Sunrise Wind - Appendix F: Analysis of Incomplete or Unavailable Information

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Appendix F: Analysis of Incomplete or Unavailable Information

In accordance with Section 1502.21 of the CEQ regulations implementing NEPA, when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and when information is incomplete or unavailable, the agency shall make clear that such information is lacking. When incomplete or unavailable information was identified, BOEM considered whether the information was relevant to the assessment of impacts and essential to its analysis of alternatives based upon the resource analyzed. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information and if the cost of obtaining it was exorbitant. If it could not be obtained or if the cost of obtaining it was exorbitant, BOEM applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the offshore wind industry may not be available for years, and certainly not within the contemplated timeframe of this NEPA process. However, if this information is essential for a reasoned decision, subject matter experts have used the scientifically credible information available and generally accepted scientific methodologies to evaluate impacts on the resources while this information is unavailable.

1.1 Incomplete or Unavailable Information Analysis for Resource Areas

1.1.1 Air Quality

Although a quantitative emissions inventory analysis of the region, or regional modeling of pollutant concentrations, over the next 35 years would more accurately assess the overall impacts of the changes in emissions from the Project, any action alternative would lead to reduced emissions regionally and can only lead to a net improvement in regional air quality. The differences among action alternatives with respect to direct emissions due to construction, O&M, and decommissioning of the Project are expected to be small. As such, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to the use of the offshore portions of the Wind Farm Area and offshore export cable route corridor. Therefore, BOEM does not believe that there is incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

1.1.2 Bats

There will always be some level of incomplete information on the distribution and habitat use of bats in the offshore portions of the Wind Farm Area, as habitat use and distribution varies among seasons and species. Additionally, because U.S. offshore wind development is in its infancy, with only two offshore wind projects having been constructed at the time of this analysis, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the Wind Farm Area. However, sufficient information on collision risk to bats observed at land-based U.S. wind projects exists and was used to analyze and corroborate the potential for this impact as a result of the proposed Project. In addition, as described in Section 3.5.1, the likelihood of a bat encountering an operating WTG during migration is very low and, therefore, the differences among

action alternatives with respect to bats for the Project are expected to be small. As such, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related distribution and use of the offshore portions of the Wind Farm Area as well as to the potential for collision risk of bats. Therefore, BOEM does not believe that there is incomplete or unavailable information on bat resources that is essential to a reasoned choice among alternatives.

1.1.3 Benthic Resources

Although there is uncertainty regarding the spatial and temporal distribution of benthic (faunal) resources and periods during which they might be especially vulnerable to disturbance, Sunrise Wind's surveys of benthic resources and other broad-scale studies (Guida et al. 2017; Inspire 2021) provided a suitable basis for generally predicting the species, abundances, and distributions of benthic resources within the geographic analysis area. Uncertainty also exists regarding the impact of some IPFs on benthic resources. For example, specific stimulus-response related to acoustics and EMF is not well studied, although there is some emerging information from benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States that allows for a broad understanding of the impacts. Similarly, specific secondary impacts, such as changes in diets throughout the food chain resulting from habitat modification and synergistic behavioral impacts from multiple IPFs, are not fully known. Again, results of benthic monitoring at European wind facilities and the Block Island Wind Farm in the United States provide general knowledge of the overall impacts of these IPFs combined, if not individually. Therefore, the analysis provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to the overall impacts. For these reasons, BOEM does not believe that there is incomplete or unavailable information on benthic resources that is essential to a reasoned choice among alternatives.

1.1.4 Birds

Habitat use and distribution of marine birds varies between seasons, species, and years and, as a result, there will always be some level of incomplete information on the distribution and habitat use of marine birds in the offshore portions of the geographic analysis area. However, avian survey findings by that cover the Project (see Sunrise Wind COP, Appendix P, Sunrise Wind 2022) were used to inform the predictive models and analyze the potential adverse impacts on bird resources in the EIS. In addition, because U.S. offshore wind development is in its infancy, there will always be some level of uncertainty regarding the potential for collision risk and avoidance behaviors for some of the bird species that may be present within the offshore portions of the geographic analysis area. In place of this information, subject matter experts used the data and assumptions described below and in the EIS to create models to evaluate impacts, where it was determined that the information was essential for reasoned decision-making. Bird mortality data are available for onshore wind facilities and, based on a number of assumptions regarding their applicability to offshore environments, were used to inform the analysis of bird mortality associated with the offshore WTGs analyzed in the EIS. However, uncertainties exist regarding the use of the onshore bird mortality rate to estimate the offshore bird mortality rate due to differences in species groups present and life history and behavior of species as well as differences in the offshore marine environment compared to onshore habitats. Modeling is commonly used to predict the potential mortality rates for marine bird species in Europe and the United States (BOEM 2015, 2021b). Due to inherent data limitations, these models often represent only a subset of species

potentially present. However, the datasets used by both Sunrise Wind and BOEM to assess the potential for exposure of marine birds to the Wind Farm Area represent the best available data and provide context at both local and regional scales. Furthermore, sufficient information on collision risk and avoidance behaviors observed in related species at European offshore wind projects is available and was used to analyze and corroborate the potential for these impacts as a result of the proposed Project (e.g., Petersen et al. 2006; Skov et al. 2018). As such, the analysis provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to distribution and use of the offshore portions of the geographic analysis area as well as to the potential for collision risk and avoidance behaviors in bird resources. Furthermore, the similarity between the layouts analyzed for the different action alternatives does not render any of this incomplete and unavailable information essential to a reasoned choice among alternatives. Therefore, BOEM does not believe that there is incomplete or unavailable information on avian resources that is essential to a reasoned choice among alternatives.

1.1.5 Coastal Habitat and Fauna

Although the preferred habitats of terrestrial and coastal fauna are generally known, specific data on abundances and distributions within the geographic analysis area of various fauna within these habitats are likely to remain unknown without site-specific surveys. However, the species inventories and other general information about the area provide an adequate basis for evaluating the fauna likely to inhabit the onshore geographic analysis area. Additionally, the onshore activities proposed involve only common, industry-standard activities, and would occur almost exclusively within existing rights-of-way, for which impacts are generally understood. Therefore, BOEM believes that the analysis provided in this EIS is sufficient to make a reasoned choice among the alternatives.

1.1.6 Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed in the context of an incomplete understanding of fish stock dynamics and effects of environmental factors on fish populations. The commercial fisheries information used in this assessment has limitations. For example, vessel trip report data are only an approximation because this information is self-reported and may not account for all trips. The vessel trip report data also do not include all commercial fishing operations that may be affected by the Proposed Action and only represent vessel logbook data for species managed by the Greater Atlantic Regional Fisheries Office. While these data include incidental catch of Atlantic menhaden, highly migratory species, or species managed by the NMFS Southeast Regional Office (e.g., wahoo and mahi mahi) when targeting other species, they are not a subset of total catch of these species within the Lease Area. Additionally, available historical data lack consistency, making comparisons challenging.

VMS data are also limited, with a number of factors contributing to their limitations.

- VMS coverage is not universal for all fisheries, with some fisheries (summer flounder, scup, black sea bass, bluefish, American lobster, spiny dogfish, skate, whiting, and tilefish) not covered at all by VMS.
- There is limited historical coverage for most fisheries (e.g., monkfish is optional and elective on a yearly basis, 2005 or earlier for herring, 2006 for groundfish and scallops, 2008 for surfclams/ocean quahogs, 2014 for mackerel, and 2016 for longfin squid/butterfish).
- Trip declaration does not necessarily correspond to actual operation.

- Hourly position pings limit area resolution based on speed.
- Fishing time/location can be mis-estimated by operational assumptions (speed and direction) that are affected by externalities (weather, sea state, mechanical issues).
- Catch data are limited for there is no information on catch rates, retained catch composition is limited to target species and some bycatch species, and the data are not universal.
- Catch information is for the full trip, not sub-trips.
- Not all information is collected from all fisheries (gear type).

However, these data represent the best available data, and sufficient information exists to support the findings presented in this EIS.

1.1.7 Cultural Resources

Due to the size of the offshore remote-sensing survey areas in the marine APE, the full extent or size of individual ancient submerged landforms cannot be defined. As such, differences among alternatives with respect to cultural resources cannot be fully known. However, Sunrise Wind has committed to avoiding ancient submerged landforms and, if they cannot be avoided, BOEM will specify mitigation in the ROD to resolve adverse effects on the ancient submerged landforms. Several potential submerged archaeological resources were identified within the remote-sensing survey area of the marine APE, but these resources were not definitively determined to be archaeological resources. However, these resources are assumed to be eligible, and Sunrise Wind will avoid most of the resources as well as a 50-meter buffer around each resource. As a result, despite there being data gaps related to the specific nature of the potential submerged archaeological resources, there is sufficient information available to avoid these resources, or to minimize or mitigate impacts if they cannot be avoided.

1.1.8 Demographics, Employment, and Economics

Sunrise Wind's economic analysis estimated the employment and outputs for the Proposed Action. This provided sufficient information for the evaluation of demographics, employment, and economics to support a reasoned choice among alternatives. There is some inherent uncertainty in forecasting how economic variables in various areas will evolve over time. However, the differences among action alternatives with respect to demographics, employment, and economics are not expected to be significant. Therefore, BOEM does not believe that there is specific incomplete or unavailable information on demographics, employment, and economics that is essential to a reasoned choice among alternatives.

1.1.9 Environmental Justice

Evaluations of impacts on environmental justice communities rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities.

As discussed in other sections, BOEM has determined that incomplete and unavailable resource information for environmental justice or for other resources on which environmental justice

communities rely was either not relevant to assess reasonably foreseeable significant adverse impacts, was not essential to a reasoned choice among alternatives, alternative data or methods could be used to predict potential impacts and provided the best available information, or the overall costs of obtaining the information were exorbitant or the means to do so were unknown. Therefore, the information provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the geographic analysis area. Furthermore, the differences among action alternatives with respect to environmental justice are not expected to be significant.

1.1.10 Finfish, Invertebrates, and Essential Fish Habitat

Although there is some uncertainty regarding the spatial and temporal distribution of finfish and invertebrate resources and periods during which they might be especially vulnerable to disturbance, Sunrise Wind's benthic resource surveys (e.g., Inspire 2021) and other broad-scale studies (e.g., Guida et al. 2017) provided a suitable basis for general predictions of finfish and invertebrate resources with respect to species, densities, and distributions within the geographic analysis area. Additional information related to ESA-listed species and EFH will be addressed in the forthcoming BA and EFH Assessment. While impacts on these specific finfish and invertebrate species are not anticipated to vary from the general impacts provided in the EIS, specific impact discussion for ESA-listed species and EFH will be provided in the BA and EFH Assessment.

Uncertainty also exists regarding the impact of some IPFs on invertebrate resources, such as the effects of EMFs and underwater noise (e.g., generated from pile driving). The available information on invertebrate sensitivity to EMF is equivocal (Hutchinson et al. 2020), and sensitivity to sound pressure and particle motion effects is not well understood for many species, nor are synergistic or antagonistic impacts from multiple IPFs. Similarly, specific secondary impacts such as changes in diets throughout the food chain resulting from habitat modification are not well known for finfish and invertebrates. Where applicable, the assessment drew upon information in the available literature and an increasing number of monitoring and research studies related to wind development, other undersea development, or artificial reefs in Europe and the United States, several of which were recently drafted or published. These monitoring studies help provide a broad understanding of the overall impacts of these IPFs combined, if not individually. In addition, the forthcoming BA and EFH Assessment will include monitoring that will provide additional data with respect to potential impacts of the IPFs.

Impacts to marine ichthyoplankton due to operation of the proposed offshore converter station, which would require cooling water to be withdrawn from the lower portion of the water column and potential entrainment of fish eggs and larvae, were estimated based on density data obtained from the NOAA National Centers for Environmental Information (NECI) electronic database as well as operational parameters specified in the COP. The database includes data collected by NOAA's Marine Resource Monitoring, Assessment, and Prediction program from 1977-1987 and by the Ecosystem Monitoring program from 1995 through 2017 throughout the North Atlantic region. Due to the large temporal and spatial scale of these surveys, there remains some uncertainty regarding the actual densities of ichthyoplankton in the vicinity of the proposed SRWF offshore converter station. In addition, eggs are not identified to the species level in the NOAA programs, so there remains uncertainty regarding the overall impacts resulting from the water withdrawals.

For these reasons, the information provided in this EIS is sufficient to support sound scientific judgments and informed decision-making related to the overall impacts. Therefore, BOEM does not believe that there is incomplete or unavailable information on finfish, invertebrate, and EFH resources that is essential to a reasoned choice among alternatives.

1.1.11 Land Use and Coastal Infrastructure

There is no incomplete or unavailable information related to the analysis of impacts on land use and coastal infrastructure.

1.1.12 Marine Mammals

NMFS has summarized the most current information about marine mammal population status, occurrence, and use of the region in its 2019 stock status report for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2020, 2021). These studies provided a suitable basis for predicting the species, abundances, and distributions of marine mammals in the geographic analysis area. However, population trend data from NMFS are unavailable for 14 species, and annual human-caused mortality is unknown for five species (see Table F-1). The majority of species lacking population trend data are offshore species, such as blue whale, fin whale, and non-porpoise odontocetes (e.g., beaked whales and dolphins). As a result, there is uncertainty regarding how Project activities and cumulative effects may affect these populations. In addition to species distribution information, effects of some IPFs on marine mammals are also uncertain or ambiguous, as described below.

Potential effects of EMF have not been scaled to consider impacts on marine mammal populations or their prey in the geographic analysis area (Taormina et al. 2018). The widespread ranges of marine mammals and difficulty obtaining permits make experimental studies challenging. As a result, no scientific studies have been conducted that examine the effects of altered EMF on marine mammals. However, although scientific studies summarized by Normandeau et al. (2011) demonstrate that marine mammals are sensitive to, and can detect, small changes in magnetic fields, potential impacts would likely only occur within a few feet of cable segments. The current literature does not support a conclusion that EMF could lead to changes in behavior that would cause significant adverse effects on marine mammal populations.

The behavioral effects of anthropogenic noises on marine mammals are increasingly being studied; however, behavioral responses vary depending on a variety of factors such as life stage, previous experience, and current behavior (e.g., feeding, nursing) and are therefore difficult to predict. In addition, the current NMFS disturbance criteria apply a single threshold for all marine mammals for impulsive noise sources and do not consider the overall duration, exposure, or frequency distribution of the sound to account for species-dependent hearing acuity. While elevated underwater sound could startle or displace animals, behavioral responses are not necessarily predictable from source levels alone (Southall et al. 2007).

In addition, research regarding the potential behavioral effects of pile-driving noise has generally focused on harbor porpoises and seals; studies that examine the behavioral responses of baleen whales to pile driving are absent from the literature. Of the available research, most studies conclude that, although pile-driving activities could cause avoidance behaviors or disruption of feeding activities, individuals would likely return to normal behaviors once the activity had stopped. However, uncertainty

remains regarding the long-term cumulative acoustic impacts associated with multiple pile-driving projects that may occur over a number of years. This also applies to other project activities such as vessel movements, HRG surveys, geotechnical drilling, and dredging activities that may elicit behavioral reactions in marine mammals. As a result, it is not possible to predict with certainty the potential long-term behavioral effects on marine mammals from Project-related pile driving or other activities, as well as ongoing concurrent and cumulative pile driving and other activities.

To address this uncertainty, the assessment used the best available information when considering behavioral effects related to underwater noise. To better characterize these impacts, the behavioral response severity scores developed by Southall et al. (2021) were used in conjunction with the NMFS disturbance threshold, as described in Section 3.5.6. For the assessment of large baleen whales, studies on other impulsive noises (e.g., seismic sources) were used to inform the potential behavioral reactions to pile-driving noise. Monitoring studies would provide insight into species-specific behavioral reactions to Project-generated underwater noise. Long-term monitoring of concurrent and multiple projects could inform the understanding of long-term effects and subsequent consequences from cumulative underwater noise activities on marine mammal populations.

There is a lack of research regarding the responses of large whale species to extensive networks of new structures due to the novelty of this type of development on the Atlantic OCS. Although new structures are anticipated from multiple offshore wind projects under the planned activities scenario, it is expected that spacing will allow large whales to access areas within and between wind facilities. No physical obstruction of marine mammal migration routes or habitat areas are anticipated, but whether avoidance of offshore wind lease areas will occur due to new structures is unknown. Additionally, while there is some uncertainty regarding how hydrodynamic changes around foundations may affect prey availability, these changes are expected to have limited impacts on the local conditions around WTG foundations. The potential consequences of these impacts on marine mammals of the Atlantic OCS are unknown. Monitoring studies would provide insight into species-specific avoidance behaviors and other potential behavioral reactions to Project structures.

At present, this EIS has no basis to conclude that these IPFs would result in significant adverse impacts on marine mammal populations.

BOEM determined that the overall costs of obtaining the missing information for or addressing these uncertainties are exorbitant, or the means to obtain it are not known. Therefore, to address these gaps as described above, BOEM extrapolated or drew assumptions from known information for similar species and studies using acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information, as presented in Section 3.5.6 and in the BA submitted to NMFS (BOEM 2022). The information and methods used to predict potential impacts on marine mammals represent the best available information, and the information provided in this EIS is sufficient to support sound scientific judgments and informed decision-making. Therefore, BOEM does not believe that there is incomplete or unavailable information on marine mammal resources that is essential to a reasoned choice among alternatives.

Table F - 1 **Marine Mammal Species Documented, or Likely to Occur, in the Project Area and their Status, Population, Abundance, Seasonal Occurrence, Critical Habitat Near the Offshore Project Area, Stock, Best Population Estimate, Population Trend, Annual Caused Mortality, Effects of Human-caused Mortality, and Source of Population and Mortality Data**

Common Name	Scientific Name	ESA/MMPA[1] Status	Occurrence in Northwest-Atlantic OCS[2]	Annual Peak Occurrence in the Northwest-Atlantic OCS[11]	Seasonal Occurrence in Marine Mammal Project Area[3]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Best Population Estimate from SAR[5]	Population Trend[6]	Annual Human-Caused Mortality[7]	Effects of Human-Caused Mortality[8]	Reference for Population & Mortality Data
Fin whale	*Balaenoptera physalus*	endangered/ strategic	common	year-round	spring, summer, fall (possibly year-round)	Not yet designated	Western North Atlantic	6,802	unavailable	2.35	significant	Hayes et al. (2021)
Humpback whale	*Megaptera novaeangilae*	delisted/none	common	year-round (winter–spring)	spring, summer, fall (possibly year-round)	N/A	Gulf of Maine	1,396	+2.8%/year	15.25	significant	Hayes et al. (2021)
North Atlantic right whale	*Eubalaena glacialis*	endangered/ strategic	common	year-round (winter–spring)	year-round	No[13]	Western North Atlantic	412	decreasing	8.15	significant	Hayes et al. (2021)
Sei whale	*Balaenoptera borealis*	endangered/ strategic	regular	year-round (spring)	spring, summer	Not yet designated	Nova Scotia	6,292	unavailable	1.2	significant	Hayes et al. (2021)
Minke whale	*Balaenoptera acutorostrata*	none/none	common	year-round (summer–fall)	spring, summer, winter (possibly year-round)	N/A	Canadian East Coast	21,968	unavailable	10.55	insignificant	Hayes et al. (2021)
Mid-frequency Cetaceans												
Sperm whale	*Physeter macrocephalus*	endangered/ strategic	regular	year-round (summer–fall)	spring, summer, fall	Not yet designated	North Atlantic	4,349[10]	unavailable	unknown	unknown	Hayes et al. (2020)
Short-finned pilot whale	*Globicephala macrorhynchus*	none/strategic	common	year-round	year-round	N/A	Western North Atlantic	28,924	unavailable	unknown	unknown	Hayes et al. (2020)
Long-finned pilot whale	*Globicephala melas*	none/strategic	common	year-round (spring–summer)	year-round	N/A	Western North Atlantic	39,215	unavailable	21	insignificant	Hayes et al. (2020)
Risso's dolphin	*Grampus griseus*	none/none	common	year-round (spring–fall)	year-round	N/A	Western North Atlantic	35,493[10]	unavailable	53.9	significant	Hayes et al. (2020)
Short-beaked common dolphin	*Delphinius delphis*	none/none	common	year-round (summer–fall)	fall, winter (possibly year-round)	N/A	Western North Atlantic	172,974	unavailable	399	significant	Hayes et al. (2020)
Atlantic white-sided dolphin	*Lagenorhynchus acutus*	none/none	regular	year-round (spring–fall)	winter	N/A	Western North Atlantic	93,233	unavailable	26	insignificant	Hayes et al. (2020)
Atlantic spotted dolphin	*Stenella frontalis*	none/none	regular	spring–fall	summer, fall	N/A	Western North Atlantic	39,921	decreasing[9]	unknown	unknown	Hayes et al. (2020)
Common bottlenose dolphin (coastal)[8]	*Tursiops truncatus*	none/strategic	common	year-round	year-round (most frequently in spring and summer)	N/A	Western North Atlantic, Northern Migratory Coastal	3,751	decreasing	unknown	unknown	Hayes et al. (2021)

Table F - 1 ***(continued)***

Common Name	Scientific Name	ESA/MMPA[1] Status	Occurrence in Northwest-Atlantic OCS[2,4]	Annual Peak Occurrence in the Northwest-Atlantic OCS[11]	Seasonal Occurrence in Marine Mammal Project Area[3]	Critical Habitat in Area of Direct Effects	Stock (NMFS)	Best Population Estimate from SAR[5]	Population Trend[6]	Annual Human-Caused Mortality[7]	Effects of Human-Caused Mortality[8]	Reference for Population & Mortality Data
Common bottlenose dolphin (offshore)[8]	*Tursiops truncatus*	none/none	common	year-round	year-round (most frequently in spring and summer)	N/A	Western North Atlantic, Offshore	62,851	unavailable	28	insignificant	Hayes et al. (2020)
High-frequency Cetaceans												
Harbor porpoise	*Phocoena phocoena*	none/none	common	year-round (fall–spring)	winter (possibly during spring and summer)	N/A	Gulf of Maine-Bay of Fundy	95,543	unavailable	150	significant	Hayes et al. (2021)
Phocid Pinnipeds												
Harbor seal[8]	*Phoca vitulina concolor*	none/none	common	year-round (fall–spring)	spring, fall, winter	N/A	Western North Atlantic	75,834	unavailable	150	significant	Hayes et al. (2021)
Gray seal[8]	*Halichoerus grypus*	none/none	common	year-round	spring, fall	N/A	Western North Atlantic	451,431	increasing	5,410	significant	Hayes et al. (2021)

Notes:
[1] The MMPA defines a "strategic" stock as a marine mammal stock (a) for which the level of direct human-caused mortality exceeds the potential biological removal level; (b) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the ESA within the foreseeable future; (c) which is listed as a threatened or endangered species under the ESA; or (d) is designated as depleted.
[2] Data from NEFSC and SEFSC (2018) and Davis et al. (2020).
[3] Seasons are depicted as follows: spring (March–May); summer (June–August); fall (September–November); winter (December–February).
[4].The species known to occur in the Project area and vicinity, and expected to occur in the survey area, are addressed based on their reported occurrence of rare to regular (i.e., common).
[5] Best population estimates reported in the 2020 stock assessment report and most recently updated 2020 draft stock assessment report (Hayes et al. 2020, 2021).
[6] Increasing = beneficial trend, not quantified; Decreasing = adverse trend, not quantified; Unavailable = population trend analysis not conducted on this species.
[7] Data based on Hayes et al. 2020, 2021; Waring et al. 2007; and Kenney and Vigness-Raposa 2010.
[8] Data based on Hayes et al. 2020, 2021; Waring et al. 2007; and Kenney and Vigness-Raposa 2010. Reflects human-caused mortality from all known sources, including fishing-related, vessel collisions, and other/unspecified. Per cited reference.
[10] Density models (Palka et al. 2017) predicted that typically deep-water species such as Risso's dolphins and sperm whales are present at very low densities in offshore edges of several wind energy study areas that are either close to the OCS break or extend into deeper waters.
[11] Kenney and Vigness-Raposa (2010)
[12] Kenney and Vigness-Raposa (2010) and NEFSC and SEFSC (2018) and Davis et al. (2020).
[13] Critical habitat areas approximately 260 miles north of the marine mammal geographic analysis area: Cape Cod Bay, Stellwagen Bank, and the Great South Channel and calving areas off Cape Canaveral, FL to Cape Fear, NC
FL = Florida; N/A = not applicable; NC = North Carolina; SAR = stock assessment report

1.1.13 Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the EIS is based on 1 year's (July 1, 2018, to June 30, 2019) AIS data from vessels required to carry AIS (i.e., those 65 feet [19.8 meters] or greater in length), as well as VMS data (to infer commercial fishing and recreational vessel transits). Fishing vessels at least 65 feet long were not required to carry AIS until March 2015 (80 Federal Register 5282); therefore, AIS data prior to March 2015 are more limited than data available after March 2015. To account for some gaps in the data due to limitations of the AIS carriage requirements, additional vessel transits were added to the risk modeling to account for both current and future traffic not represented in the data. For example, the number of non-AIS commercial fishing transits was estimated by scaling port departures of AIS-carrying commercial fishing vessels per the ratio of registered commercial fishing vessels not required to carry AIS (less than 65 feet in length) (Sunrise Wind COP, Appendix X; Sunrise Wind 2022).

The combination of AIS and VMS data described above with informed assumptions about smaller vessel numbers represents the best available vessel traffic data and is sufficient to enable BOEM to make a reasoned choice among alternatives.

As stated in Section 3.6.6, WTG and OSS structures could potentially interfere with marine radars. Marine radars have varied capabilities and the ability of radar equipment to properly detect objects is dependent on radar type, equipment placement, and operator proficiency; however, trained radar operators, properly installed and adjusted vessel equipment, marked wind turbines, and the use of AIS all would enable safe navigation with minimal loss of radar detection (USCG 2020). Based on the foregoing, BOEM does not believe that there is incomplete or unavailable information on navigation and vessel traffic that is essential to a reasoned choice among alternatives.

1.1.14 Other Uses

There is no incomplete or unavailable information related to the analysis of impacts on other uses.

1.1.15 Recreation and Tourism

Evaluations of impacts on recreation and tourism rely on the assessment of impacts on other resources. As a result, incomplete or unavailable information related to other resources, as described in this document, also affect the completeness of the analysis of impacts on recreational tourism. BOEM has determined that incomplete and unavailable resource information for recreation and tourism or for other resources on which the analysis of recreation and tourism impacts rely was either not relevant to reasonably foreseeable significant adverse impacts, was not essential to a reasoned choice among alternatives, alternative data or methods could be used to predict potential impacts and provided the best available information, or the overall costs of obtaining the information were exorbitant or the means to do so were unknown. Therefore, the information provided in the EIS is sufficient to support sound scientific judgments and informed decision-making related to the proposed uses of the onshore and offshore portions of the geographic analysis area.

1.1.16 Sea Turtles

There is incomplete information on the distribution and abundance of sea turtle species that occur in the Atlantic OCS and the Lease Area. The NMFS BA (BOEM 2022) provides a thorough overview of the available information about potential species occurrence and exposure to Project-related IPFs. The studies summarized therein provide a suitable basis for predicting potential species occurrence, relative abundance, and probable distribution of sea turtles in the geographic analysis area.

Some uncertainty exists about the effects of certain IPFs on sea turtles and their habitats. The effects of EMF on sea turtles are not completely understood. However, the available relevant information is summarized in the BOEM-sponsored report by Normandeau et al. (2011). Although the thresholds for EMF disturbing various sea turtle behaviors are not known, the evidence suggests that impacts may only occur on hatchlings over short distances, and no adverse effects on sea turtles have been documented to occur from the numerous submarine power cables around the world. In addition, no nesting beaches, critical habitat, or other biologically important habitats were identified in the offshore export cable corridor.

There is also uncertainty about sea turtle responses to proposed Project construction activities, and data are not available to evaluate potential changes to movements of juvenile and adult sea turtles due to elevated suspended sediments. However, although some exposure may occur, total suspended solid impacts would be limited in magnitude and duration and would occur within the range of exposures periodically experienced by these species. On this basis, any resulting impact on sea turtle behavior due to sediment plumes would likely be too small to be biologically meaningful, and no adverse impacts would be expected (NOAA 2020). Some potential exists for sea turtle displacement, but it is unclear if this would result in adverse impacts (e.g., because of lost foraging opportunities or increased exposure to potentially fatal vessel interactions). Additionally, it is currently unclear whether concurrent construction of multiple projects, increasing the extent and intensity of impacts over a shorter duration, or spreading out project construction with lower-intensity impacts over multiple years would result in the least potential harm to sea turtles. There is also uncertainty regarding the cumulative acoustic impacts associated with pile-driving activities. It is unknown whether sea turtles affected by construction activities would resume normal feeding, migrating, or breeding behaviors once daily pile-driving activities cease, or if secondary impacts would continue. Under the planned activities scenario, individual sea turtles may be exposed to acoustic impacts from multiple projects in a single day or from one or more projects over the course of multiple days. Although the consequences of these exposure scenarios have been analyzed with the best available information, some level of uncertainty remains due to the lack of observational data on species' responses to pile driving.

Some uncertainty exists regarding the potential for sea turtle responses to FAA hazard lights and navigation lighting associated with offshore wind development. Sunrise Wind would limit lighting on WTGs and OSS to minimum levels required by regulation for worker safety, navigation, and aviation. Although sea turtles' sensitivity to these minimal light levels is unknown, sea turtles do not appear to be adversely affected by oil and gas platform operations, which produce far more artificial light than offshore wind structures. The placement of new structures would be far from nesting beaches, so no impacts on nesting female or hatchling sea turtles are anticipated.

Considerable uncertainty exists about how sea turtles would interact with the long-term changes in biological productivity and community structure resulting from the reef effect of offshore wind farms across the geographic analysis area. Artificial reef and hydrodynamic impacts could influence predator-prey interactions and foraging opportunities in ways that influence sea turtle behavior and distribution. Also, the extent of sea turtle entanglement on artificial reefs and shipwrecks is not captured in sea turtle stranding records and the significance and potential scale of sea turtle entanglement in lost fishing gear are not quantified. These impacts are expected to interact with the ongoing influence of climate change on sea turtle distribution and behavior over broad spatial scales, but the nature and significance of these interactions are not predictable. BOEM anticipates that ongoing monitoring of offshore energy structures will provide some useful insights into these synergistic effects.

BOEM considered the level of effort required to address the uncertainties described above for sea turtles and determined that the methods necessary to do so are lacking or the associated costs would be exorbitant. Therefore, where appropriate, BOEM inferred conclusions about the likelihood of potential biologically significant impacts from available information for similar species and situations to inform the analysis in light of this incomplete or unavailable information. These methods are described in greater detail in Section 3.5.7, Sea Turtles, and in the BA submitted to NMFS (BOEM 2022). Therefore, the analysis provided is sufficient to support sound scientific judgments and informed decision-making about the proposed Project with respect to its impacts on sea turtles. For these reasons, BOEM does not believe that there is incomplete or unavailable information on turtles that is essential to a reasoned choice among alternatives.

1.1.17 Scenic and Visual Resources

No incomplete or unavailable information related to the analysis of impacts on scenic and visual resources was identified.

1.1.18 Water Quality

No incomplete or unavailable information related to the analysis of impacts on water quality was identified.

1.1.19 Wetlands

No incomplete or unavailable information related to the analysis of impacts on wetlands was identified.

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