration at this time.

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Collision risk to marine birds and bats	<ul style="list-style-type: none"> • To avoid and minimize attraction- and disorientation-related impacts to birds and bats, artificial lighting on Equinor Wind projects will be reduced to the extent practicable while maintaining human safety and compliance with FAA, USCG, BOEM and other regulations; • Monitoring will be conducted to determine if there is a need for perching-related deterrents 		X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<p>to reduce attraction and minimize potential perching and loafing opportunities for birds;</p> <ul style="list-style-type: none"> • During construction, installation of anti-perching devices where appropriate on offshore, above-water, project-related vessels and structures to minimize introduction of perching structures to the offshore environment; • Project-related vessels will be instructed to avoid rafting seabirds to minimize disturbance during construction, operations, and maintenance; • Equinor Wind will consider the use of HDD for installation of the export cable landfall to avoid surficial disturbances; and • Equinor Wind will consider the maintenance of anti-perching devices where appropriate on offshore, above-water Project-related vessels and structures to minimize introduction of perching structures to the offshore environment, during operations and maintenance. 				
Habitat impacts, including breeding and nesting areas	<ul style="list-style-type: none"> • Siting and construction of nearshore and onshore project components for offshore wind farms (including but not limited to nearshore export cable routes, landfall sites, onshore cable routes, and onshore substations) shall be conducted in such a way as to avoid or minimize the loss or alteration of bird and bat habitat, as well as avoid or minimize disturbance and direct and indirect effects to bird and bat populations and their prey. Specifically, onshore infrastructure (i.e., landfall site, cable routes, substations) and development activities should 1) maximize the use of previously developed or disturbed areas, and 2) avoid unique or protected habitats, as well as habitat for key species, where feasible; • For bats, Equinor Wind will avoid tree-clearing at the onshore project components, unless otherwise determined acceptable by the USFWS and NYSDEC, to minimize risks to bats; 		X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<ul style="list-style-type: none"> Avoidance of key habitats and tree clearing within the onshore substation sites where appropriate and required during sensitive times of year (e.g., breeding season), to minimize risk to bats and tree nesting birds; Adherence to time of year restrictions as necessary in sensitive onshore bird habitats, where feasible and required, unless otherwise determined acceptable by the applicable agencies; and For both birds and bats, temporarily disturbed areas will be revegetated with appropriate native species, as appropriate. 				
Additional proposed mitigations	<ul style="list-style-type: none"> Development of a monitoring program to address specific questions, including identification of key species of interest, and when possible, to contribute to the understanding of long-term project-specific impacts and larger scale efforts to understand cumulative impacts. 	X	X	X	X

**Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission*

5.4. Monitor for impacts during each phase

Describe how potential impacts will be monitored on these species during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

5.4.1. Pre/Post Monitoring to assess and quantify changes

Describe how changes to environmental resources will be quantified using statistically sound methods

- Pre- and post-construction monitoring will be designed in such a way that it improves understanding of the impacts of offshore wind energy development on birds and bats, including identifying specific questions and taxa on which to focus monitoring efforts for the proposed project, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to effectively analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.

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- Outside expertise will, if practicable, be consulted during study design and data analysis processes.
- Additionally:
 - Equinor Wind believes that monitoring of highly mobile species, such as birds, should focus on behavioral responses rather than pre-, during, and post construction monitoring of abundance, which may not always have robust statistical power to identify change as a direct result of the wind farm.
 - Should further monitoring of birds be required, for example for Roseate terns, then Equinor Wind is willing to explore monitoring through novel techniques such as GPS tagging exercises, subject to approvals from the relevant regulatory agencies.
 - Equinor Wind will continue desktop studies and stakeholder discussions for avian and bat species. During field studies, Equinor Wind will complete appropriate surveys to further characterize the project area and determine presence/absence of habitat within proposed project activities.
 - Impacts to avian and bat species will be sufficiently examined as part of BOEM's NEPA process and as part of the COP, through state permitting processes, and in consultation with USFWS and relevant stakeholders. Where appropriate, mitigation will be implemented to reduce impacts to as low as practicable.

5.4.2. Address data gaps

Describe how data gaps will be addressed.

- Equinor Wind shall work with stakeholders, including regulatory agencies and local groups, in the design phase of the project to identify data gaps to be addressed through surveys or permitting applications.
- Additionally:
 - Equinor Winds notes that further research and monitoring is important where data and knowledge gaps remain and where there remains uncertainties over potential significant adverse impacts attributable to the offshore wind farm.
 - Equinor Wind will engage with relevant stakeholders, for example through the regulatory process and E-TWG, to identify areas where data gaps may exist for further monitoring and research and will consider proposals for research on a case by case basis.

5.5. Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted birds and bats in an alternative location.

- As necessary, Equinor Wind will explore this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.
- Additionally:

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- Equinor Wind has yet to finalize a process for alternative protocols, but is open to exploring this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.

6. Proposed Mitigation of Impacts to Fish, Invertebrates, and their Habitats

6.1. Baseline characterization

Describe what is known about the proposed site in terms fish and invertebrate assemblage, and temporal and spatial variations in fish, invertebrates and their habitats at the proposed site. The use of collaborative monitoring models with the fishing community is encouraged to develop trusted baseline data.

6.1.1. Available information

Describe existing literature and datasets that are available for baseline characterization.

- Public data sources are suitable for characterizing benthic habitat and fisheries resources in the project area, including:
 - The evaluation of NYSERDA's Master Plan Fish and Fisheries Study (2017; Appendix J);
 - NOAA National Centers for Coastal Ocean Science and BOEM Comprehensive Seafloor Substrate Mapping and Model Validation in the Atlantic (2019);
 - Estuarine Living Marine Resource database (NOAA 2000) provide descriptions of spatial and temporal distributions of species (by life stage) in Hudson River/Raritan Bay and the Great South Bay, however, the database is not updated regularly; and
 - Use of commercial and recreational fisheries effort data as a proxy for fish species.



6.1.2. Data being collected

Describe data collected, or will be collected, to support baseline characterization.

- NOAA National Centers for Coastal Ocean Science and BOEM Comprehensive Seafloor Substrate Mapping and Model Validation in the Atlantic research/survey collected sediment grab samples at 400 locations in the lease area, as well as bathymetric data and opportunistic fisheries data.
 - Status: Complete
- Equinor Wind commissioned benthic sampling in 2018 by Gardline Environmental covering the entire Lease Area and building on previous comprehensive benthic surveys carried out by NOAA's National Center for Coastal Ocean Science (NOS). These Equinor Wind surveys were conducted at a total of 67 sample stations, and included grab samples, drop down digital video and stills imagery. Grab samples were analyzed for sediment grain size distribution and macro faunal analysis. This report has been made publicly available for download from the Empire Wind website.

- Status: Complete
- Benthic sampling was conducted in 2019 by Inspire Environmental covering proposed potential export cable routes for the Lease Area. Sampling included Sediment Profile Imaging (SPI) and Plan View (PV) imaging at 157 sample stations, with 15 reference stations and sediment grab samples for sediment grain size analysis and macrofaunal analysis for verification. This report has been made publicly available for download from the Empire Wind website.
 - Status: Complete
- Geophysical, benthic habitat (through geophysical interpretation), and geotechnical surveys were conducted from March 2018 to November 2018 across the entire Lease Area and export cable corridors, with additional geophysical and geotechnical surveys carried out in 2019 to fill in data gaps and cover areas from landfall to the 65 ft (20 m) depth contour.
 - Status: Complete



6.2. Species at risk

Describe which species Equinor Wind believes to be of greatest concern and why.

- Equinor Wind notes that fish and invertebrate species of interest in the Lease Area fall into three groups based on regulatory status: (1) species managed under the MSA; (2) species listed under the ESA; and (3) non-game fish and invertebrate species that are considered important prey (or shelter, in the case of biogenic habitats) for fish and wildlife.
- In addition, the role of the benthic habitat as a fisheries resource is fundamental to the identification of essential fishing habitat (EFH), as reflected in the emphasis on EFH in BOEM's benthic survey guidance (BOEM 2019). EFH has been designated in the Lease Area for various life stages of more than two dozen nonmigratory managed species, including finfish, sharks and rays, and invertebrates.
- Designated EFH for three (3) coastal migratory pelagic and seventeen (17) highly migratory managed fish species also occurs in the Lease Area.
- Three federally-listed endangered fish may occur in the Lease Area:
 - Atlantic salmon (*Salmo salar*);
 - Atlantic sturgeon (*Acipenser oxyrinchus*); and
 - shortnose sturgeon (*Acipenser brevirostrum*).
- NYSDEC lists a number of other fish species as endangered, most if not all, are associated with freshwater habitat which will be evaluated, as applicable to the export cable route.



6.3. Potential impacts/risks and mitigation measures by project stage

The table below should list the potential impacts to fish, invertebrates, and their habitats and proposed mitigation measures. To this end, this section should describe how the Developer will minimize risk to fish, invertebrates and their habitats (e.g., foundation type, scour protection, cable shielding for electromagnetic fields, construction windows, siltation/turbidity controls, use of dynamic-positioning vessels and jet plow embedment).

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
Micro-siting conflicts with habitats and fishery resources	<ul style="list-style-type: none"> Equinor Wind will seek input from regulatory authorities, the fishing industry, and maritime industry to locate foundations and cable routes in the least impactful manner that is practicable. Equinor Wind will avoid, to the extent possible, siting structures (wind turbines, offshore substations, and submarine cables) in areas of sensitive habitat, where feasible; Equinor Wind will consider the timing of construction activities; working with the fishing industry and fisheries agencies on sensitive spawning and fishing periods to actively avoid or reduce interaction with receptors, where feasible. 	X			
Temporary, alteration of the seabed and localized increases in noise and turbidity	<p>General:</p> <ul style="list-style-type: none"> Most construction vessels will maintain position using dynamic positioning, limiting the use of anchors and jack-up features, where feasible. Any anchors or jack-up features would be placed within the previously cleared and/or disturbed area around the foundations; Equinor Wind will consider the use of HDD at landfall to minimize physical disturbance of coastal habitats. Equinor Wind would implement appropriate measures during HDD activities at landfalls to minimize potential release of HDD fluid. To minimize an inadvertent fluid return, an HDD Contingency Plan would be developed and implemented; and 	X	X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	<ul style="list-style-type: none"> Equinor Wind will consider the use of appropriate measures and timing during cable installation activities to minimize sediment resuspension and dispersal in areas of known historically contaminated sediments. <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p>				
Long-term changes to seabed and habitat	<ul style="list-style-type: none"> Equinor Wind will, to the extent possible, avoid sensitive benthic habitats. Equinor Wind will implement mitigation and avoidance measures to protect water quality, such as spill prevention. Specifically, Equinor Wind will use appropriate measures for vessel operation and implement an OSRP, which includes measures to prevent, detect, and contain accidental release of oil and other hazardous materials. Project personnel will be trained in accordance with relevant laws, regulations, and project policies, as described in the OSRP; During construction, operations, and maintenance, Equinor Wind will utilize sensitive lighting schemes to minimize exposure of light, as practicable; Most construction vessels will maintain position using dynamic positioning, limiting the use of anchors and jack-up features, where feasible. Any anchors or jack-up features would be placed within the previously cleared and/or disturbed area around the foundations; Equinor Wind will consider the use of HDD at the landfall to minimize physical disturbance of 	X	X	X	X

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Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	coastal habitats. Equinor Wind would implement appropriate measures during HDD activities at landfalls to minimize potential release of HDD fluid. To minimize an inadvertent fluid return, an HDD Contingency Plan would be developed and implemented.				
EMF Impacts	<ul style="list-style-type: none"> • Equinor Wind will use proper shielding to reduce EMF impacts; • Equinor Wind will conduct EMF modeling and assessments to identify potential mitigation requirements; • Electrical cables will be armored and sufficiently buried where feasible to reduce EMF effects; and • As noted above, Equinor Wind will conduct both onshore and offshore EMF assessments for the COP. 		X	X	
Cable burial	<ul style="list-style-type: none"> • Equinor Wind shall bury export cables to an appropriate minimal depth to reduce exposure risk. If depth cannot be reached, Equinor Wind will add protective materials over the cable. Sufficient burial of inter-array and export cables to facilitate continued seabed penetrating fishing activity. • Dissemination of information to fishers on cable locations including inclusion on navigational charts. • Intention to bury inter-array and export cables based on Cable Burial Risk Assessment. • Periodical post installation cable surveys as appropriate, with sharing of information on identified navigational risks as appropriate. • Development of a Cable Installation Plan, detailing how cable installation will be managed. 		X	X	
Additional proposed mitigations	<ul style="list-style-type: none"> • Equinor Wind will install scour protection, as needed; and • Equinor Wind will develop a monitoring program to address specific questions, to include identifying key species of interest, and when possible, to contribute to the understanding of long-term project-specific 	X	X	X	X

Potential Impacts	Proposed Mitigation Measures	Phase*			
		1	2	3	4
	impacts and larger scale efforts to understand cumulative impacts.				
*Phase: 1: Survey/Design; 2: Construction; 3: Operation; 4: Decommission					

6.4. Monitor for impacts during each phase

Describe how potential impacts will be monitored on these types of fish and invertebrates during each phase of physical work for the Project (site assessment, construction, operation, and decommissioning) to inform mitigation planning for later phases of the Project as well as for future Projects.

6.4.1. Pre/Post Monitoring to assess and quantify changes

Describe how changes to environmental resources will be quantified using statistically sound methods.

- Ideally, specific questions and focal taxa shall be chosen for the project either based on site-specific fisheries risk assessment, or in relation to broader regional efforts to assess variation between sites and understand cumulative impacts for sensitive species.
- Monitoring will, to the extent practicable, use appropriate study designs and methodologies to effectively analyze risk prior to construction and evaluate impacts during construction and operation by testing hypotheses and helping to assure statistical power for meaningful data analysis.
- Outside expertise will, if practicable, be consulted during study design and data analysis processes.
- Equinor Wind shall seek to collaborate with other regulatory agencies and stakeholder groups to identify research needs and opportunities.
- Additionally:
 - Equinor Wind understands that from the outset, any research and monitoring to assess changes and impacts should be statistically robust. However, for some biological monitoring, this level of robustness to adequately detect change as a direct result of an offshore wind farm is not always possible as many outside factors can influence these variations with much greater significance than the factors that can be attributed to causes from offshore wind energy developments (e.g., seawater temperature, nutrient levels, etc.).
 - As such, Equinor Wind is open to monitoring that explore other approaches to detect and quantify change, where further monitoring is appropriate, for example behavioral responses. Equinor Wind will work with the regulatory agencies, E-TWG and relevant stakeholders to identify research and monitoring needs and agree on methodology.

6.4.2. Address data gaps

Describe how data gaps will be addressed.

- Equinor Wind will work with stakeholders, including regulatory agencies, to identify data gaps to be addressed through surveys or permitting applications.
- Additionally:
 - Equinor Wind will conduct further research and monitoring where data and knowledge gaps remain that present uncertainties over potential significant adverse impacts attributable to the effects of offshore wind farm development.
 - Equinor Wind is open to discussing further monitoring and research to fill data gaps as appropriate through regulatory agencies, E-TWG and relevant stakeholders.

6.5. Strategies for developing alternate protocols

Describe the process for determining when mitigation strategies are insufficient and under what conditions they might elect to rehabilitate or restore impacted fisheries in an alternative location or when the provision of compensation of some form may be appropriate.

- As necessary, Equinor Wind will explore this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.
- Additionally:
 - Equinor Wind has yet to finalize a process for alternative protocols, but is open to exploring this further in consultation with the E-TWG, regulatory agencies and relevant stakeholders.

7. Project Decommissioning

7.1. Potential impacts on marine wildlife, birds, bats, and fisheries

This section should describe potential impacts to marine mammals, sea turtles, birds, bats, and fisheries and habitats from decommissioning the project, based on available information and relevant experience (if any).

- Equinor Wind’s waste handling processes during decommissioning will focus on re-use or recycling, with disposal as the last option.
- Equinor Wind will collaborate with regulatory authorities and key environmental stakeholder groups to better understand the effects and potential impacts associated with decommissioning.
- Additionally:
 - Equinor Wind does not expect impacts from decommissioning to exceed impacts resulting from the maximum design scenarios associated with construction.
 - As monitoring during operations provides a better understanding of the spatial and temporal presence of marine mammals, sea turtles, birds, bats, and fish habitats within the Lease Area, mitigation measures can be more tailored and effective at further reducing the likelihood and level of impacts.
 - Equinor Wind will collaborate on further research into the effects and potential impacts associated with decommissioning, including coordination with the E-TWG and F-TWG, using the experiences in Europe to help inform that process as well as experiences from decommissioning of oil and gas installations and other offshore wind developments on the eastern seaboard of the United States.

7.2. Approach for developing a decommissioning plan and coordination with stakeholders

This section should describe how a decommissioning plan will be developed to identify and mitigate potential impacts, including coordination with stakeholders, and any elements of its contemplated decommissioning plan that can be identified at this stage.

- Equinor Wind will decommission the project in accordance with all necessary laws and regulations and generate a detailed Project-specific decommissioning plan.
- Equinor Wind will seek input on the detailed project-specific decommissioning plan from regulatory agencies, fisheries and marine stakeholders, and local communities.
- Equinor Wind will use “lessons learned” from the construction and operations activities and apply them when appropriate to the decommissioning plan.
- Additionally:
 - Equinor Wind has and will continuously evaluate and improve this EMP so that all the components of the EMP are complete and sufficient, including the decommissioning plan.

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- Equinor Wind expects that additional guidance and information will become available throughout the planning and regulatory process and will continue to consider its relevance to the EMP at the appropriate intervals.

8. Additional Considerations

8.1. Additional mitigation strategies and EMP refinement

This section should describe any additional mitigation strategies not otherwise described herein that would improve the Plan and reduce impacts on the environment. In addition, describe how the EMP will be updated and refined based on additional information and stakeholder feedback.

- Equinor Wind will support collaborative research on potential mitigation strategies and best management practices, with other developers, agencies, and stakeholders.
- Additionally:
 - Equinor Wind will continue to monitor new and novel approaches to mitigation in the offshore wind industry both in the US and from Equinor's existing offshore wind farms and developments elsewhere in the world, including the forums and networks in which Equinor Wind participates.

8.2. Process for updating the EMP

This section should describe how feedback from the fishing industry stakeholders, F-TWG, and other agencies and working groups will be incorporated and updated in the EMP.

- Updates to the EMP are intended to reflect the results of iterative exchanges with members of the E-TWG, F-TWG, and relevant stakeholders.
- Additionally:
 - Equinor Wind has and will continuously evaluate and improve this EMP so that all the components of the EMP are complete and sufficient.
 - Equinor Wind expects that additional guidance and information will become available throughout the planning and regulatory process and as such will continue to consider its relevance to the EMP at the appropriate intervals.
 - Currently Equinor Wind is working with the E-TWG in establishing a process for updating the EMP, where formal updates will likely occur after major project milestones (e.g., NOI).