

Appendix D. Analysis of Incomplete or Unavailable Information

In accordance with Section 1502.21 of the Council on Environmental Quality (CEQ) regulations implementing the National Environmental Policy Act (NEPA), when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an Environmental Impact Statement (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, the U.S. Department of the Interior, Bureau of Ocean Energy Management (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. In its place, 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.

D.1. Incomplete or Unavailable Information Analysis for Resource Areas

D.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, operations and maintenance (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 potential air quality and climate impacts of the Project. Therefore, BOEM does not believe that there is incomplete or unavailable information on air quality that is essential to a reasoned choice among alternatives.

D.1.2 Bats

Habitat use and distribution varies between season and species, and, as a result, there will always be some level of incomplete information on the distribution and habitat use of bats in both the onshore and offshore portions of the analysis area. Additionally, there is some level of uncertainty regarding the potential collision risk to individual bats that may be present within the offshore portions of the analysis area, as the U.S offshore wind is a new industry with only two offshore wind projects having been constructed at the time of this analysis. However, sufficient information on collision risk to bats observed at land-based U.S. wind projects exists, and it was used along with empirical data, including regional bat acoustic studies conducted from coastal, island, vessel, or offshore structure locations and regional telemetry data from recent studies focusing on listed species, to assess the likelihood of offshore occurrence, seasonal patterns, and bat species composition (see Appendix O-1 of the Construction and Operations Plan [COP]; Dominion Energy 2022). Dominion Energy is conducting Acoustic Thermographic Offshore Monitoring of birds and bats as part of the CVOW-Pilot Project adjacent to the commercial lease area to advance the understanding of avian and bat activity offshore. As described in Section 3.5 of the EIS, the likelihood of an individual bat encountering an operating wind turbine

generator (WTG) during migration is low and, therefore, the differences among action alternatives with respect to bats for the Project are expected to be small. Dominion Energy has consulted with state and federal agencies and will conduct presence/absence surveys (acoustic and/or mist-net) for bats along portions of the Interconnection Cable Route Alternatives that will require tree removal beginning in May 2022 to better understand bat presence in the Onshore Project Area. As such, the analysis provided in the Final EIS is sufficient to support sound scientific judgments and informed decision-making related to the distribution and use of the onshore and offshore portions of the analysis area as well as to the potential for collision risk of bats. Therefore, in light of the data currently being collected and data planned to be collected, BOEM does not believe that there is incomplete or unavailable information on bat resources that is essential to a reasoned choice among alternatives.

D.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, Dominion's surveys of benthic resources and BOEM studies (COP, Appendix D, Dominion Energy 2022; BOEM 2012; BOEM 2015) 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 impact-producing factors (IPFs) on benthic resources. For example, specific stimulus-response related to acoustics and electromagnetic fields (EMFs) is not well studied, although there is some information from benthic monitoring at the Block Island Wind Farm and other studies (Hutchinson et al. 2018; PNNL 2013; Love et al. 2015, 2016) 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 the Block Island Wind Farm 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.

D.1.4 Birds

There is incomplete information on the exact migratory routes of passerines and shore birds that fly over the Atlantic Outer Continental Shelf (OCS) (including those that fly at night) where some may fly overland or along the coast before crossing the ocean. In addition, there will always be some level of incomplete information on the distribution and habitat use of marine birds in the offshore portions of the analysis area, as habitat use and distribution varies between season, species, and years. However, a risk assessment framework was used to quantitatively evaluate adverse impacts of the Project on bird resources in the geographic analysis area (Section 3.7 of the EIS). The risk assessment utilized a weight-of-evidence approach and combined an assessment of exposure and behavioral vulnerability (including both displacement and collision) within the context of the literature to establish potential risk (see Appendix O-1 of the COP; Dominion Energy 2022). In addition, because U.S. offshore wind is a new industry, as described above for bats, there will 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 analysis area until information can be gained from operational projects.

Similarly, the U.S. Fish and Wildlife Service (USFWS) Biological Assessment (BA) (BOEM 2022) also provides a qualitative analysis of collision risk for the Project because relatively few individual birds from each of the listed species are likely (if at all) to enter into the proposed wind farm. Further, 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; see Appendix O-1 of the

COP; Dominion Energy 2022). 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 analysis area as well as to the potential for collision risk and avoidance behaviors in bird resources. Further, the similarity between the WTG layouts analyzed for the different 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.

D.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 for which impacts are generally understood. Therefore, BOEM believes that the analysis provided in Section 3.8 of the EIS is sufficient to make a reasoned choice among the alternatives.

D.1.6 Commercial Fisheries and For-Hire Recreational Fishing

Fisheries are managed using a number of assumptions due to a partial understanding of fish stock dynamics and effects of environmental factors on fish populations. The commercial fisheries information used in this assessment has additional limitations including, but not limited to, reliance on self-reported fishery-dependent data and lack of economic baseline data. Vessel trip report data only provide an approximation because this information is self-reported and may not account for all trips. Available historical fisheries data lack consistency, making comparisons challenging. However, these data represent the best available data, and, in combination with other fisheries-dependent and independent data, sufficient information exists to support the findings presented in this EIS.

Recent annual revenue exposed for for-hire recreational fishing deriving directly from the Lease Area is also not currently available, although the majority of effort is centered around the triangle reefs area. The economic analysis conducted by BOEM of recreational for-hire boats, as well as for-hire and private-boat angler trips that might be affected by the overall Virginia Wind Energy Area (WEA), including the Lease Area, was conducted for 2007–2012 (Kirkpatrick et al. 2017). Although these data are presented in the COP and used for impact determinations in Section 3.9, updated data for the period of 2013 to the present are not explicitly available for the Lease Area. Using this study, coupled with recreational fishing surveys (e.g., the National Oceanic and Atmospheric Administration’s [NOAA] Marine Recreational Information Program), BOEM does not believe that there is incomplete or unavailable information on commercial fisheries and for-hire recreational fishing resources that is essential to a reasoned choice among alternatives.

D.1.7 Cultural Resources

BOEM requires detailed information regarding the nature and location of historic properties that may be affected by an applicant’s proposed activity in order to conduct review of the COP under Section 106 of National Historic Preservation Act (NHPA) (54 United States Code 306108; BOEM 2020). The assessment of effects from the proposed Project on historic properties is reliant on the identification and analysis of cultural resources in the geographic area in which these activities are proposed to take place (referred to as the *area of potential effects* [APE]). BOEM has determined there is sufficient information on cultural resources within the APE for the proposed Project that allows for the assessment of impacts, analysis and comparison of alternatives, and preliminary completion of a determination of effects on

historic properties. However, BOEM has identified areas of presently unavailable information that would better inform and increase the specificity of the analysis.

For the Terrestrial Archaeological Resource Assessment (TARA), BOEM requires a complete inventory of terrestrial archaeological resources within the terrestrial APE to assess Project impacts and complete the analysis of alternatives based on specific historic properties. Dominion Energy will be using a process of phased identification and evaluation of historic properties as defined in 36 CFR 800.4(b)(2) to provide BOEM with the full completion of historic property identification in the terrestrial APE. (COP, Appendices DD; Dominion Energy 2022). Any thus-far known terrestrial archaeological resources identified as being located within the terrestrial APE are provided in the TARA. However, completion of Phase IB archaeological surveys during the phased process may lead to the identification of additional archaeological resources in the terrestrial APE. Findings from the phased process are anticipated to be presented in the Final EIS for this Project. However, some information pertaining to terrestrial archaeological resources will not be available until after completion of the Final EIS. BOEM will use a Memorandum of Agreement (MOA) to establish commitments for reviewing the sufficiency of any supplemental terrestrial archaeological investigations as phased identification; assessing effects on historic properties; and implementing measures to avoid, minimize, or mitigate effects in these areas prior to construction.

In conclusion, BOEM has determined there is sufficient information on cultural resources within the geographic analysis area and APE for the analysis in this Draft EIS to support a reasoned choice among alternatives. BOEM anticipates receiving additional information that would better inform the analysis through Dominion Energy's phased identification process as defined in 36 CFR 800.4(b)(2) and ongoing consultation.

D.1.8 Demographics, Employment, and Economics

There is some incomplete information relating to future offshore wind activities within the geographic analysis area, specifically for the number of WTGs and foundations, area of seafloor disturbance, and construction timeline. Best estimates or placeholders have been used for the current analysis; however, this missing information is not related to the Proposed Action. 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.

D.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, such as visual and scenic resources, as described in this document, also affect the completeness of the analysis of impacts on environmental justice communities. BOEM is attempting to obtain all information essential to a reasoned choice among alternatives for environmental justice impacts.

D.1.10 Finfish, Invertebrates, and Essential Fish Habitat

Assessing and predicting the temporal and spatial distribution and abundance of marine motile finfish or invertebrates within an area as large as the proposed CVOW-C Lease Area will lead to some unexplained variability. Using resource survey data collected within the Lease Area (Dominion Wind Energy 2021), BOEM (2012, 2014, and 2015) assessments, and inter-agency broad-scale monitoring studies (Guida et al. 2017) have furnished a sufficient basis to assess and predict the finfish and invertebrate resources within the geographic analysis area. Information outlining the Endangered Species Act (ESA)-listed species, Essential Fish Habitat (EFH), and Habitats Areas of Particular Concern (HAPCs) will support the EIS in the BA and EFH Assessments. The Draft EIS and Draft EFH Assessment do not include or provide

impact estimates per specific EFH features of concern (e.g., sand waves, megaripples, trough habitat, and isolated mud and gravel). Estimates for these benthic habitat features should be provided in the Final EIS and EFH assessments. Impacts on the ESA and EFH managed species should not be affected in a greater or lesser manner for the finfish or invertebrates discussed in the EIS. Specific impact discussions for the ESA and EFH species are provided in the BA and EFH Assessments (BOEM 2022).

The effects of EMF and noise such as pile driving on invertebrates is not well documented. The effects of sound and the thresholds of exposure have not been defined for fish and invertebrate juvenile and larvae stages as they have for adult finfish (Hawkins and Popper 2017; Weilgart 2018). The available studies concerning sound impacts related to pile driving specifically have been performed in test tanks and not in natural conditions, leaving some ambiguity as to the exact effect of noise impacts on the behavior of finfish invertebrate in an in-situ setting. Other related impacts concerning habitat modification and the concomitant change in community structure and secondary impacts of the offshore food chain are not well studied for the geographic analysis area. The assessment utilized studies within the Mid-Atlantic Bight and European temperate waters that focused on monitoring the invertebrate and finfish assemblage dynamics and food-chain linkages. Using these studies provided a better understanding of how the benthic resources and communities within the proposed Lease Area may change and what impacts these changes may produce. Although these studies supported a better understanding of how these resources may be affected, the National Marine Fisheries Service (NMFS) has identified uncertainties of the scale of the broader geographic resource impacts and made recommendations for designing studies and pre-, during, and post-construction monitoring efforts to be used to identify and assess the potential effects on the finfish, invertebrate, and EFH resources within the geographic analysis area. NMFS has recommended that offshore wind energy projects incorporate and support the Northeast Fisheries Science Center scientific surveys (NMFS surveys), incorporating and developing a programmatic approach to mitigate impacts on these NMFS surveys and develop a broader geographical understanding of habitat modifications made by wind energy project structures.

Overall, the analysis of the IPFs presented in this EIS is sufficient to support sound scientific judgment and informed decision-making related to the impacts discussed and presented. 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.

D.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.

D.1.12 Marine Mammals

NMFS has summarized the current information about marine mammal population status, occurrence, and use of the region in its stock assessment reports for the Atlantic OCS and Gulf of Mexico (Hayes et al. 2019, 2020, 2021; NMFS 2021). These studies provided a suitable basis for predicting the species, abundances, and distributions of marine mammals in the geographic analysis area. The *Draft U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment 2021* (NMFS 2021) indicated that there are insufficient data to determine population trends for most marine mammal species found regularly in the coastal and oceanic waters of Virginia, with the exception of the humpback whale (*Megaptera novaeangliae*; increasing population trend) and North Atlantic right whale (*Eubalaena glacialis*; decreasing population trend). 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), and 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 (as described in Section 3.15 of the EIS), 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. Based on 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 (including vessel noise), high-resolution geophysical (HRG) surveys, geotechnical drilling, dredging activities, and wind turbine operational noise 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 in the EIS used the best available information when considering behavioral effects related to underwater noise. To better characterize these impacts, all potential types of behavioral responses, as well as the context within which these responses may occur, were considered following guidance from applicable studies (Ellison et al. 2012, 2015; Southall et al. 2021) and used in conjunction with the NMFS disturbance threshold, as described in Section 3.15. 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 over 2,100 new structures are anticipated from multiple offshore wind projects in the geographic analysis area 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. It is anticipated that the presence of structures on the Atlantic OCS will also lead to localized changes in fishing activities and vessel traffic in the vicinity of the WTG

foundations. The potential consequences of these impacts on marine mammals of the Atlantic OCS are currently 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 most marine mammal populations. The life history and stock status of the North Atlantic right whale combined with ongoing, planned non-wind, and planned wind activities in the Atlantic OCS could result in severe population-level effects that may compromise the viability of the species. However, given the complex interconnectedness of individual IPFs, the exact level and extent of impacts on the North Atlantic right whale is impossible to predict with certainty. To address data gaps identified above, BOEM extrapolated or drew assumptions from known information for similar species and studies, as presented in Section 3.15 and in the BA submitted to NMFS (BOEM 2022). The information and methods used to predict potential impacts to marine mammal species represent the best available information. The analysis 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.

D.1.13 Navigation and Vessel Traffic

The navigation and vessel traffic impact analysis in the EIS is based on one year (January 1, 2019, to December 31, 2019) of Automatic Identification System (AIS) data from vessels required to carry AIS (i.e., those 65 feet [19.8 meters] or greater in length), as well as Vessel Monitoring System (VMS) data to infer commercial fishing and recreational vessel transits. Fishing vessels at least 65 feet (19.8 meters) 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, the risk model included VMS data and Vessel Trip Reports required by NOAA to account for both current and future traffic not represented in the data (COP, Section 4, Table 4.4-19; Dominion Energy 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 3.16, WTG and offshore service station (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.

D.1.14 Other Uses

As the design for the onshore project components is finalized, Dominion Energy will provide results from the Federal Aviation Administration's (FAA) Obstruction Evaluation Notice Criteria Tool, and this analysis will be incorporated into the EIS.

The proposed Project lies within the Atlantic Test Range Geographical Area of Concern, with the potential to impact test capabilities of the Advanced Dynamic Aircraft Measurement System at Patuxent River Naval Air Station. The Department of the Navy requests continued coordination on the undersea cable route and cable landing location, and notification of whether there are plans to put monitoring equipment on the undersea cables, and coordination on the use of foreign-owned or controlled vendors in

the Project. Discussions with the Department of Defense are ongoing based on the findings of this informal review, and results will be incorporated into the EIS.

D.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 visual and scenic resources, navigation and vessel traffic, commercial fisheries, and for-hire recreational fishing, as described in this document, also affect the completeness of the analysis of impacts on recreational tourism. BOEM is attempting to obtain all information essential to a reasoned choice among alternatives for recreation and tourism impacts.

D.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 within close proximity to the cables, 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). Certain types of dredgers, specifically trail suction hopper dredgers, may also pose an entrainment risk for sea turtles during installation of Project cables; however, there is still uncertainty regarding what methodology will be employed for each project and where these activities would occur. 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. Dominion Energy would limit lighting on WTGs and OSSs 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, given their propensity for resting at these structures (Gitschlag and Herczeg 1994; NRC 1994), 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.

To address data gaps identified above, BOEM extrapolated or drew assumptions from known information for similar species and studies, as presented in Section 3.19, and in the BA submitted to NMFS (BOEM 2022). The information and methods used to predict potential impacts on sea turtle species represent the best available information. 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.

D.1.17 Scenic and Visual Resources

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

D.1.18 Water Quality

There is no incomplete or unavailable information related to the analysis of impacts on water quality.

D.1.19 Wetlands

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

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