Coastal Virginia Offshore Wind Commercial Project Biological Assessment–Addendum

For National Marine Fisheries Service
August 2023

U.S. Department of the Interior
Bureau of Ocean Energy Management
Office of Renewable Energy Program

BOEM
Bureau of Ocean Energy Management

Contents

1. Introduction 1

2. Substantive Clarifications 1

3. Updated Mitigation, Monitoring, and Reporting Measures Proposed by BOEM 2

4. Consistency with the MMPA Proposed LOA (published 4 May 2023) 2

5. Literature Cited 31

Abbreviations and Acronyms

AIS	automatic identification system
BA	Biological Assessment
BiOp	Biological Opinion
BOEM	Bureau of Ocean Energy Management
BSEE	Bureau of Safety and Environmental Enforcement
CBRA	Cable Risk Burial Assessment
COP	Construction and Operations Plan
CVOW-C	Coastal Virginia Offshore Wind Commercial
DBBC	double big bubble curtain
DPS	distinct population segment
EIS	Environmental Impact Statement
EMF	electromagnetic field
ESA	Endangered Species Act
GARFO	Greater Atlantic Regional Fisheries Office
HRG	high-resolution geophysical
ITA	Incidental Take Authorization
ITA	Incidental Take Statement
LAA	likely to adversely affect
LFC	low-frequency cetacean
LOA	Letter of Authorization
MFC	mid-frequency cetacean
MMPA	Marine Mammal Protection Act of 1972
NARW	North Atlantic right whale
NEFSC	Northeast Fisheries Science Center
NLAA	not likely to adversely affect
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
OCS	Outer Continental Shelf
OSS	offshore substation
PDE	project design envelope

PTS	permanent threshold shift
ROD	Record of Decision
SFV	sound field verification
SMR	State Military Reservation
SOV	service operations vessel
SPL	sound pressure level
TSHD	trailing suction hopper dredgers
USCG	U.S. Coast Guard
UXO	unexploded ordnance
WROV	work class remotely operated vehicle
WTG	wind turbine generator

1. Introduction

The Bureau of Ocean Energy Management (BOEM) has prepared this addendum to the Coastal Virginia Offshore Wind Commercial (CVOW-C) Biological Assessment, dated March 2023 (the Biological Assessment or BA), in response to a list of requests for clarification and additional questions received by letter from the National Marine Fisheries Service (NMFS) on July 17, 2023. Reviewer S. Dahl from NMFS provided comments of the Draft CVOW-C BA past the closing period that warranted review and response. Several comments pointed out some clarifications that would improve the context of the BA but would not change any of the analysis nor any of the final determinations. Additionally, many comments and questions had been previously dealt with in the most recent and updated version of the CVOW-C BA (dated March 2023); these are noted in the comment responses. BOEM has organized the response to comments in this letter into a comment and response matrix, which is provided below (Table 1). All information requests are addressed within this matrix.

In addition, complete details on the sound field verification (SFV) mitigation measure have been updated (see Section 3 below) and one table in the BA has been corrected for consistency with the May 4, 2023, Marine Mammal Protection Act (MMPA) Proposed Letter of Authorization (LOA) (see Section 4 below).

There have been no changes in effect determinations for any species considered within the BA.

2. Substantive Clarifications

The following comment responses have been identified to provide substantive clarification to the March 2023 version of the NMFS BA and are fully described within Table 1:

- **Comment #1 response**: Harm as defined by the Endangered Species Act (ESA) may result from the underwater noise generated by the Proposed Action due to the risk of permanent threshold shift (PTS) during impact pile driving activities during installation of the wind turbine generator (WTG) and offshore substation (OSS) foundations.

- **Comment #5 response**: On demand or ropeless systems will be used for the duration of all welk and black sea bass studies. Different technologies may be tested; however, traditional vertical lines will never be used.

- **Comment #32 response**: The mitigation, monitoring, and reporting measures considered part of the Proposed Action, to the extent those measures are known, are described in Tables 1-7 (Mitigation, monitoring, and reporting measures committed to by the Applicant) and 1-8 (Additional proposed mitigation, monitoring, and reporting measures proposed by BOEM).

All other changes identified in Table 1 are considered non-substantive and include minor clarifications, explanations, or typographical error corrections. All responses, changes, and clarifications are described fully within Table 1.

No change in determinations for any species is warranted at this time based on these substantive and non-substantive changes.

3. Updated Mitigation, Monitoring, and Reporting Measures Proposed by BOEM

BOEM has expanded the description of the Sound Field Verification Plan to add the following description to Measure #13 in BA Table 1-8 (Additional proposed mitigation, monitoring, and reporting measures proposed by BOEM):

The Lessee must submit the SFV Plan to BOEM, BSEE, and NMFS GARFO at least 180 days before impact pile driving is planned to begin. BOEM, BSEE, and NMFS GARFO will review the plan and will provide comments within 45 days of receipt of the plan. NMFS GARFO's comments to BOEM, BSEE, and the Lessee will include a determination as to whether the plan is consistent with the requirements outlined in the BiOp and its ITS. If the plan is determined to be inconsistent with these requirements, the Lessee must resubmit a modified plan that addresses the identified issues at least 15 days before the start of the associated activity; at that time, BOEM, BSEE and NMFS will discuss a timeline for review and approval of the modified plan. Under the terms of the NMFS BiOp, the Lessee must obtain BOEM, BSEE, and NMFS GARFO's concurrence with this plan prior to the start of pile driving activities. The plan must describe how the Lessee will ensure that the first three monopile and pin pile installation sites selected for SFV are representative of the rest of the monopile and pin pile installation sites. In the case that these sites are not determined to be representative of all other monopile and pin pile installation sites, the Lessee must include information on how additional sites will be selected for SFV. The plan must also include methodology for collecting, analyzing, and preparing SFV data for submission to NMFS GARFO. The Lessee's plan must describe how the effectiveness of the sound attenuation methodology will be evaluated based on the results. The Lessee must also provide, as soon as they are available, but no later than 48 hours after each installation, the initial results of the SFV measurements to BOEM, BSEE, and NMFS GARFO in an interim report after each monopile for the first 3 piles and pin pile installation for the first full jacket foundation (4 pin piles). If any interim SFV report submitted for any of the first 3 monopiles indicates the sound fields exceed the modeled distances to any protected species injury or behavioral harassment/disturbance thresholds (as modeled assuming 10 decibel attenuation), the Lessee must carry out SFV for the next 3 monopiles and provide a SFV report to BOEM, BSEE, and NMFS GARFO within 48 hours after each foundation is installed. If any interim SFV report submitted for the first full jacket foundation indicates the sound fields exceed the modeled distances to any protected species injury or behavioral harassment/disturbance thresholds (as modeled assuming 10 decibel attenuation), the Lessee must carry out SFV for the next full jacket foundation (i.e., all 4 pin piles) and provide a SFV report to BOEM, BSEE, and NMFS GARFO within 48 hours after the foundation is installed. After the first 6 monopiles and/or the first two full jacket foundations (i.e., 8 pin piles), BOEM, BSEE, or NMFS GARFO may require the Lessee to carry out additional SFV and provide additional interim SFV reports to BOEM, BSEE, and NMFS GARFO if the measured sound fields continue to exceed the modeled results. These requirements are in addition to the requirement for the Lessee to implement additional sound attenuation measures and/or adjustments to clearance and shutdown zones if sound fields exceed the modeled distances to any protected species injury or behavioral harassment/disturbance thresholds (as modeled assuming 10 decibel attenuation).

4. Consistency with the MMPA Proposed LOA (published 4 May 2023)

Table 3-15 of the CVOW-C BA (version dated March 2023) is edited as shown below so that all exposure numbers for ESA-listed species considered are consistent with those authorized by NMFS in the proposed LOA (88 *Federal Register* [*FR*] 28656). These numbers have been revised from previous versions of the BA to reflect updated marine mammal density information, updated species distribution information, and updated Project information (e.g., number of pile driving events anticipated). The corrected numbers are

shown as red text in Table 3-15 below. However, it is worth noting that these updated numbers were already incorporated in Sections 3.2.5.2.3.1 (WTG and OSS Foundation Installation), 3.2.5.2.3.2 (Goal Post Pile Installation), 3.2.5.2.3.3 (Cofferdam Installation), and 3.2.5.2.3.4 (High-Resolution Geophysical [HRG] Surveys) of the March 2023 BA. Therefore, the correct take numbers were applied to the effects determinations in the March 2023 BA and no change in determinations for any species is warranted at this time.

CVOW-C BA Table 3-15 Estimated number of ESA-listed marine mammals exposed to sound levels above PTS and behavioral thresholds

	Marine Mammal Species	PTS Exposures[a]	Behavioral Exposures[b]
WTG and OSS Foundation Installation (10 dB noise mitigation)			
LFC	NARW	0	~~18~~ 12
	Fin whale	~~9~~ 7	~~240 (205 [c])~~ 202
	Sei whale	~~3~~ 2	~~7~~ 5
MFC	Sperm whale	0	~~9~~ 6
Goal Post Pile Installation (0 dB noise mitigation)			
LFC	NARW	0	0
	Fin whale	0	0
	Sei whale	0	0
MFC	Sperm whale	0	0
Cofferdam Installation (0 dB noise mitigation)			
LFC	NARW	0	0
	Fin whale	0	1
	Sei whale	0	0
MFC	Sperm whale	0	0
HRG Surveys (5-Year Total) (0 dB noise mitigation)			
LFC	NARW	0	5
	Fin whale	0	5
	Sei whale	0	3
MFC	Sperm whale	0	0

dB = decibels; HRG = high-resolution geophysical; LFC = low-frequency cetacean; MFC = mid-frequency cetacean; NARW = North Atlantic right whale; OSS = offshore substation; PTS = permanent threshold shift; WTG = wind turbine generator
Source: Tetra Tech 2022b
[a] Estimated PTS exposures under the Proposed Action are equivalent to estimated PTS exposures under the likely scenario of 176 WTGs and 3 OSSs.
[b] Unless otherwise noted, estimated behavioral exposures under the Proposed Action are equivalent to estimated behavioral exposures under the likely scenario of 176 WTGs and 3 OSSs.

Table 1 The Bureau of Ocean Energy Management responses to the National Marine Fisheries Service's comments and requests for additional information received July 17, 2023, on the Coastal Virginia Offshore Wind Biological Assessment

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
1	Effects include permanent threshold shift (PTS), behavioral disturbance, or both. No harm.	Isn't PTS considered a form of injury?	Yes; per our definition in Section 3.2.5.1 of the Biological Assessment (BA) "any Level A harassment has been considered for this analysis to be instances of potential harm via PTS/auditory injury under the Endangered Species Act (ESA)." Therefore, the statement in Section 3.2.5.2 of the BA stating "No harm as defined by the ESA is expected to result from any underwater noise generated by the Proposed Action" should be corrected to indicate PTS and therefore auditory injury/ESA harm may occur.	The statement in Section 3.2.5.2 saying "No harm as defined by the ESA is expected to result from any underwater noise generated by the Proposed Action" will be changed as follows: "**Harm as defined by the ESA (Section 3.2.5.1, *Definition of Take, Harm, and Harass*) may result from the underwater noise generated by the Proposed Action due to the risk of PTS during impact pile driving activities during installation of the WTG and OSS foundations (Section 3.2.5.2.3.1)."**
2	Sand wave removal: Trailer Suction Hopper Dredger (TSHD)	Including this with the potential vessels indicates that this is a possibility. Later there was this statement: "Based on recent input from Dominion Energy, sandwave removal methods are not currently anticipated to occur prior to cable installation; and are therefore, not discussed	The BA has since been updated (version dated March 2023) so that TSHD is no longer listed in Table 1-5 to not contradict the statement that sandwave removal methods are not included in the Proposed Action.	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
		further under the Proposed Action." So it is not a part of the proposed action? If so, then if it was decided later that it was needed, that would require reinitiation.		
3	The approximate length of each trawl will be 1,800 feet (149 meters) with 150 feet (45 meters) spacing	What type of line will be used?	The type of line used will ultimately depend on the contractor hired by the developer to perform these surveys to ensure appropriate location-specific setup. Sinking groundlines used will have colored markings (yellow and black marking scheme using paint or woven tracer).	None
4	Required whale release (weak link/swivel) and colored markings	Required by who? Are there specifics regarding the 'whale release'? How to confirm it is actually being used?	These are required by NMFS under the Atlantic Large Whale Take Reduction Plan ((2)(ii)(iii)). Enforcement would be random checks, typically by state and federal law enforcement.	None
5	A static vertical buoy line	This does not seem to agree	Both the whelk and black sea bass surveys will use on demand or	The following statement should be removed from BA Section 1.4.3.1 (Welk

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
		with the proposed ITA: "Dominion Energy will be using on-demand fishing systems aimed at reducing the entanglement risk to protected species. These systems include, but are not limited to, spooled systems, buoy and stowed systems, lift bag systems, and grappling"	ropeless systems for the duration of the studies. Different technologies may be tested; however, traditional vertical lines will never be used. Should the ropeless system fail, the gear will be recovered with a grappling hook. Corrections to the description for the welk and black sea bass surveys are provided (right).	Surveys): "At the end of each string, there is a static vertical buoy line that is attached to mark the gears position at the surface." and replaced with: **"On demand or ropeless systems will be used for the duration of the studies. Different technologies may be tested; however, traditional vertical lines will never be used. GPS will be used to mark the location of deployed gear. Recovery will be conducted via timed or acoustic release mechanism, with grappling as a secondary method of retrieval should the acoustic release fail."** The following statement should be removed from BA Section 1.4.3.2 (Black Sea Bass Surveys): "At the end of each string, there is a static vertical buoy line that is attached to mark the gears position at the surface."
6	Elongated section	How long?	The exact length of this section is currently unknown but will consist of sinking groundline to mitigate the entanglement potential. Final details will be determined by discussions with fishermen to ensure appropriate location-specific setup.	None
7	GPS locations will be used to mark gear	Not clear on how this is being retrieved?	GPS locations will be used to mark gear (recovered via timed or acoustic release mechanism, with grappling as a secondary method of retrieval should the acoustic release fail). Per the Draft Black Sea Bass Monitoring Plan dated 24 January 2023: "This section of line	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			will facilitate gear retrieval with a grappling hook which has been identified as a less expensive alternative to acoustic release on-demand gear (NEFSC 2022)."	
8	Intended to test other on-demand fishing systems	Why not use this with the whelk pots too?	Both the whelk and black sea bass surveys will use on demand or ropeless systems for the duration of the studies. Different technologies may also be tested (without the use of vertical lines).	None
9	Biological data, samples, and tagging would occur as outlined below.	Who is requiring this? Who would perform this? This activity and procedures are not discussed in the proposed fishery monitoring surveys.	The developer would perform these data collection activities as part of the fisheries monitoring surveys as outlined in the Fisheries Survey Plan.	None
10	https://media.fisheries.noaa.gov/2021-11/Sturgeon%20%26%20Sea%20Turtle%20Take%20SOPs_external_11032021.pdf	This doesn't work	Here is the working link: https://media.fisheries.noaa.gov/dam-migration/sea_turtle_handling_and_resuscitation_measures.pdf	None
11	https://media.fisheries.noaa.gov/2021-11/Sturgeon%20%26%20Sea%20Turtle%20Take%20SOPs_external_11032	This doesn't work	Here is the working link: https://media.fisheries.noaa.gov/dam-migration/sturgeon_genetics_sampling_revised_june_2019.pdf	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	021.pdf			
12	Punch-Out (the termination of the drilling at the exit pit where the drill exits the seabed)	What is that?	This is the location where the offshore export cable will exit the seabed and the developer will start feeding in the portion of the export cable that leads to shore will be fed in. Please see Figure 1-3 in the BA (version dated March 2023) for a visual indication of where the Punch-out falls along the export cable route.	None
13	Up to 16 megawatts (MW) (SG-14-222 DD) 14.7 MW (SG-14-222 DD) with power boost technology	https://www.siemensgamesa.com/en-int/products-and-services/offshore/wind-turbine-sg-14-222-dd Claims 14 MW nominal, up to 15 with power boost	Per Section 3.3.1.1 of the COP: "For the purpose of the assessments presented within this COP, the WTG design envelope has been defined by minimum and maximum parameters that are representative of the Siemens Gamesa WTGs currently on the market or expected to become available in time to be used for the Project. Dominion Energy has retained an envelope of up to 16 MW for the purposes of this COP; however, Dominion Energy is proposing to install 176 WTGs, with a WTG capacity of 14.7-MW, with seven locations identified as spare positions." Therefore, the full PDE follows in line with what the WTG manufacturer claims as well as what Dominion is anticipated may be available at the time of construction.	None
14	Recovery period	How long does it take to recover?	As discussed in BA Section 3.2.5.3.1 (version dated March 2023): "…restoration of marine soft-sediment	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			habitats occurs through a range of physical (e.g., currents, wave action) and biological (e.g., bioturbation, tube building) processes (Dernie et al. 2003). Disturbed areas not replaced with hardened structures or scour protection would; therefore, be resettled and the benthic community would be expected to return to normal conditions, typically within 1 year (Dernie et al. 2003; Department for Business, Enterprise and Regulatory Reform 2008)."	
15	Maximum of 55.7 acres (22.5 hectares) of seafloor will be temporarily disturbed by the jack-up vessels	Disturbed how? From the vessel itself or the construction activities?	This disturbance refers to from the vessel itself (i.e., by the spuds and anchoring of the jack up barge).	None
16	Total Number of Foundations Installed	88+95= 183 WTGs. Is that all installed? Or is that the total build-out of 176 WTGs plus the seven re-piling events that may be needed?	BA Section 1.3.1.2 (version dated March 2023) further clarifies the number of WTGs that are planned to be installed under the Proposed Action: "Dominion Energy's Proposed Action includes the construction and installation of 202 14- to 16-MW WTGs. Of the 202 WTG sites, 26 are considered spare locations to provide the flexibility to switch positions if any sites are determined unfavorable for monopile foundation installation. The majority of spare WTG locations are located along the northwestern and northeastern boundaries of the Lease	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			Area and within an area referred to as the fish haven area[1] (Figure 1-6). A likely scenario of 176 WTGs is anticipated." Regarding the piling schedule table (Table 1-2): "The exact number of WTG foundations requiring the piling schedule in each scenario is not known at this time. However, for the purposes of the modeling conducted for the COP (Appendix Z; Dominion Energy 2022) and the LOA application (Tetra Tech 2022a), a proposed pile installation schedule was developed using preliminary seabed data available for the wind farm area".	
17	125.9 to 148.1 acres (50.9 to 59.9 hectares) of seafloor will be temporarily disturbed by the platform supply vessel during DBBC installation	Disturbed how, in what way?	This would be the disturbance due to anchoring of the vessel as well as the physical displacement during installation/removal of the bubble curtain on the seafloor (outlined in COP Section 3.4.1.1).	None
18	CVOW-C WTG and offshore substation layout	This figure was blurry in the BA, could use a better version. Please submit a figure	This figure is what was provided in the Project's COP and there is no other figure available at this time.	None

1 The Fish Haven is an area of documented recreational fisheries uses within the northern border of the Lease Area known as the *Triangle Wrecks* and *Triangle Reef*. The area consists of several large, scuttled World War II-era ships, tires, cable spools, and other materials deposited since the 1970s to facilitate an artificial reef development (COP Sections 2.1.1 and 4.2.4.2; Dominion Energy 2022).

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
		with improved clarity.		
19	Checked and cleared for debris, large boulders, and UXO	How would this be handled, especially UXO?	A description of Boulder Removal methods is provided in COP Section 3.4.1.4 which states that, while not anticipated, boulders may be removed using a combination of methods such as a Hydroplow. Boulders or other obstructions will be relocated to areas as close as feasibly possible to their original positions. For UXO, the preferred approach is avoidance, but if that is not feasible, the UXOs would be relocated using non-detonation methods (e.g., lift and shift) as outlined in Section 3.2.5.3.1 of the BA. Per COP Section 3.4.1.2, "Relocation of UXO will be done by first using a suction pump to uncover and reconfirm the classification of the UXO, then using the WROV's articulated arm to place slings underneath the UXO, and finally lifting it and shifting it to a safe location."	None
20	Pre-lay grapnel runs	Description? Impacts?	Pre-lay grapnel runs are when the vessel dredges a grapnel to clear any obstacle that could obstruct the corridor. These impacts are discussed in context of the physical disturbance of sediment (for example, Section 3.2.5.3.1 for marine mammals).	None
21	The UXO will be relocated to a safe	How and where? Should avoid	The developers preferred approach is avoidance; however if relocation is	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	location	creating a hazard for someone else, like commercial fishing.	required, the precise locations and methods of removal have not yet been selected as final site selection will be situation- and location-specific, but the UXO relocation would not be more than ~50 m from the original position, and the Coast Guard would be notified of all relocated UXO. The USCG would mark the UXO location and issue a Notice to Mariners to inform them of this movement. As for fishing activities, NMFS is responsible for minimization of fishing activities in this area.	
22	Onboard UXO experts will confirm that the UXO is “safe to handle,”	Expert qualifications? Criteria for safe?	The qualifications for the experts and criteria for safe handling of UXO will be included in the final COP.	None
23	Industry standard handling procedures	What are those?	Standard handling practices for UXO will be specified in the final COP.	None
24	WROV	Not defined.	WROV = work-class remotely operated vessel.	None
25	Methods to minimize the quantity of seafloor obstructions from relocated boulders in areas of active bottom trawl fishing	Seems like a good idea for UXOs too.	Similar to how UXO would be handled per the response to your comment above, the USCG would be notified of all relocated boulders/seafloor obstructions. These locations would be marked by the USCG and a Notice to Mariners would be issued. In addition, at the request of Dominion Energy and with the support of the U.S. Coast Guard, CVOW offshore export and inter array submarine cables will be	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			charted by NOAA. Dominion Energy is not aware of any restrictions; however, the following general information is provided. Much of the commercial fishing in cable corridor and lease area is done by small vessels (under 65 feet) using fixed gear (e.g., pots/traps and gillnets) primarily targeting whelk/conch, black sea bass, and spiny dogfish. There is very little mobile gear fishing that occurs in these areas. Mobile gear is prohibited within the 3-mi (4.8- km) limit of the Virginia Atlantic shoreline (Code of Virginia § 28.2-315), however an experimental beam trawl fishery for shrimp does exist but is currently restricted to areas outside of the cable corridor. A trawl fishery targeting shrimp outside 3 mi (4.8 km) has recently developed and does take place over the cable corridor. The fishing gear posing the greatest risk to the submarine cables, in terms of seabed penetration, would be bottom trawling. Data from the Mid-Atlantic Ocean Data Portal (Fig W-31) shows the amount in the 2006 – 2010 timeframe was low and has declined to being almost nonexistent in the 2011 – 2015 timeframe. The trawl effort that does exist is likely to be smaller vessels targeting spiny dogfish and/or mixed species for a few months out of the year.	
26	Additional	What extra	As described in COP Section 3.4.1.4:	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	protection at the three fiber optic cable crossing locations and at the Omega joint location	protection and why?	"Dominion Energy has assumed that the Offshore Export Cable Route Corridor will require additional protection at the three fiber optic cable crossing locations, which is anticipated to be located between mile posts 14 and 17 (kilometer posts 23 and 27), using a combination of the following solutions depending on the technical requirements: • Dumped rocks, • Geotextile sand containers, and/or • Concrete mattresses." It is anticipated that additional cable protection will be required at this location because the presence of the three fiber optic cables and the CVOW Pilot Project export cable make it difficult to reach the desired cable burial depth as outlined in the Project's Cable Risk Burial Assessment (CBRA) (COP Appendix W) so cable protection is warranted.	
27	Vessel transits under the likely scenario may be reduced overall by 15 percent	Why?	This is due to the difference between maximum scenario under the Proposed Action (up to 202 WTGs and 3 OSSs) versus the likely scenario (only 176 WTGs and 3 OSSs). This is discussed in context of impacts as follows (i.e., Section 3.2.5.6 for marine mammals; BA version dated March 2023): "Vessel transits under the likely scenario may be reduced overall by 15 percent, though daily estimated vessel trips would still likely range from a minimum of 3 trips per day to a maximum of 95 trips per day. As a result, this BA considers the	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			maximum construction scenario (i.e., the Proposed Action) in the assessment of effects due to vessel traffic."	
28	Conflicting information regarding the number of round trips expected to be completed by CTVs, SOVs, or both during O&M is presented in the COP and the draft EIS. Additionally, the estimated number does not comport with O&M service trip estimates for other U.S. East Coast wind farm projects with published COPs, which estimate several hundred to thousands of annual service round trips; however, this is the vessel transit data available for analysis in this BA.	The vessel table for construction has Crew Transfer every 2nd day. This section has 26 annual, so every two weeks? Support for that assertion? Live out there for 2 weeks?	This section is specifically discussing O&M vessel transits, separate from the construction phase. Information about O&M vessel activity has been updated in the most recent version of the BA (Section 1.3.2.2) (version dated March 2023) as follows: "Dominion Energy anticipates 365 operating days for a single service operations vessel (SOV), with 26 annual round trips to the O&M port, and 365 operating days for each of two crew transfer vessels (CTVs), with 75 annual round trips to the O&M port per vessel. Dominion Energy anticipates approximately 25 annual round trips for additional vessels to conduct routine surveys. Additionally, the SOV will also have a daughter craft which will be used for in-field support and personnel transfers, with an estimated 26 round trips to port per year for the daughter craft. In total, Dominion Energy estimates approximately 253 annual round trips to port during O&M."	None
29	Repair and replace it in a timely	Vague. Any idea of how long that	The duration of repair time for offshore components could vary greatly	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	manner	would be?	depending on the severity of the repair; however, Dominion Energy has estimated repair durations below: Wind Turbine Generators: Up to 8 days Offshore Substations: Up to 8 days Cables (Offshore Export Cables and Interarray Cables): Up to 21 days For all Project component repairs, it is anticipated that the repair vessel would remain in the lease are or cable corridor for the duration of the repair. Vessels would not be transiting in and out of port each day.	
30	Decommissioning	Would scour and rock fill be left in place or removed during decommissioning?	It is assumed that scour protection and rock filling will be removed unless leaving in place is deemed appropriate through consultation with the appropriate authorities (BA Table 1-6 in Section 1.3.3).	None
31	Consultation	A separate ESA consultation for decommission plan?	Additional consultation in the 30 years to decommissioning can be expected, but no additional consultation is currently slated.	None
32	These potential additional mitigation measures are described in Table 1-8. Some or all of these BOEM proposed mitigation measures may be required	May or may not? How to evaluate if not required?	Mitigation measures as presented in Table 1-7 (applicant-committed) and Table 1-8 (BOEM proposed) are <u>both</u> considered part of the Proposed Action and are therefore required. The text to introduce these measures should be updated in the BA Addendum (see right).	Introductory text (two paragraphs) in BA Section 1.3.5 for Tables 1-7 and 1-8 needs to be removed and replaced with the following: **"This section outlines the proposed mitigation, monitoring, and reporting conditions intended to minimize or avoid potential effects on ESA-listed species. The measures considered part of the Proposed Action, to the**

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
				extent those measures are known, are described in Tables 1-7 (*Mitigation, monitoring, and reporting measures committed to by the Applicant*) and 1-8 (*Additional proposed mitigation, monitoring, and reporting measures proposed by BOEM*). **Dominion Energy has applied for an MMPA ITA. If issued, the MMPA ITA will authorize the incidental harassment of marine mammals when adhering to the terms and conditions included in the authorization. For the purpose of this consultation, the mitigation and monitoring measures included in the most recent MMPA ITA application; however, the conditions as they may be amended in the issued MMPA ITA will be included as a condition in the final ROD, and as they may apply to BOEM and BSEE's authorities, will be required by BOEM in its final approval of the COP. The MMPA ITA application only covers mitigation and monitoring measures for marine mammals, including threatened and endangered whale species considered in this BA. Additional measures for ESA-listed whales may be required through ESA consultation in the issued MMPA ITA.** **BOEM is proposing numerous measures to require as conditions of COP approval that are designed to avoid, minimize, or monitor effects of the action on all ESA-listed species, including sea turtles and marine fish.**

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
				In addition, BOEM may include additional measures as conditions of COP approval. The measures BOEM is proposing to include as conditions of COP approval are described in Table 1-8."
33	Measures presented in Table 1-8 may not all be within BOEM's statutory and regulatory authority to require	Is it really a proposed action then?	Same comment as above.	Same as above (comment #32)
34	A limited number of Project vessels would transit from Europe or the Gulf of Mexico	A lot contingent on the 'limited number', any indication of how many?	All data in the BA (version dated March 2023) has been updated with the most recent vessel transit information from the developer. The exact number of vessel transits to/from Europe and the Gulf of Mexico is not known at this time, though the number will be far fewer than those transiting from US ports and likely only limited to the construction phase. In addition, there may potentially be close to or zero transits from these regions because many of the vessels may actually be in the US by the time the Proposed Action is enacted, and these vessels would then therefore be moved from US port to US port. For example, "Dominion Energy's wind turbine installation vessel (the "Charybdis") is currently being constructed in Brownsville, Texas, but will be deployed on Orsted-Eversource	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
			projects in the northeast before construction of the CVOW-C Project and will be homeported in Virginia during construction of the Proposed Action" (BA Section 1.3). For context, and based on other comparable windfarm vessel activity data, vessel transits from Europe could range from fewer than 5 round trips per year during each year of construction, to slightly over 200 round trips per year during each year of construction. However, this maximum potential scenario still represents a small fraction of the ongoing number of daily vessel transits from these regions of the North Atlantic. No European or Gulf of Mexico transits are confirmed for the O&M phase.	
35	Limited to smaller support vessels and only a minimal number of transits would be expected to occur throughout the life of the Project.	Size of vessels, ballpark number of trips?	All data in the BA (version dated March 2023) has been updated with the most recent vessel transit information from the developer and is presented in BA Section 1.3.1.2, Table 1-5. The exact size of vessels and number of transits this statement is in reference to is not known at this time. See previous comment response regarding vessel information for European and Gulf of Mexico vessel data (above).	None
36	Most commonly reported behavioral effect of pile-driving activity on marine mammals has been	Any references for that?	Yes, the following papers discuss marine mammal behavioral responses to pile driving: Maybaum (1993), Watkins et al. (1993), Goldbogen et al. (2013), Würsig et al. (2000), Graham	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	short-term avoidance or displacement		et al. (2017), Russel et al. (2016), and Branstetter et al. (2018). These studies largely focus on dolphin, porpoise, and pinniped species and are further discussed in BA Section 3.2.5.3.2.1 under the MFC sub-header. These sources represent the best available field studies for marine mammal responses to pile driving. For LFC, the best data we have are for documented responses to airgun surveys (another impulsive sound source) and these are discussed in the paragraph following that statement (BA Section 3.2.5.3.2.1, LFC sub-header).	
37	Two posts would be installed per day	Could this happen on the same day as WTG monopile driving? Potential for overlapping sound?	No concurrent pile driving would occur for this proejct, and given the location of the goal post piles in relation to the WTG foundations (See Figure 1-1 of the BA). The Lease Area where WTG monopiles will be installed is ~43.99 km offshore Virginia Beach, whereas the Offshore Nearshore Trenchless Installation Punch-out where the goal post piles will be installed is only approximately 549 m from the cable landing location.	None
38	Nearshore location of this activity	How nearshore, distance?	The goal post piles will be installed in the Offshore Nearshore Trenchless Installation Punch-out which is located approximately 549 m from the cable landing location at the proposed parking lot, west of the firing range at State Military Reservation (SMR) (Figure 1-1 of the BA)	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
39	Driving during installation of the goal post piles would only occur up to 3 hours a day for 54 days	Previously stated 130 mins/day, up to 24 days. Please confirm which is correct.	The 24 days is a typo, should be 54 which will be corrected, but the 130 min per day equates to ~2.2 hrs per day so rounded up is 3 so that is consistent with both sections of the BA.	The text on page 3-24 of the BA (Section 3.2.5.2.3.2) stating "All goal post piles would be installed between May 1 and October 31 in 2024 and would occur over a total of 24 days for all 108 piles, assuming up to two piles are installed per day" will be updated as follows to reflect the correct number of days over which pile driving during installation of the goal post piles may occur: **"All goal post piles would be installed between May 1 and October 31 in 2024 and would occur over a total of 54 days for all 108 piles, assuming up to two piles are installed per day."**
40	368	More days than in a year? Same for the following year.	This is indicative of the multiple vessels that will be included in the HRG surveys; represents vessel survey days not calendar days.	None
41	Clearance and shutdown ranges for all ESA-listed species would extend out to 500 meters (Table 1-8)	Not stated in table 1-8	This should refer to Table 1-7 not 1-8; will be corrected.	The sentence on page 3-31 of the BA (Section 3.2.5.2.3.4) stating "Both the clearance and shutdown ranges for all ESA-listed species would extend out to 500 meters (Table 1-8) and fully cover the largest PTS threshold range" will be updated as follows to refer to the correct table number: **"Both the clearance and shutdown ranges for all ESA-listed species would extend out to 500 meters (Table 1-7) and fully cover the largest PTS threshold range."**
42	not occur during the entire survey	How much time, a relative percent?	The specific survey schedule for this project is not currently available, and	The statement on page 3-31 of the BA (Section 3.2.5.2.3.4) which reads

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	period		the final duration of equipment use will ultimately depend on data collected requirements and situational requirements that won't be known until just before the survey starts. Therefore, the assessment in the BA assumes all survey days used the sparker source to be conservative.	"Additionally, the maximum range is only applicable during operations of boomer equipment, which would not occur during the entire survey period, further limiting the risk of exposure to sound energy above the PTS threshold" will be updated as follows to refer to the correct equipment type: "**Additionally, the maximum range is only applicable during operations of sparker equipment, which would not occur during the entire survey period, further limiting the risk of exposure to sound energy above the PTS threshold**"
43	Estimate the range to the marine mammal behavioral disturbance thresholds	What is that estimate?	The estimate using the practical spreading loss equation and reported SLs for cable laying equipment is approximately 16 m for the SPL 160 dB marine mammal behavioral disturbance threshold. This will be included in an addendum to the BA.	Following the sentence on page 3-37 of the BA (Section 3.2.5.2.3.6) which reads: "To estimate the extent of behavioral disturbance from cable-laying operations, a practical spreading loss equation (15 log [range]) was applied with the estimated source level to estimate the range to the marine mammal behavioral disturbance thresholds (Section 3.2.5.2.2, *Auditory Criteria for Marine Mammals*)", the following statement should be included: "**Using this method, the range to the threshold was estimated to be approximately 52 feet (16 meters) from the source**."
44	assumed the equipment with the largest behavioral threshold range	Assumed equipment with the largest range, here states	Noted, this will be corrected.	See comment above (comment #42) about updating boomer in text.

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	(i.e., the sparker)	sparker, just before states boomer.		
45	Underwater noise exceeding behavioral disruption thresholds from cable laying operations	No values as to distance areas and exposure estimates, so cannot evaluate.	Per the previous response, the calculated range to the behavioral disturbance threshold for marine mammals will be included in an addendum to the BA. However, this activity was not modeled by the Applicant so there will not be exposures included in the BA.	See comment above (comment #43) about including this statement to accompany text in Section 3.2.5.2.3.6: "**Using this method, the range to the threhsold was estimated to be approximately 52 feet (16 meters) from the source**."
46	Associated with charter and recreational fishing gear lost	Not commercial gear? Which could get caught on structure, scour protection around the foundation or cable mattress? Abandonment of damaged gear?	The Lessee must recover marine trash and debris that is lost or discarded in the marine environment while performing OCS activities when such incident is likely to: (a) cause undue harm or damage to natural resources, including their physical, atmospheric, and biological components, with particular attention to marine trash or debris that could entangle, or be ingested by, marine protected species; or (b) significantly interfere with OCS uses (e.g., because the marine trash or debris is likely to snag or damage fishing equipment, or presents a hazard to navigation). The developer therefore is not required to remove other's trash and debris except as described in BA Table 1-8.	None
47	Provides BOEM with the ability to require removal of entanglement	Is that not a requirement now, currently proposed?	See response to above comment #46.	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	hazards			
48	Baseline encounter rate for vessels and animals to be within a strike risk with one another is already low	How so? What is it?	While BOEM's vessel strike risk model was not run for this project, a qualatative assessment was conducted to assess strike risk within the BA, based on realtive marine mammal densities and Project-related vessel transit data. This is discussed in depth in BA Section 3.2.5.6 (version dated March 2023). The low encounter rate is based on the low number of documented vessel strikes to ESA-listed marine mammals in the Project area and vicinity compared to baseline vessel traffic levels. Add reference to SARs (Hayes et al. 2020, 2022; NMFS 2023b) to justify low number of vessel strikes compared to baseline/ongoing vessel traffic.	Replace the statement in BA Section 3.2.5.6, "The baseline encounter rate for vessels and animals to be within a strike risk with one another is already low" with the following text: "**The baseline encounter rate for vessels and animals to be within a strike risk with one another is already low, based on a qualitative assessment of documented vessel strikes to ESA-listed marine mammals (Hayes et al. 2020, 2022; NMFS 2023b) compared to baseline vessel traffic in the Project area (Section 2.1.3.2 *Vessel Traffic*).**"
49	Figure 3-1 Map of the area around the CVOW-C Project area used to calculate seasonal sea turtle densities	This is actually a humpback whale density map.	The basemap for this figure is the humpback whale density layer used for the modeling in Appendix Z of the COP; the red outlined area which indicates the 8.9-km buffer around the lease areas was also used to estimate the sea turtle densities in the modeling report. However, the humpback whale densities as the basemap are misleading and this figure does not otherwise provide any value to the discussion of the modeled effects on sea turtles so it will be removed in the BA addendum.	Figure 3-1 on page 3-69 of the BA (Section 3.3.5.1.3.1) should be removed. In addition, the text in the preceeding paragraph which reads "Densities calculated for the Project Lease area with a 5.5-mile (8.9-kilometer) buffer surrounding it (Figure 3-1) for each season during which WTG and OSS foundations may occur are provided in Table 3-20" shall be updated to the following: "**Sea turtle densities were calculated in COP Appendix GG (Dominion Energy 2023) for the Project Lease area (Figure 1-1) with a 5.5-mile (8.9-**

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
				kilometer) buffer for each season during which WTG and OSS foundations may occur and are provided in Table 3-20."
50	Frequency range of best hearing sensitivity estimated for sea turtles has been to be within the range of ~100 to 700 Hz	Evidence? Citation?	This statement no longer exists in the BA (version dated March 2023). Following revisions made to the BA, it now reads (BA Section 3.3.5.1.2): "The limited data available on sea turtle hearing abilities is summarized in Table 3-17. The frequency range of best hearing sensitivity of sea turtles ranges from ~100 to 700 Hz, however there is some sensitivity to frequencies as low as 60 Hz, and possibly as low as 30 Hz (Ridgway et al. 1969)."	None
51	Would not be expected to result in an appreciable increase in noise levels.	Based on what?	This is based on the baseline vessel traffic in the area. Baseline vessel traffic for the Project area is described in Section 2.1.3.2 of the BA (version dated March 2023) and Section 3.16 of the Final EIS.	None
52	Oil and gas platforms used by sea turtles are expected to produce higher sound pressure levels than WTG operations	What evidence?	Noise levels for WTG operations are provided in BA Section 3.3.5.1.3.7 and the available references for O&G platform noise in relation to marine life effects are also provided in the text in that section for reference. This will not be updated any further in the BA at this time as it does not affect the analysis.	None
53	WTG operations are expected to produce even lower	Numbers for that comparison are not given	Noise levels for WTG operations are provided in BA Section 3.3.5.1.3.7 and the available references for O&G	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	sound levels		platform noise in relation to marine life effects are also provided in the text in that section for reference. This will not be updated any further in the BA at this time as it does not affect the analysis.	
54	Presence of the foundations is not likely to negatively affect regional abundances or dispersion of plankton species	How so?	This statement is derived from the analysis of benthic resources in the COP (COP Section 4.2.4.3; Dominion Energy 2022).	None
55	Monofilament line, which has been identified as a major hazard for all sea turtle species.	By who?	See Carr (1987) and Yaghmour et al (2018). Carr, A., 1987. Impact of nondegradable marine debris on the ecology and survival outlook of sea turtles. *Marine Pollution Bulletin*, *18*(6), pp.352-356. Yaghmour, F., Al Bousi, M., Whittington-Jones, B., Pereira, J., García-Nuñez, S. and Budd, J., 2018. Marine debris ingestion of green sea turtles, Chelonia mydas,(Linnaeus, 1758) from the eastern coast of the United Arab Emirates. *Marine Pollution Bulletin*, *135*, pp.55-61.	None
56	Incremental increase would be relatively small compared to current vessel traffic in the area	Could use values to back that up.	BA Section 2.1.3.2 presents ongoing baseline vessel data for the region.	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
57	Average of 46 Project vessel trips per day would represent an approximately 79 percent increase over the current number of unique vessels operating in the Project area	How is that small and incremental?	Based on the limitations of the baseline vessel traffic automatic identification system (AIS) data analysis, actual baseline vessel transits are likely considerably underrepresented in the data (see BA Section 2.1.3.2, *Vessel Traffic*, for a discussion of baseline data limitations).	The current statement in the BA Section 3.3.5.5, which reads "Overall, while some increase in vessel traffic associated with the Proposed Action would occur, the incremental increase would be relatively small compared to current vessel traffic in the area (see Section 2.1.3.2, *Vessel Traffic*, for baseline vessel data)" should be removed and replaced with the text below: **"Vessel activity associated with the Proposed Action will increase the total number of vessel transits that occur within the Project area."**
58	Locations where transmission cables lie on the bed surface, the affected areas would be localized around unburied cable segments	How much cable will be on the surface? Unburied?	No cables will be unburied; the target cable burial depth described in the CBRA (COP Appendix W), and if that depth cannot be reached the cable will be buried as deep as feasible and covered with cable protection. The reference to "unburied cable" is from the Offshore EMF Report in COP Appendix AA where, for the purposes of the modeling, locations where the cable would be closer to the surface and covered with cable protection were treated as "unburied."	None
59	The Project area falls within the New York Bight DPS	Not the Chesapeake?	Given the range of the Action Area, all DPS of Atlantic sturgeon are considered in the BA assessment; however, you are correct, the reference to the New York Bight DPS here is incorrect and will be updated.	In BA Section 3.4.1 on page 3-94 of the BA, the following statement "Five genetically DPS make up the U.S. East Coast population; the Project area falls within the New York Bight DPS" will be updated as follows to correctly identify the geographic region of the Project

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
				area: "**Five genetically DPS make up the U.S. East Coast population; the Project area falls within the Chesapeake Bay DPS**."
60	The maximum range to the fish thresholds would be even lower	How much lower? Not assessed in the acoustic appendix.	Because there is no modeling for HRG survey noise for fish in the modeling report, the best information we have for ranges to fish thresholds is from Baker and Howsen (2021) which use the maximum power settings for each equipment. When comparing the SLs from Baker and Howsen (2021) to the SLs in the LOA application, the SL (expressed in root mean square) decreases from 214 dB re 1 µPa m to 200 dB re 1 µPa m. Using the same 20log(r) transmission loss equation from Baker and Howsen (2021), the range to the fish SPL 150 dB behavioral disturbance threshold range decreases from 708 m to 316 m. The difference in this range to the behavioral disturbance threshold does not change the results of the assessment in the BA so changes to the text are not warranted at this time.	None
61	If a shift from mobile gear to fixed gear occurs due to the inability of the fishermen to maneuver mobile gear	Any indication that this would happen?	While this shift from mobile to fixed gear is currently speculative (https://www.fisheries.noaa.gov/topic/offshore-wind-energy/fishing-community-impacts), it is included in the analysis within the BA.	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
62	Concentrations greater than 10 mg/L	Is that a threshold? Reference?	This is the minimum turbidity level known to result in mortality for fish eggs/larvae from the NMFS Section 7 Effects Analysis: Turbidity in the Greater Atlantic Region page (https://www.fisheries.noaa.gov/new-england-mid-atlantic/consultations/section-7-effects-analysis-turbidity-greater-atlantic-region)	None
63	Marine fish are electrosensitive but appear to have relatively low sensitivity to magnetic fields based on studies of other sturgeon species. Bevelhimer et al. (2013) studied behavioral responses of lake sturgeon, a species closely related to marine fish	Do they mean Atlantic Sturgeon?	This study as referenced is specific to freshwater fish species, including lake sturgeon (*Acipenser fulvescens*), which is used as a proxy for Atlantic sturgeon response to EMF levels.	None
64	Based on magnetic field strength, the induced electrical field in Atlantic sturgeon and giant manta rays in proximity to exposed cable segments is likely	By how much, what is that exposure induced field value?	Results of the Offshore EMF modeling report indicate the maximum EMF for cables buried up to 1 m were 1.1 mV/m for the inter-array cable and 1.9 mV/m for the export cables. Based on this the 0.5 mV/m threshold could be exceed by up to 1.4 mV/m. The NMFS BA effects determination included the risk of EMF effects on marine fish	None

Comment Number	Comment scope	Comment text	Response	Amended Text (if applicable)
	to exceed the 0.5-mV/m threshold		based on the available literature cited in Section 3.4.3.7 of the BA so no changes in the BA are warranted as this does not change the results of the assessment.	
65	Natural electrical field effects generated by wave and current actions are on the order of 10 to 100 mV/m, many times stronger than the induced field generated by buried cable segments.	Reference?	Slater et al. (2010). This is also discussed in more detail in Section 2.1.2 of the BA.	None
66	Giant manta rays may be more sensitive to underwater EMF than Atlantic sturgeon	Evidence?	Reference to Normandeau et al. (2011), which specifies the sensory range of marine species (including rays and sturgeon) to EMF levels. Based on this information, rays are more sensitive to EMF than sturgeon.	None
67	LAA	None of the categories for fish were LAA so how do you get to this?	This is a typo, this will be fixed.	The final row of Table 4-1 in BA Section 4 for “Overall Effects Determination” shall be edited under for the ESA-listed fish from LAA to **NLAA**.

5. Literature Cited

Baker, K., and U. Howsen. 2021. Data Collection and Site Survey Activities for Renewable Energy on the Atlantic Outer Continental Shelf. Biological Assessment. U.S. Department of the Interior, Bureau of Ocean Energy Management, Office of Renewable Energy Programs. October 2018, Revised February 2021. 152 pp.

Branstetter, B.K., V.F. Bowman, D.S. Houser, M. Tormey, P. Banks, J. Finneran, and K. Jenkins. 2018. Effects of vibratory pile driver noise on echolocation and vigilance in bottlenose dolphins (Tursiops truncatus). The Journal of the Acoustical Society of America 143(1):429.

Carr, A., 1987. Impact of nondegradable marine debris on the ecology and survival outlook of sea turtles. Marine Pollution Bulletin, 18(6), pp.352-356.

Department for Business, Enterprise and Regulatory Reform. 2008. Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Industry. Technical report. January 2008. Available at: Review of Cabling Techniques and Environmental Effects Applicable to the Offshore Wind Farm Industry (pnnl.gov) Accessed January 26, 2023.

Dernie, K. M., M. J. Kaiser, and R. M. Warwick. 2003. Recovery rates of benthic communities following physical disturbance. Journal of Animal Ecology 72:1043-1056. https://doi.org/10.1046/j.1365-2656.2003.00775.x.

Dominion Energy. 2022. Construction and Operations Plan, Coastal Virginia Offshore Wind Commercial Project. Prepared by Tetra Tech, Inc. Submitted to Bureau of Ocean Energy Management. May 2022. Revised July 2022.

Goldbogen, J.A., A.S. Friedlaender, J. Calambokidis, M.F. McKenna, M. Simon, and D.P. Nowacek, 2013. Integrative Approaches to the Study of Baleen Whale Diving Behavior, Feeding Performance, and Foraging Ecology, BioScience 63(2):90-100.

Graham, I.M., E. Pirotta, N.D. Merchant, A. Farcas, T.R. Barton, B. Cheney, G.D. Hastie, and P.M. Thompson. 2017. Responses of bottlenose dolphins and harbor porpoises to impact and vibration piling noise during harbor construction. Ecosphere 8(5):e01793.

Hayes, S.A., E. Josephson, K. Maze-Foley, and P.E. Rosel (Eds.). 2020. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2019. NOAA Technical Memorandum NMFS NE-264. U.S. Department of Commerce, National Marine Fisheries Service. July 2020. 479 pp.

Hayes, S.A., E. Josephson, K. Maze-Foley, P.E. Rosel, and J.E. Wallace (Eds.). 2022. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Reports 2021. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. May 2022. 386 pp.

Maybaum, M.L. 1993. Responses of humpback whales to sonar sounds. Journal of the Acoustical Society of America 94(3):1848.

National Marine Fisheries Service (NMFS). 2023b. Draft U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Reports 2022. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. June 2022. 147 pp.

Northeast Fisheries Science Center (NEFSC) 2022. Draft Ropeless Roadmap: A Strategy to Develop On-Demand Fishing. https://media.fisheries.noaa.gov/2022-07/RopelessRoadmapDRAFT-NEFSC.pdf

Normandeau Associates, Inc. (Normandeau), Exponent, Tricas, T., and Gill, A. 2011. Effects of EMFs From Undersea Power Cables on Elasmobranchs and Other Marine Species. OCS Study Report No. BOEMRE 2011-09. Final report prepared for the U.S. Department of the Interior, Bureau of Ocean Energy Management, Pacific OCS Region.

Ridgway, S.H., E.G. Wever, J.G. McCormick, J. Palin, and J.H. Anderson. 1969. Hearing in the giant sea turtle, Chelonia mydas. Proceedings of the National Academy of Science U.S. 64(2):884-890.

Russell D.J.F., G.D. Hastie, D. Thompson, V.M. Janik, P.S. Hammond, L.A.S. Scott-Hayward, J. Matthiopoulos, E.L. Jones, and B.J. McConnell. 2016. Avoidance of wind farms by harbour seals is limited to pile driving activities. Journal of Applied Ecology 53: 11.

Slater, M., A. Shultz, and R. Jones. 2010. Estimated ambient electromagnetic field strength in Oregon's coastal environment. Prepared by Science Applications International Corp. for Oregon Wave Energy Trust. September 10, 2010. 26 pp.

Tetra Tech, Inc. (Tetra Tech). 2022a. Dominion Energy Coastal Virginia Offshore Wind Commercial Project, Request for Rulemaking and Letter of Authorization (LOA) for Taking of Marine Mammals Incidental to Construction Activities on the Outer Continental Shelf (OCS) within Lease OCS-A 0483 and the Associated Offshore Export Cable Route Corridor. Prepared for Dominion Energy, Submitted to NOAA National Marine Fisheries Service February 2022, Revised March, May, June, and July 2022. 311 pp.

Watkins, W.A., M.A. Daher, K.M. Fristrup, T.J. Howald, and G. Notarbartolo Di Sciara. 1993. Sperm whales tagged with transponders and tracked underwater by sonar. Marine Mammal Science 9(1):55–67.

Würsig, B., T.A. Jefferson, and D.J. Schmidly. 2000. The Marine Mammals of the Gulf of Mexico. Texas A&M College Station: University Press. 232 pp.

Yaghmour, F., Al Bousi, M., Whittington-Jones, B., Pereira, J., García-Nuñez, S. and Budd, J., 2018. Marine debris ingestion of green sea turtles, Chelonia mydas,(Linnaeus, 1758) from the eastern coast of the United Arab Emirates. Marine Pollution Bulletin, 135, pp.55-61.