From:	Grange, Briana
Sent:	Tuesday, June 11, 2019 1:12 PM
To:	'Julie Crocker - NOAA Federal'
Subject:	NRC responses to NMFS requests for additional information for Oyster Creek ESA Section 7 Consultation
Attachments:	Oyster Creek Sect 7 - Responses to NMFS 5-24-19 Requests for Additional Information.pdf

Julie,

With this email, I am transmitting to you the NRC's responses to your May 24, 2019, requests for additional information concerning the Endangered Species Act Section 7 consultation for the shutdown and decommissioning of Oyster Creek Nuclear Generating Station in Ocean County, New Jersey. The information in these responses supplement the NRC's April 30, 2019, request to reinitiate consultation with the NMFS for Oyster Creek. Please let me know if you have any questions are you are reviewing these responses.

Thank you,

Briana

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Endangered Species Act Section 7 Consultation with the National Marine Fisheries Service (NMFS) for Oyster Creek Nuclear Generating Station Shutdown and Decommissioning

Docket No. 50-219; License No. DPR-16

Responses to the NMFS's May 24, 2019, Additional Information Requests

June 11, 2019

Background

On April 30, 2019, the U.S. Nuclear Regulatory Commission (NRC) (2019) requested to reinitiate consultation with the NMFS under the provisions of Section 7 of the Endangered Species Act of 1973, as amended (ESA), related to the shutdown and decommissioning of Oyster Creek Nuclear Generating Station in Ocean County, New Jersey.

On May 24, 2019, the NMFS (2019) requested additional information from the NRC to assist the NMFS perform its review of the proposed action. The NRC's responses to these requests are below.

NRC Responses

1. **Estimated Impingement. I've carefully reviewed the calculations presented by Exelon and noted in your reinitiation. It is my understanding that currently, and expected through March 2024, water withdrawal will only occur through the CWS and will be a maximum of 12,000 gpm. This compares to the fully operational scenario where water was withdrawn through the CWS and DWS with a combined intake of approximately 1,000,000 gpm. In their calculations, Exelon anticipates that the rate of impingement would be 2% of the rate during operations. However, 12,000/1,000,000 is 0.012. Can you explain why Exelon used 0.02 in your calculations rather than 0.012? Just rounding up to be more conservative or am I missing something in the math? Also, please note that I reran the numbers using an annual average derived from the actual observed take in 2012-2018 and compared it to the Exelon estimate which was based on the numbers predicted in the 2011 BiOp. The end results were very similar, but I would like to understand the 0.02 vs. 0.012. I also looked at just CWS impingements and that also didn't significantly change the expected impingement rate during the shutdown period.**

   The NMFS's assumption is correct: Exelon anticipates that the sea turtle impingement rate under shutdown conditions through March 2024 would be 2 percent of the impingement rate during full power operations to be conservative in its calculations. In its October 2018 evaluation, Exelon (2018a) states on page A-3:

   > …the OCNGS intake flow rate between December 2018 and the first quarter of 2024 will be reduced to less than two percent of the flow rate during full power operation (i.e., 12,000 ÷ $1x10^6$ = 0.012). The accompanying flow velocity in the intake canal at this reduced intake flow rate will be less than 0.02 fps.

   In its April 2019 reinitiation request, the NRC (2019) adopts Exelon's estimate of 2 percent for impingement to maintain the conservative assumption.

2. **It is my understanding that water withdrawal will cease in 2024, but NRC's action related to decommissioning will not end until 2080. As such, it seems that needs to be the timeframe for the reinitiated consultation. Is that correct? Will there be any intervening NRC actions between now and 2080?**

   Yes, the timeframe for the consultation is through April 2080 when Exelon anticipates that the Oyster Creek site will be fully restored. Over this period, the NRC will continue to oversee the licensee's compliance with its renewed facility operating license.[1] Exelon may pursue additional amendments to its license or exemptions to NRC regulations, which the NRC would review and either grant or deny. However, at this time, there are no scheduled or known future Federal actions that would trigger the NRC staff to perform an environmental review.

3. **You and Exelon note that dredging may be necessary to facilitate the movement of plant components off site via barge. These activities will need to be considered in the reinitiation. It is my understanding that dredging has occurred in the area previously. It may be reasonable for the purposes of the section 7 consultation to assume that past dredging practices (i.e., dredge type) would be used for future dredging. We are not aware of any impingement or entrainment of sea turtles in a suction dredge. You would need to consider any impacts to sea turtle forage and other habitat features. I can provide you with an example of a dredge analysis if that would be helpful. Similarly, because vessel strike is a concern for sea turtles, you will need to consider effects of an increase in vessel traffic (i.e, the barges). I've attached a copy of the consultation we did for the North Anna project that considered use of a temporary offloading facility and may be helpful to you.**

   During the decommissioning period, Exelon (2018b) anticipates that it will ship dismantled large plant components by barge from an existing barge landing at the north bank of Oyster Creek immediately east of U.S. Highway 9. The licensee has periodically used this barge landing during both the construction and operation periods to transport large components to and from the site. The barge landing contains no permanently installed equipment or infrastructure, and Exelon anticipates that none would be needed to support barge traffic and loading associated with decommissioning. In connection with barge traffic, Exelon (2018b) anticipates that dredging in Oyster Creek between the barge landing and Barnegat Bay to an unknown depth could be required to provide enough depth for barge vessels to pass. Dredging may also be required in Barnegat Bay itself to allow passage of loaded barges between the mouth of Oyster Creek and Barnegat Inlet. Any dredging would require Exelon to obtain U.S. Army Corps of Engineers and appropriate New Jersey Department of Environmental Protection, Division of Land Use Regulation, permits. Exelon (2018b) would dispose of dredge spoils in an existing State of New Jersey dredge spoils basin on Exelon property east of the barge landing. Figure 1 below depicts the location of the barge landing and the dredge spoils basin within the former Finnigan Farm portion of the Oyster Creek site.

[1] The NRC issued Amendment No. 295 to the Oyster Creek renewed facility operating license on October 26, 2018, which revised the license and the associated technical specifications to permanently defueled technical specifications consistent with the permanent cessation of operations and permanent removal of fuel from the reactor vessel. See NRC 2018.

Figure 1. Location of Barge Landing on Oyster Creek Site

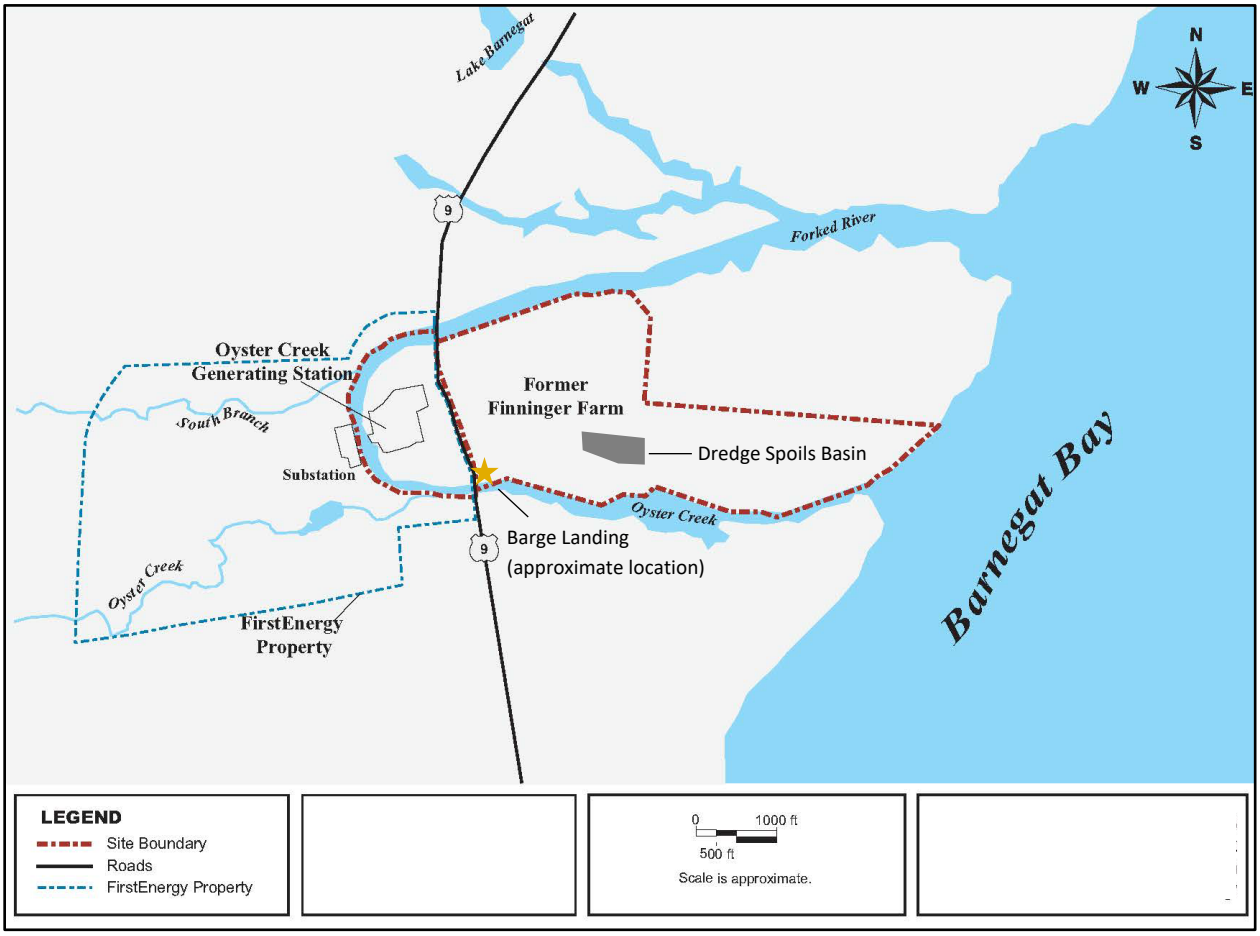

Figure source: modified from Figure 2-3 in AmerGen 2005

For the purposes of its analysis, the NRC staff assumes that barge vessel traffic would only occur during the large component removal phase of the decommissioning period. Exelon (2018b) currently anticipates that this phase would require one year to complete and would occur between June 2075 and June 2076.[2] The NRC staff conservatively assumes that large component removal would necessitate up to four barge loads such that barge vessel traffic would occur quarterly for the one-year large component removal phase. The NRC staff also conservatively assumes that prior to this phase of decommissioning, dredging would be required to allow for vessel traffic. The NRC staff assumes that dredging would take place in the first half of 2075 and that dredging would only occur once because large component removal would be completed within a year. Based on information on past dredging within the area, one year is not enough time for sediment to build up to a degree that would necessitate further dredging. Finally, the NRC staff assumes that cutterhead

[2] See Table 2.1, "Decommissioning Schedule and Plant Status Summary," in the Oyster Creek Post-Shutdown Decommissioning Activities Report (Exelon 2018b).

(i.e., suction) dredging would be performed because this is the method of dredging that has been undertaken in the past.[3]

Vessel Traffic

Vessel traffic associated with Oyster Creek decommissioning could strike sea turtles in Barnegat Bay and Oyster Creek and result in injury or mortality of those turtles. The infrequency of vessel traffic associated with decommissioning would limit the exposure of sea turtles to this risk. Other factors that affect the risk of vessel strike include vessel speed, bottom clearance, and waterway width or other obstructions. Barges typically travel at slow speeds, which reduces the risk of vessels striking sea turtles because turtles would have greater opportunity to avoid the vessels. Dredging would ensure that there would be at least several feet of clearance between barges and the bottom of the river or bay at the shallowest points such that sea turtles would be able to swim under the vessel to avoid being hit. Oyster Creek and Barnegat Bay do not contain any other geographic obstructions, such as areas of narrow width, that would limit the ability of sea turtles to avoid vessels. Given the slow speeds of barge vessels, the clearance between the vessels and the river/bay bottom, and the unimpeded geography of the affected waterways, the NRC staff expects that sea turtles would be able to avoid any vessels such that any potential impacts of vessel traffic are discountable because they are extremely unlikely to occur. Additionally, the NRC staff is unaware of any sea turtle vessel-strike injuries or mortalities resulting from barge traffic in connection with Oyster Creek construction or operations, which further supports this conclusion. The NMFS (2016, 2017) has also assessed the impacts of barge traffic, among other effects, as part of its ESA Section 7 consultations with the NRC for other projects requiring regular barge deliveries and found the potential impacts of vessel traffic on sea turtles and other mobile aquatic listed species (sturgeon) to be discountable.

Cutterhead Dredging

During cutterhead dredging, the dredge head is buried in the sediment, which produces a suction flow field. The amount of suction is a function of the diameter of the dredge pipe and the linear flow rates inside the pipe (Clausner and Jones 2004). Large pipes and higher flow rates create greater suction velocities and a wider flow field. The suction produced decreases exponentially with distance from the dredge head (Boysen and Hoover 2009). Cutterhead dredge heads do not begin operating until they are placed within dredge site sediments, which makes it extremely unlikely for sea turtles to be exposed to the suction. During dredging, sea turtles are not known to be vulnerable to entrainment in cutterhead dredge heads because sea turtles are able to avoid the relatively small intake size and low intake velocity associated with this type of dredge. Sea turtle entrainment is, therefore, discountable because it is extremely unlikely to occur based on the lack of documented interactions between sea turtles and cutterhead dredges. These assumptions and conclusions are further supported by the NMFS's (2018) analysis of cutterhead dredging during a 2018 programmatic ESA Section 7 consultation with the Federal Highway Administration.

Dredging also has the potential to affect sea turtles indirectly through impacts on prey, forage, or other habitat features. Dredging of any kind results in the direct removal of benthic habitat along with infaunal and epifaunal organisms of limited mobility. Thus, dredging can be expected to cause short-term reductions in biomass of benthic organisms. Dredging also creates sediment plumes that increase water turbidity, which can adversely affect aquatic biota and create short-term decreases

[3] See Section 2.2.3, p. 2-22 of NRC 2007.

in habitat quality during and after dredging. Turbidity primarily affects liquid-breathing organisms, such as fish and shellfish, as well as aquatic plants because turbid conditions typically decrease photosynthetic capabilities. Turbidity levels associated with the sediment plumes of cutterhead dredges typically range from 11.5 to 282.0 mg/L with decreasing concentrations at greater distance from the dredge head (Nightingale and Simenstad 2001). Studies of benthic community recovery following dredging indicate that species abundance and diversity can recover within several years of dredging (Michel et al. 2013). Specifically, within temperate, shallow water regions containing a combination of sand, silt, or clay substrate, such as the conditions present in the Oyster Creek action area, benthic communities can recover in one to eleven months, according to studies reviewed by Wilbur and Clarke (2007).

Sea turtles prey on a variety of pelagic, epibenthic, and benthic organisms, some of which could be affected by dredging. Kemp's ridley and loggerhead sea turtles are primarily carnivorous. Kemp's ridley turtles eat sea urchins, squid, and jellyfish, as well as certain benthic shellfish. Loggerheads eat sea urchins, horseshoe crabs, clams, mussels, and other benthic invertebrates. Juvenile green sea turtles are omnivorous and eat insects, crustaceans, seagrasses, algae, and worms, while adult green turtles are herbivores and restrict their diets to seagrasses and algae. The areas that would be affected by dredging are freshwater or estuarine and, therefore, do not provide habitat for many preferred sea turtle prey and forage (e.g., sea urchins, squid, jellyfish, and seagrasses). Pelagic prey species would also be largely unaffected because dredging primarily disrupts the lower portion of the water column and substrates. Adult green turtles would not be expected to forage in the action area due to lack of preferred vegetation. Freshwater and estuarine mollusks and crustaceans, which are prey of Kemp's ridley turtles, loggerheads, and juvenile green turtles, are present in the area that would be affected by dredging. Smaller mollusks and crustaceans may be susceptible to entrainment into the dredge head. Larger individuals or those that are farther from the dredge head could move away from the suction flow field to avoid being entrained. All prey in the dredge area could also be affected by other factors, such as sedimentation and turbidity. However, as explained above, the local benthic community would likely recover within one year or less such that any local reductions in benthic biomass or other observable impacts would be relatively short term. In summary, the NRC staff concludes that the impacts of dredging on sea turtle prey and forage would be minimal for the following reasons: dredging would only occur once over the course of the proposed action; the dredge area contains a small portion of the available prey base for the sea turtle species present in the action area; the dredge area does not provide habitat for many preferred sea turtle prey and forage; and the local benthic community would recover relatively quickly.

Limited information is available on the effects of increased turbidity on sea turtles. Because sea turtles breath air, they are not subject to the same potential respiratory effects of high turbidity as fish and shellfish. Sea turtles are most likely to be affected by turbidity if dredging-induced sedimentation plumes block passage or affect normal behaviors or if sediment settles on top of existing substrates and affects sea turtle prey.[4] Because sea turtles are highly mobile, individuals are likely to be able to avoid any sediment plumes caused by dredging. Sediment plumes and associated turbidity would also be short term effects that would primarily be experienced during

[4] NMFS. Letter from to E. Biondi, Federal Highway Administration, regarding the Federal Highway Administration Greater Atlantic Regional Fisheries Office 2018 Not Likely to Adversely Affect Program. April 30, 2018. Available at <https://www.greateratlantic.fisheries.noaa.gov/protected/section7/FHWA%20documents/fhwa_programmatic_esa_s7_consultation_april_2018.pdf> (accessed June 10, 2019).

operation of the dredge and would end soon after dredging ceased. Sedimentation could also affect benthic prey of sea turtles, including mollusks and crustaceans. However, these individuals could avoid the plume or uncover themselves from any sedimentation experienced during dredging such that these impacts would be negligible and short-term and would not measurably affect the available prey base within the dredged area. Based on the above discussion, the NRC staff concludes that turbidity and sedimentation associated with dredging would not noticeably or measurably affect sea turtles or their prey or forage.

Based on the above analysis, the NRC staff expects that all effects associated with cutterhead dredging on sea turtles would be too small to be meaningfully measured or detected and would, therefore, be insignificant. Additionally, the NRC staff is unaware of any dredging-related effects on sea turtles during the Oyster Creek construction and operation periods, which further supports this conclusion. The NMFS (2017) has also assessed the impacts of dredging, among other effects, as part of its ESA Section 7 consultation with the NRC for other projects and found the potential impacts of dredging on sea turtles to be discountable.

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