PSEGESPEnvDocsPEm Resource

From: Fetter, Allen
Sent: Tuesday, May 03, 2016 4:05 PM
To: PSEGESPEnvDocsPEm Resource
Subject: NMFS concurrence letter supplemental BA for PSEG ESP review
Attachments: Scanned from a Xerox multifunction device (6).pdf

From: Julie Crocker - NOAA Federal [mailto:julie.crocker@noaa.gov]
Sent: Tuesday, May 03, 2016 3:51 PM
To: Fetter, Allen <Allen.Fetter@nrc.gov>
Cc: Dixon-Herrity, Jennifer <Jennifer.Dixon-Herrity@nrc.gov>
Subject: [External_Sender] Re: Re: Query: Status of response letter to NRC? (PSEG ESP)

Scanned, signed PDF attached.

Julie

On Tue, May 3, 2016 at 2:36 PM, Julie Crocker - NOAA Federal <julie.crocker@noaa.gov> wrote:

> Hi Allen and Jennifer -
>
> Following up on this. The letter is in final clearance...I expect to have it to you no later than tomorrow morning. I understand that there is increasing interest in receipt. Please know we are working to get it wrapped up and to you as quickly as possible and understand that it is important to your process to have it before May 5. I will be sending you a scanned PDF of the letter as soon as it is signed and dated. There are no significant changes from the draft that was shared previously.
>
> Julie
>
> On Mon, May 2, 2016 at 10:12 AM, Fetter, Allen <Allen.Fetter@nrc.gov> wrote:
>
> > Good Morning Julie,
> >
> > Is the concurrence letter still on track for issuance by COB today? I'm asking as NRC senior management interest in this item is becoming notable.
> >
> > Many Thanks,
> >
> > Allen
> >
> > **From:** Julie Crocker - NOAA Federal [mailto:julie.crocker@noaa.gov]
> > **Sent:** Wednesday, April 27, 2016 4:17 PM

To: Fetter, Allen <Allen.Fetter@nrc.gov>
Cc: Dixon-Herrity, Jennifer <Jennifer.Dixon-Herrity@nrc.gov>; Delligatti, Mark <Mark.Delligatti@nrc.gov>; Akstulewicz, Frank <Frank.Akstulewicz@nrc.gov>
Subject: [External_Sender] Re: Query: Status of response letter to NRC? (PSEG ESP)

Hi

Yes - I'm hoping to get it out by COB Monday.

Julie

On Tue, Apr 26, 2016 at 2:24 PM, Fetter, Allen <Allen.Fetter@nrc.gov> wrote:

> Julie,
>
> We received the Board's initial decision on the PSEG early site permit (ESP), and, by regulation, the permit needs to be issued by NRC within ten (10) days. Could you please let me know if the letter will be out of clearance and finalized by May 5, 2016?
>
> Thanks,
>
> Allen H. Fetter, Senior Project Manager
>
> US Nuclear Regulatory Commission
>
> Office of New Reactors (NRO)
>
> Division of New Reactor Licensing
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> Environmental Projects Branch
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Julie Crocker

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Sent Date: 5/3/2016 4:04:48 PM
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From: Fetter, Allen

Created By: Allen.Fetter@nrc.gov

Recipients:
"PSEGESPEnvDocsPEm Resource" <PSEGESPEnvDocsPEm.Resource@nrc.gov>
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National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

MAY - 3 2016

Jennifer Dixon-Herrity, Chief
Environmental Projects Branch Division
New Reactor Licensing Office
US Nuclear Regulatory Commission
Washington, DC 20555-0001

RE: Docket: 52-043 Draft Supplemental Biological Assessment for Early Site Permit at PSEG Site Artificial Island, Lower Alloways Creek Township, Salem County, NJ

Dear Ms. Dixon-Herrity,

We have reviewed your request for consultation pursuant to section 7 of the Endangered Species Act, inclusive of the Biological Assessment (BA) and supplemental BA prepared by the U.S. Nuclear Regulatory Commission (NRC) for PSEG Nuclear, LLC's (PSEG) application for an Early Site Permit (ESP) for site approval for a potential new nuclear generating station (NGS) adjacent to PSEG's existing Salem and Hope Creek NGSs along the Delaware River on Artificial Island, Lower Alloways Creek Township, Salem County, New Jersey. The U.S. Army Corps of Engineers' Philadelphia District (USACE) is proposing to issue Clean Water Act Section 404 and Section 10 Rivers and Harbors Act permits for specific site preparation activities generally involving dredging, infilling, and structures in navigable waters. NRC is the lead Federal agency for this consultation. We concur with your determination that the proposed action, as defined in the Supplemental BA, is not likely to adversely affect any listed species under our jurisdiction; however, we disagree with your rationale, to the extent it addresses possible effects of construction and operation of a potential new nuclear facility at the site. The justification for our concurrence that the proposed action, as defined in the Supplemental BA (namely, NRC's proposed issuance of an ESP for site approval for a potential new nuclear reactor, and the U.S. Army Corps of Engineers' (USACE) proposed issuance of permits for site preparation activities involving dredging, infilling, pile driving, and barge traffic for installing the haul road bulkhead, building the barge unloading and mooring facility, installing the cooling water intake and discharge structures, and building an access road/causeway), is not likely to adversely affect listed species is provided below. However, we first want to address the scope of the analysis in your BA and Supplemental BA, and your rationale that the proposed action is not likely to adversely affect listed species.

Scope of the analysis

As mentioned above, the NRC is considering PSEG's application for an ESP. If issued, the ESP is valid for up to 20 years and can be extended for an additional 20 years, for a total of 40 years. The USACE is proposing to issue a permit authorizing certain pre-construction activities that would be allowed if the ESP is issued.

We understand that an ESP does not authorize the construction and operation of a NGS. An ESP is a Commission approval of a site for one or more nuclear power facilities. Issuance of an ESP is a process that is separate from the issuance of a construction permit (CP), an operating license (OL), or a combined construction permit and operating license (combined license or COL) for such a

facility. The ESP application and review process makes it possible to evaluate and resolve safety and environmental issues related to siting before the applicant makes a large commitment of resources. If an ESP is approved, the applicant can "bank" the site for up to 20 years for future reactor siting. An ESP does not, however, authorize construction and operation of a nuclear power plant. To construct and operate a nuclear power plant, an ESP holder must obtain a CP and an OL, or a COL, which NRC staff confirmed would be considered separate major Federal actions that require their own environmental reviews in accordance with 10 CFR Part 51. The regulations states that "matters resolved in the ESP proceeding are considered resolved in any subsequent proceeding absent identification of new and significant information;" it is our understanding that this statement does not limit the requirement for reinitiation of consultation if any of the triggers for reinitiation of consultation identified at 50 CFR Part 402 have been met, or limit the requirement to carry out ESA section 7 consultation on any new Federal action (e.g., issuance of a CP or COL).

PSEG submitted an application to the NRC for an ESP that did not include a request for a limited work authorization (LWA). Prior to receiving a CP or COL, the holder of an ESP without an LWA may only perform preliminary activities that do not require NRC authorization, as enumerated in 10 CFR 50.10(a)(2). These preliminary activities can include clearing and grading, excavating, erection of support buildings and transmission lines, and other associated activities. This consultation considers the effects of those preliminary activities (referred to as "pre-construction"). At this time, PSEG has not applied for a construction or operating license, and NRC is not proposing to issue either type of operating license at the PSEG ESP site.

Our concern regarding the scope of analysis stems from what we perceive as a lack of clarity regarding the relationship between the original June 2014 BA[1] that was part of the DEIS and the August 2015 Supplemental BA submitted by letter on August 21, 2015. Specifically, the August 21, 2015, letter states that the Supplemental BA and the Supplemental EFH Assessment "augment the information provided in the previous BA and EFH Assessment; hence are complements, not replacements. Both the original documents and the enclosed supplements will be published in Appendix F of the final environmental impact statement (FEIS)" (Letter to Louis Chiarrella, NMFS, from Jennifer Dixon-Herrity, NRC, August 21, 2015). However, the Supplemental BA resulted in part from our request for clarification regarding the activities to be considered in this Section 7 consultation. Notably, while the 2014 BA included discussion of the operation of the cooling water intake system in the "Description of the Proposed Action" and "Proposed Action Effects Analysis" sections, NRC removed all discussion of the cooling water intake system and effects NRC ascribes to it from both of those sections in the Supplemental BA. We interpret that to mean that NRC's rationale for its "not likely to adversely affect" determination does not rely on consideration of the effects of the operation of the cooling water intake system. If NRC's rationale does incorporate its analysis of effects of the operation of the cooling water intake system in the 2014 BA, then we disagree with it for the reasons discussed below.

We have considered whether future construction and operation of a new NGS at the PSEG ESP site meet the definition of "indirect", "interrelated" or "interdependent" actions and have determined that they do not. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur. While the construction and operation of a new NGS at this site would occur after the activities authorized by the ESP and USACE permit were carried

[1] The June 2014 BA was submitted to us by letter dated August 19, 2014.

out and, therefore, would be "later in time," the effects of construction and operation of a new NGS are not reasonably certain to occur for the following reasons. First, we do not know if PSEG is likely to apply for construction and operating licenses or if doing so will be economically viable during the 20-40 year period the ESP is effective. NRC indicated to us that many different factors influence whether a construction and operation license is sought, including but not limited to the cost of natural gas and other energy sources, as well as clean air act restrictions on other facilities, which affect profitability of a nuclear facility. Second, even if PSEG did apply for a construction and operation license, we do not know whether or when NRC would propose to issue them or whether other agencies would propose to issue necessary permits or authorizations. Even if PSEG is likely to construct and operate a new NGS, no designs have been selected. The 2014 BA references standards in the EPA's Clean Water Act Section 316(b) cooling water intake rule, which along with NMFS' Biological Opinion on it, is currently being challenged in court. However, we have no indication that New Jersey, which has delegated authority under the Clean water Act, has made its determinations regarding best available technology and drafted a permit for the cooling water intake system. As a result, we have no way to predict any of the features of a new NGS or what the effects of any new facility's operations would be. In addition, over the next 20-40 years, the ecological conditions of the project area and the site may change and new information is likely to become available on listed species, critical habitat may be designated and new species may be listed under the ESA. Therefore, any effects are not knowable at this time and are not reasonably certain to occur.

Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02). The effects of interrelated and interdependent activities still need to be reasonably certain to occur to be included in an analysis. Future construction and operation of a new NGS would be carried out to provide electricity to the electric grid; therefore, future construction and operation of a new NGS has independent utility apart from the proposed ESP. It is not necessary for an applicant to obtain an ESP prior to applying for a construction and operation license, therefore, any future potential construction and operation of a new NGS does not depend on the ESP for justification. As such, these future potential actions regarding construction and operation are not considered interdependent or interrelated actions, and effects of any future construction and operation of a new NGS are not considered to be indirect effects of the action under consultation. Any future proposed issuance of a construction and operating license as well as the proposed issuance of any other permits necessary for construction and operation would be considered in a subsequent and separate environmental review and would be the subject of separate ESA Section 7 consultation between NMFS, NRC and possibly USACE. Thus, this consultation does not evaluate the effects of any future activities beyond the pre-construction activities that could be authorized under the ESP, and our rationale for concluding the proposed action as narrowly defined in the Supplemental BA is not likely to adversely affect listed species does not incorporate an analysis of the effects of the potential operation of some sort of cooling water intake system. The proposed action is completely independent from the existing facilities owned and operated by PSEG (Salem Unit 1, Salem Unit 2 and Hope Creek), and the effects of the continued operations of those facilities are not indirect effects of the issuance of the ESP or interrelated or interdependent actions.

We note that the Supplemental BA (page 1) states that NRC will engage in a new consultation in accordance with the ESA regarding any future proposal to issue construction and operation license(s) for a facility at the Artificial Island site. We look forward to that opportunity to review

the best available scientific and commercial data in existence at that time and to assist you in an analysis of effects to listed species and any critical habitat when construction and operational details are known.

Our justification for a "not likely to adversely affect" finding

As currently proposed, the site preparation activities that could be undertaken under the authority of a USACE permit once an ESP is issued and before a construction and operation license is granted, include:

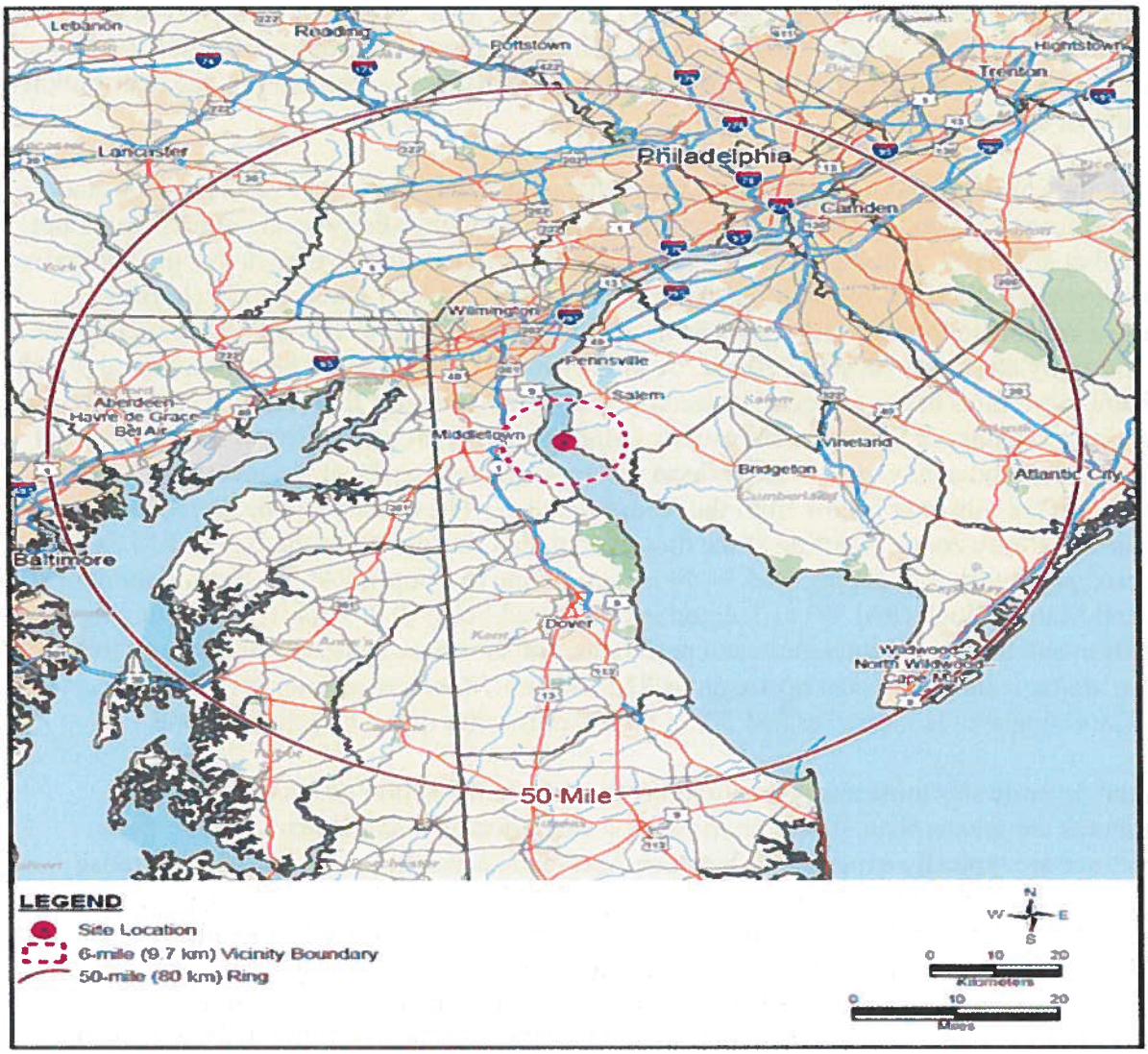
- approximately 92 acres of new dredging in the Delaware River to construct a barge unloading and mooring facility and to allow for the installation of potential future intake and discharge pipes;
- 131 acres of permanent wetland impacts, 81.6 acres or temporary wetland impacts and 1 acre of open water fill within the Delaware River to construct support and service facilities;
- construction of a barge terminal and an access road/causeway; and,
- installation of bulkheading along the shoreline of the river.

Action area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR § 402.02). The action area consists of the footprint of the proposed PSEG site, inclusive of the area to be dredged and extending into the Delaware River where increased turbidity and underwater noise will be experienced during dredging and pile driving. The action area also includes the area where construction support vessels will operate as described below and the barge transport routes (from existing barge terminals in the Delaware River to the project site). This area is expected to encompass all of the direct and indirect effects of the proposed project.

The PSEG Site is located on the southern part of Artificial Island in Lower Alloways Creek Township, Salem County, New Jersey. Artificial Island was formed from dredge spoils produced as a result of maintenance dredging of the Delaware River navigation channel by the ACOE. Lands developed by the USACE as the Artificial Island Confined Disposal Facility (CDF) for the placement of material dredged from the Delaware River are located immediately north of the PSEG property along the east bank of the river. The site is approximately 7 miles east of Middletown, Delaware, 7.5 mi southwest of Salem, New Jersey, and 9 miles south of Pennsville, New Jersey at Latitude: 39°28′23.744″ North and Longitude: 75°32′24.332″ West. The Delaware River borders the western and southern sides of the existing PSEG property. Lands consisting of tidal marsh are located to the north and east of the PSEG property. PSEG's proposed site is located 15 miles south of the Delaware Memorial Bridge near Delaware River Mile 52 on the east side of the Delaware River. The portion of the river flowing adjacent to the site is 2.5 mi wide.

The benthic macroinvertebrate community in the Delaware River Estuary near the PSEG Site was characterized during two periods, 1971 to 1976, and again during the spring and fall of 2009. The composition and species richness of the macroinvertebrate community in the Delaware River Estuary near the site is similar to those benthic communities in other areas of the Delaware Bay within several miles of the site. A total of 19 invertebrate taxa were identified during the 2009 sampling period by ponar dredge, but only a few species dominated the composition of the benthic community in numerical abundance and standing crop biomass. These species included polychaetes, amphipods, and isopods (PSEG 2015-TN4280; PSEG 2013-TN2586).



NMFS Listed Species and Designated Critical Habitat in the Action Area

Shortnose sturgeon (*Acipenser brevirostrum*) and Atlantic sturgeon occur in the Delaware River and estuary. Four DPSs of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus)* are listed as endangered *(New York Bight, Chesapeake Bay, Carolina, and South Atlantic*) and one DPS as threatened (Gulf of Maine) under the ESA. The marine range for all five DPSs includes all marine waters, coastal bays and estuaries, from Labrador Inlet, Labrador, Canada to Cape Canaveral, FL. Both Atlantic and shortnose sturgeon are known to occur in the action area. Currently, no critical habitat is designated in the action area. However, we intend to propose designation of critical habitat for Atlantic sturgeon in the near future. If we propose critical habitat in the action area, NRC and/or the USACE should contact us to determine whether additional analysis is required.

Shortnose sturgeon eggs and larvae do not occur in the action area. Due to the benthic, adhesive nature of the eggs, they only occur in the immediate vicinity of the spawning area, located at least 80 miles upstream of the action area. Immobile larvae are also limited to an area close to the

spawning grounds and, therefore, do not occur in the action area. Free swimming larvae occur only in freshwater and do not occur in the action area, which is saline. Distribution of adult and juvenile shortnose sturgeon in the action area is influenced by seasonal water temperature, the distribution of forage items, and salinity.

Although they have been documented in waters with salinities as high as 31 parts per thousand (ppt), shortnose sturgeon are typically concentrated in areas with salinity levels of less than 3 ppt (Dadswell et al. 1984). Jenkins et al. (1993) demonstrated in lab studies that 76 day old shortnose sturgeon experienced 100% mortality in salinity greater than 14 ppt. One year old shortnose sturgeon were able to tolerate salinity levels as high as 20 ppt for up to 18 hours but experienced 100% mortality at salinity levels of 30 ppt. A salinity of 9 ppt appeared to be a threshold at which significant mortalities began to occur, especially among the youngest fish (Jenkins et al. 1993). The distribution of salinity in the Delaware estuary exhibits significant variability on both spatial and temporal scales, and at any given time reflects the opposing influences of freshwater inflow from tributaries versus saltwater inflow from the Atlantic Ocean. The estuary can be divided into four longitudinal salinity zones. Starting at the downstream end, the mouth of the Bay to RM 34 is considered polyhaline (18-30ppt), RM 34-44 is mesohaline (5-18ppt), RM 44-79 is oligohaline (0.5-5ppt), and Marcus Hook (RM 79) to Trenton is considered Fresh (0.0-0.5ppt). Based on this information and the known tolerances and preferences of shortnose sturgeon to salinity, shortnose sturgeon are most likely to occur upstream of RM 44 (rkm 70) where salinity is typically less than 5ppt. The action area is located at RM 50, in the lower reaches of the oligohaline zone.

Adult and juvenile shortnose sturgeon are likely to occur in the action area any time water temperatures are greater than 10°C (the trigger for movement to overwintering areas); these temperatures are typically experienced between April and November[2]. All but two shortnose sturgeon documented at the Salem nuclear power plant, adjacent to the action area, have occurred between April and November. One dead shortnose sturgeon was observed at the intake in January 1978 and one in late November 2007. However, due to the level of decomposition observed with these fish, it is unlikely that they died at the intakes; it is likely that they died further upstream and drifted down river to the intakes; therefore, we do not consider these individuals to indicate that shortnose sturgeon occur in the action area during the winter. Salinity is lowest in the action area during the winter months when shortnose sturgeon are known to occur at overwintering locations further upstream; the higher salinities experienced in the action area outside of the overwintering period is expected to reduce the number of shortnose sturgeon in the action area. Shortnose sturgeon in the part of the action area where the pre-construction work will occur are migrating and foraging.

Atlantic sturgeon are well distributed throughout the Delaware River and Bay and could be present year round in the action area. Spawning is thought to occur between river mile 75-93 and 106-118. Eggs are only likely to be present within these reaches and not in the action area. Because of low tolerance to salinity, larvae are not present in the action area. During times of year when salinity in

[2] For example, in 2012 water temperatures fell to 10°C on November 9 and rose above 10°C on April 11, 2013. In the Fall of 2013, water temperatures fell to 10°C on November 14. Water temperatures reached 10°C on April 12, 2014. This information is based on water temperature taken at PORTS 8537121 at Ship John Shoal, NJ. Water temperature is measured at 12.4' below MLLW. Data is available at: http://tidesandcurrents.noaa.gov/stationhome.html?id=8537121 (last accessed on July 2, 2014).

the action area is low (i.e., winter) some older juveniles could be present in the action area. The majority of Atlantic sturgeon in the action area will be subadults or adults. In the action area, any young of the year (juveniles) would only originate from the New York Bight DPS because these life stages are restricted to their natal river. Subadults from any of the five DPSs could be present in the action area; this life stage is most likely to be in the action area from mid-April to mid-November although some subadults may overwinter in the river and be present year round. Adults are only likely to be present in the river for approximately a four week period from the late spring to early summer, dependent on annual water temperature. Nearly all adults in the river are likely to originate from the New York Bight DPS, but tracking indicates that occasionally adults are present in rivers outside their DPS of origin. Atlantic sturgeon in the action area are expected to be migrating or foraging opportunistically.

Four species of federally listed threatened or endangered sea turtles under our jurisdiction are found seasonally in Delaware Bay: the threatened Northwest Atlantic Ocean distinct population segment (DPS) of loggerhead (*Caretta caretta*), and the endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles. Sea turtles are most likely to occur in the action area between June and October when water temperatures are above 11°C and depending on seasonal weather patterns, could be present in May and early November. In the Delaware River, sea turtles occur as far upstream as Artificial Island; the action area is the northern extent of the species range in Delaware Bay. The action area is not a high use area for sea turtles and presence is expected to a limited number of occasional transient individuals.

Effects of Pre-Construction Activities

If an ESP is issued, PSEG may pursue certain site preparation activities. PSEG has submitted an application to USACE to authorize these activities. Site preparation activities that may affect Atlantic and shortnose sturgeon and sea turtles are limited to those activities that result in effects in the Delaware River. These activities consist of dredging, pile installation and operation of project support vessels. NMFS listed species will not be exposed to effects of other activities occurring on land or in wetlands.

Dredging

According to the applicant's Supplemental BA, the new barge storage area and unloading facility would require dredging about 440,000 yd^3 of sediment to deepen a 61 acre area by 4.5 feet (PSEG 2014). An additional 0.05 acre of river bottom habitat would be dredged for installation of seven 20-ft-diameter barge mooring caissons. Dredging to support the potential future installation of a new intake structure would result in the removal of about 225,000 yd^3 of sediment to deepen a 31 acre area by 4.5 feet (PSEG 2014). Dredging, grading, and backfilling activities would be required to support the potential future installation of a new discharge structure; approximately 0.2 acres of tidal waters would be affected (PSEG 2014).

All dredging will be done by one hydraulic suction dredge; dredged material disposal would be by direct pipeline to Artificial Island (PSEG 2015). No maintenance dredging is planned or proposed for authorization by the USACE. In total, approximately 92 ac of open water habitat would be permanently affected by dredging, which will occur over a 2-month period (USACE 2015). An increase in suspended sediments would occur during dredging activities; however, PSEG determined that due to the natural high turbidity of the Delaware Estuary at the project location, any increase in sedimentation would not be detectable above background levels (PSEG 12 2015). No dredging will occur between March 1 and June 30.

Potential for Impingement or Entrainment in the Dredge
Impingement or entrainment in hydraulic cutterhead dredges may kill or injure sturgeon. Sea turtles are too large to be impinged or entrained in cutterhead dredges. No interactions between sea turtles and the dredge are expected to occur.

In order for sturgeon to be impinged or entrained in the cutterhead dredge, an individual needs to be on the bottom and within very close proximity to the cutterhead. Studies indicate that small, juvenile sturgeon (less than 18.3 cm fork length) need to be within 1.5-2 m of the cutterhead for there to be any potential for entrainment (Boysen and Hoover 2009). Because the dredge moves slowly and sturgeon are highly mobile, it is likely that any sturgeon in the area to be dredged would easily be able to avoid the dredge. The risk of exposure is further reduced because the cutterhead, when operating normally, is buried into the bottom sediment and fish in the water column would not be exposed to the cutterhead. This assumption regarding the likelihood of avoidance is supported by recent monitoring work completed in the James River (Virginia) and the Delaware River (Reine *et al.* 2014; ERC 2012). In both studies, the movements of tagged sturgeon were tracked in an area where a cutterhead dredge was operating. No sturgeon were impinged or entrained by the dredge.

While entrainment of smaller sturgeon in cutterhead dredges has been observed (as evidenced by the presence of a few individual shortnose sturgeon at disposal sites), these instances are rare and have been limited to dredging events that occur near sturgeon overwintering areas where sturgeon are known to form dense aggregations. The density of sturgeon in these overwintering areas by itself increases the risk of interaction with dredge equipment. This risk is further increased at overwintering areas because evidence suggests that sturgeon may be less responsive to stimuli while overwintering, which may make it less likely that sturgeon would avoid a dredge during this time period. Overwintering aggregations do not occur in the action area and any sturgeon in the action area are expected to be active and mobile, not sedentary. Cutterhead dredging occurs annually throughout the Delaware River, and disposal sites are monitored for evidence of interactions with sturgeon. The only recorded interactions have occurred when dredging occurred in overwintering areas. Based on the best available information, it is extremely unlikely that any sturgeon would be impinged or entrained in a cutterhead dredge operating within the project site; effects to sturgeon from the proposed hydraulic dredging operations are discountable.

Dredging Interactions – Sediment Plume
Dredging operations cause sediment to be suspended in the water column. This results in a sediment plume in the water, typically present from the dredge site and decreasing in concentration as sediment falls out of the water column as distance increases from the dredge site. The nature, degree, and extent of sediment suspension around a dredging operation are controlled by many factors including: the particle size distribution, solids concentration, and composition of the dredged material; the dredge type and size, discharge/cutter configuration, discharge rate, and solids concentration of the slurry; operational procedures used; and the characteristics of the hydraulic regime in the vicinity of the operation, including water composition, temperature and hydrodynamic forces (i.e., waves, currents, etc.) causing vertical and horizontal mixing (USACE 1983).

PSEG and USACE have determined, due to the type of dredge to be used, the materials to be removed and the naturally turbid conditions in the action area, any increase in turbidity associated with dredging is expected to be undetectable above background levels. We reviewed the information and analysis presented in the Supplemental BA and agree with the analysis. Therefore, we do not expect any sturgeon or sea turtles or their prey to be exposed to any turbidity levels that

are outside of normal background levels. Any effects to these species from an increase in turbidity are extremely unlikely to occur.

Effects to Benthic Resources

While the broad action area supports a variety of benthic resources that sturgeon are likely to feed on, the dredge site has predominantly silt substrate, limited benthic resources, and no SAV or shellfish beds. As there are few benthic invertebrates for sturgeon to eat in the area to be dredged, any foraging by sturgeon is expected to be limited to occasional opportunistic events. Given this, the loss of a limited amount of potential forage will not have any measurable or detectable effects to sturgeon; therefore, these effects are insignificant.

Green sea turtles feed on sea grasses; the lack of grasses in the area to be dredged means that green sea turtles do not forage in the action area. The prey of loggerhead, Kemp's ridley and leatherback sea turtles is mobile and is likely to avoid the slow moving dredge. Therefore, effects to sea turtles from any loss of benthic resources will be extremely unlikely, and discountable.

Further, any impacts to the benthic community will not be permanent. Studies reviewed by Wilbur and Clarke (2007) demonstrate that benthic communities in temperate regions occupying shallow waters with sand, silt, or clay substrates reported recovery times between one month and eleven months. Therefore, we expect benthic communities within the project's dredged area to recover in less than one year. NRC notes that they reviewed a recent report on sediment analysis for the Delaware River Basin that describes sediment samples near the PSEG Site as potentially suitable for aquatic habitat restoration projects (DERSMPW 2013). In reviewing DERSMPW 2013, we understand this conclusion to mean that the concentrations of contaminants were compared to human and aquatic life toxicity thresholds and that adverse effects to aquatic life were not likely to result from placement of the sediment in aquatic areas. Based on this, NRC concludes that dredging is unlikely to introduce adverse exposure from sediment contaminants to nearby aquatic biota. Our review of the Supplemental BA and DERSMPW 2013 indicates that the concentrations of contaminants in the area to be dredged is low. Atlantic and shortnose sturgeon can be exposed to contaminants suspended during dredging directly through exposure to the sediment plume or by eating prey that takes in the contaminants. Given the small amount of sediment that will be suspended during dredging and the low level of contaminants in that suspended sediment, it is extremely unlikely that a sturgeon would be exposed to levels of contaminants that would result in any adverse effects. Prey could be exposed to contaminants as the suspended sediment settles onto the bottom; however, given the small amount of suspended sediment that will settle out and the low level of contamination in that sediment, it is extremely unlikely that any prey will be exposed to contaminant levels that would result in adverse effects to sturgeon if those prey were ingested. Therefore, effects are discountable

Noise related impacts from pile driving

Pile driving produces underwater sound pressure waves that can affect aquatic species, including sturgeon. Effects to fish can range from temporary avoidance of an area to death due to injury of internal organs, such as swim bladders. The type and size of pile, installation method (e.g., vibratory vs. impact hammer), size of the organism (smaller individuals are more susceptible to effects) and particular species, and distance from the sound source (i.e., sound dissipates over distance so noise levels are greater closer to the source) all contribute to the likelihood of effects to an individual. Generally, the larger the pile and the closer an individual is to the pile, the greater the likelihood of effects.

In-water activities will include the installation of 24-inch wide steel sheeting for a shoreline bulkhead, and to form 20-foot diameter caissons to support a barge unloading facility. Steel sheeting will be installed with a vibratory hammer. To support the installation of a causeway, approximately 1,000 30- inch square concrete piles will be installed using an impact hammer, with additional cushioning to reduce pile head damage (PSEG 2015) (Table 1). Only a small portion of the concrete piles will be installed in the river; the majority will be installed over land.

PSEG estimated acoustic effects from representative pile-driving studies to determine pile installation effects on aquatic biota. Figure 1 shows the areas for noise effects that will occur. Pile installation for the causeway will occur for approximately 50 days, 10 days for intake structure sheet piles, and 20 days each for shoreline and caisson sheetpile installation (See Table 1) (PSEG 2015).

PSEG used the NMFS Pile Driving Calculations spreadsheet model (CALTRANS 2013) to calculate isopleths for the Peak Sound Pressure Level (SPL_{peak}), Cumulative Sound Exposure Level (SEL_{cum}), and Behavioral Root Mean Square Sound Pressure Level (SPL_{rms}) using specific information on piles such as installation method, number of piles, and type of pile. This calculation methodology is consistent with the best available scientific information.

Table 1. Pile Material and Installation Information (PSEG 2015-TN4234).

	Structure			
Pile Information	**Intake Structure**	**Haul Road Bulkhead**	**Barge Caissons**	**Causeway**
Type of pile	Sheeting	Sheeting	Sheeting	Concrete
Number of piles	1200 linear ft	4500 linear ft	2200 linear ft	1000
Piles installed/day	120 linear ft	240 linear ft	120 linear ft	20

Background Information on Noise and Sturgeon

Sturgeon rely primarily on particle motion to detect sounds (Lovell *et al.* 2005). While there are no data either in terms of hearing sensitivity or structure of the auditory system for Atlantic and shortnose sturgeon, there are data for the closely related lake sturgeon (Lovell *et al.* 2005, Meyer *et al.* 2010), which because of the biological similarities, for the purpose of considering acoustic impacts, are a good surrogate for Atlantic and shortnose sturgeon. The available data suggest that lake sturgeon can hear sounds from below 100 Hz to 800 Hz (Lovell *et al.* 2005, Meyer *et al.* 2010). However, since these two studies examined responses of the ear and did not examine whether fish would behaviorally respond to sounds, it is hard to determine thresholds for hearing (that is, the lowest sound levels that an animal can hear at a particular frequency) using information from these studies. The best available information indicates that Atlantic and shortnose sturgeon are not capable of hearing noise in frequencies above 1000 Hz (1 kHz) (Popper 2005). Sturgeon are categorized as hearing "generalists" or "non-specialists" (Popper 2005). Sturgeon do not have any specializations, such as a coupling between the swim bladder and inner ear, to enhance their hearing capabilities, which makes these fish less sensitive to sound than hearing specialists. Low-frequency impulsive energies, including pile driving, cause swim bladders to vibrate, which can cause damage to tissues and organs as well as to the swim bladder (Halvorsen *et al.* 2012a). Sturgeon have a

physostomous (open) swim bladder, meaning there is a connection between the swim bladder and the gut (Halvorsen *et al.* 2012a). Fish with physostomous swim bladders, including Atlantic and shortnose sturgeon, are able to expel air, which can diminish tension on the swim bladder and reduce damaging effects during exposure to impulsive sounds. Fish with physostomous swim bladders are expected to be less susceptible to injury from exposure to impulsive sounds, such as pile driving, than fish with physoclistous (no connection to the gut) swim bladders (Halvorsen *et al.* 2012a).

If a noise is within a fish's hearing range and is loud enough to be detected, effects can range from mortality to a minor change in behavior (e.g., startle), with the severity of effects increasing with the loudness and duration of the noise (Hastings and Popper 2005). The actual nature of effects and the distance from the source at which they could be experienced will vary and depend on a large number of factors, such as fish hearing sensitivity, source level, how the sounds propagate away from the source and the resultant sound level at the fish, whether the fish stays in the vicinity of the source, the motivation level of the fish, etc.

Criteria for Assessing the Potential for Physiological Effects to Sturgeon

The Fisheries Hydroacoustic Working Group (FHWG) was formed in 2004 and consists of our own biologists, as well as those from USFWS, FHWA, and the California, Washington, and Oregon DOTs, supported by national experts on sound propagation activities that affect fish and wildlife species of concern. In June 2008, the agencies signed a Memorandum of Agreement documenting criteria for assessing physiological effects of pile driving on fish. The criteria were developed for the acoustic levels at which physiological effects to fish could be expected. It should be noted that these are onset of physiological effects (Stadler and Woodbury 2009), and not levels at which fish are necessarily mortally damaged. These criteria were developed to apply to all species, including listed green sturgeon, which are biologically similar to Atlantic and shortnose sturgeon and, for these purposes, is considered a surrogate. The interim criteria are:

- Peak Sound Pressure Level (SPL): 206 decibels relative to 1 micro-Pascal (dB re 1 μPa) (206 dB_{Peak}).
- Cumulative Sound Exposure Level (cSEL): 187 decibels relative to 1 micro-Pascal-squared second (dB re 1μPa^2-s) for fishes above 2 grams (0.07 ounces) (187 dBcSEL).
- cSEL: 183 dB re 1μPa^2-s for fishes below 2 grams (0.07 ounces) (183 dBcSEL).

At this time, these criteria represent the best available information on the thresholds at which physiological effects to sturgeon from exposure to impulsive noise, such as pile driving, are likely to occur. It is important to note that physiological effects may range from minor injuries from which individuals are anticipated to completely recover with no impact to fitness to significant injuries that will lead to death. The severity of injury is related to the distance from the pile being installed and the duration of exposure. The closer the fish is to the source and the greater the duration of the exposure, the higher likelihood of significant injury.

Since the FHWG criteria were published, two papers relevant to assessing the effects of pile driving noise on fish have been published. Halvorsen *et al.* (2011) documented effects of pile driving sounds (recorded by actual pile driving operations) under simulated free-field acoustic conditions where fish could be exposed to signals that were precisely controlled in terms of number of strikes, strike intensity, and other parameters. The study used Chinook salmon and determined that onset of physiological effects that have the potential of reduced fitness, and thus a potential effect on

survival, started at above 210 dB re 1μPa^2-s cSEL. Smaller injuries, such as ruptured capillaries near the fins, which the authors noted were not expected to impact fitness, occurred at lower noise levels. Chinook salmon are hearing generalists with physostomous swim bladders. Results from Halvorsen *et al.* (2012a) suggest that the overall response to noise between chinook salmon and lake sturgeon is similar.

Halvorsen *et al.* (2012b) exposed lake sturgeon to pile driving noise in a laboratory setting. Lake sturgeon were exposed to a series of trials beginning with a cSEL of 216 dB re 1uPa^2-s (derived from 960 pile strikes and 186 dB re 1uPa^2-s sSEL). Following testing, fish were euthanized and examined for external and internal signs of barotrauma. None of the lake sturgeon died as a result of noise exposure. Lake sturgeon exhibited no external injuries in any of the treatments but internal examination revealed injuries consisting of hematomas on the swim bladder, kidney, and intestines (characterized by the authors as "moderate" injuries) and partially deflated swim bladders (characterized by the authors as "minor" injuries). The author concludes that an appropriate cSEL criteria for injury is 207 dB re 1uPa^2-s.

It is important to note that both Halvorsen papers (2012a, 2012b) used a response weighted index (RWI) to categorize injuries as mild, moderate, or mortal. Mild injuries (RWI 1) were determined by the authors to be non-life threatening. The authors made their recommendations for noise exposure thresholds at the RWI 2 level and used the mean RWI level for different exposures. Because we consider even mild injuries to be physiological effects and we are concerned about the potential starting point for physiological effects and not the mean, for the purposes of this consultation we will use the FHWG criteria to assess the potential physiological effects of noise on Atlantic and shortnose sturgeon and not the criteria recommended by Halvorson *et al.* (2012a, 2012b). Therefore, we will consider the potential for physiological effects upon exposure to impulsive noise of 206 dB_{Peak} and 187 dBcSEL. Use of the 183 dBcSEL threshold is not appropriate for this consultation because all sturgeon in the action area will be larger than 2 grams. As explained here, physiological effects from noise exposure can range from minor injuries that a fish is expected to completely recover from with no impairment to survival to major injuries that increase the potential for mortality or result in death.

Available Information for Assessing Behavioral Effects on Sturgeon

To date, neither we nor the FHWG have published criteria for underwater noise levels resulting in behavioral responses. However, in practice, we rely on a level of 150 dB re 1uPa RMS as a conservative indicator as to when a behavioral response can be expected in fish exposed to impulsive noise such as pile driving. This level is based on the available literature where fish behavior has been observed (see Fewtrell 2003 and Mueller-Blenkle *et al.* 2010). Because sturgeon are hearing generalists with physostomous swim bladders, it is reasonable to assume they are not more sensitive to noise than other fish (hearing specialists and generalists) whose behavioral responses have been studied (e.g., Fewtrell 2003 and Mueller-Blenkle *et al.* 2010). Therefore, fish behavior responses and noise thresholds reported in Fewtrell 2003 and Mueller-Blenkle *et al.* 2010 are a reasonable conservative indicator of when sturgeon can be expected to respond behaviorally to noise.

Fewtrell (2003) exposed caged fish to air gun arrays. Fewtrell reported altered behavioral responses (alarm responses, faster swimming speeds) for fish exposed to noise of 158-163 dB re 1uPa. Consistent startle responses were observed at noise levels of 167-181 dB re 1uPa (in striped trumpeters). Alarm responses became more frequent at noise levels above 170 dB re 1uPa. Fewtrell

reports that avoidance behavior is expected at noise levels lower than that required to produce a startle response.

Mueller-Blenkle *et al.* (2010) played back pile-driving noise to cod and sole held in two large net pens. Movements of fish were tracked and received sound pressure levels were measured. The authors noted a significant movement response to the pile-driving stimulus in both species at received SPL of 144-156 dB re 1uPa peak (cod) and 140-161 dB re 1uPa peak (sole). Indications of directional movements away from the sound source were noted in both species.

We are aware of only one study that has attempted to assess the behavioral responses of sturgeon to underwater noise. A monitoring plan is currently being implemented at the Tappan Zee Bridge replacement project (Hudson River, New York) using acoustic telemetry receivers to examine the behavior of acoustically tagged sturgeon. During the installation of test piles, the movements of tagged Atlantic sturgeon were monitored with a series of acoustic receivers. Tagged Atlantic sturgeon spent significantly less time in the detection area (an area that encompassed the 206 dB re 1uPa peak, 187 dB re 1uPa 2s cSEL and 150 dB re 1uPa RMS SPL isopleths), during active impact pile driving compared to that time period just prior to the work window. Results of this study indicate that sturgeon are likely to avoid areas with potentially injurious levels of noise (AKRF and Popper (2012a, 2012b)). However, due to limitations of the study design, it is not possible to establish the threshold noise level that results in behavioral modification or avoidance of Atlantic sturgeon. Monitoring is ongoing as the bridge project progresses. To date, hundreds of tagged sturgeon have been documented in the project area; however, no sturgeon have been injured or killed as a result of exposure to pile-driving noise.

For the purposes of this analysis, we will use 150 dB re 1 µPa RMS as a conservative indicator of the noise level at which there is the potential for behavioral effects, provided the operational frequency of the source falls within the hearing range of the species of concern. That is not to say that exposure to noise levels of 150 dB re 1 µPa RMS will always result in behavioral modifications or that any behavioral modifications will rise to the level of "take" (i.e., harm or harassment) but that there is a potential, upon exposure to noise at this level, to experience some behavioral response. We expect that behavioral responses could range from a temporary startle to avoidance of the area with disturbing levels of sound. The effect of any anticipated response on individuals will be considered in the effects analysis below.

Physiological Effects of Pile Driving to Sturgeon

As described above, exposure to underwater noise levels of 206 dB_{Peak} and 187 dB_{cSEL} can result in injury to sturgeon. Sturgeon exposure to peak pressure levels that may result in injury (i.e., 206 dB_{Peak}) is not expected, as the potential for exposure to noise greater than 206 dB peak is limited to the area within one meter of the piles being installed for the causeway. Given the extremely small area and the temporary nature of the sound, it is extremely unlikely that a sturgeon would occur in that small area for the short time that the area is ensonified.

In addition to the "peak" exposure criteria, which relates to the energy received from a single pile strike, the potential for injury exists for multiple exposures to noise over a period of time; this is accounted for by the cSEL threshold. The cSEL is not an instantaneous maximum noise level, but is a measure of the accumulated energy over a specific period of time (e.g., the period of time it takes to install a pile).

For this project, the distance to the 187 dB cSEL isopleth ranges from 40 to 216 m. In order to be exposed to potentially injurious levels of noise during installation of the piles, a sturgeon would need to be within that distance of the pile and remain there for the duration of pile installation. This is extremely unlikely to occur because we expect sturgeon to modify their behavior (i.e., avoid an ensonified area) upon exposure to underwater noise levels of 150 dB re 1 µPaRMS. Given that a sturgeon would be exposed to levels of noise that cause behavioral modification (at 74-1,166 m, depending on the pile) before being exposed to injurious levels of noise (40-216 m), we expect sturgeon would swim away from the sound source and not be exposed to potentially injurious levels of underwater noise. If any sturgeon are within 40-216 m of the pile at the time pile driving commences, we still do not expect injury to occur. This is because the cSEL injury threshold is cumulative (requiring prolonged exposure to the noise at that level). We expect sturgeon to leave the area in a matter of seconds once pile driving commences. Furthermore, the applicant will be using a soft start technique, where the hammer is operated at reduced power before it turns to full power. This will provide additional time for the sturgeon to leave the area. Therefore, sturgeon will exit the 40-216 m radius of the pile before cumulative effects reach the cSEL injury threshold. Based on this, injury is extremely unlikely to occur.

Behavioral Effects of Pile Driving to Sturgeon

Behavioral effects, such as avoidance or disruption of foraging activities, may occur in sturgeon exposed to noise above 150 dB re 1 μPa_{RMS}. We expect underwater noise levels to be below 150 dB_{RMS} at distances beyond approximately 74 m for sheet piles and 1,166 m for causeway support piles. Should sturgeon move into the action area where the 150 dB_{RMS} isopleth extends, as described above, it is reasonable to assume that a sturgeon, upon detecting underwater noise levels of 150 dB_{RMS}, will modify its behavior such that it redirects its course of movement away from the ensonified area and therefore, away from the project site. As established above, sturgeon in the action area are likely to be migrating or foraging. Due to the location of the causeway piles, the majority of the area where noise will be potentially disturbing is vegetated marsh plain and shallow marsh creeks (PSEG 2015). The area within the Delaware River that will have disturbing noise levels will be 1,166 m for only a small number of piles and will be significantly smaller for the majority of the piles. In all cases, the potentially disturbing levels of noise will only be experienced temporarily.

Given the very small distance a sturgeon would need to move to avoid the disturbing levels of noise and the temporary increase in noise, any effects will not be able to be meaningfully measured or detected. Migration would continue to occur and foraging may be temporarily suspended; however, as explained above, benthic resources are present throughout the action area. Therefore, it is reasonable to expect that a sturgeon that stops feeding momentarily to swim away from the pile driving noise, will quickly resume foraging. Because the increase in noise will be temporary (minutes per day for less than 60 days), all changes in distribution of sturgeon in the action area will be temporary. Because effects will not be able to be meaningfully measured or detected, these effects are insignificant.

Distances from the pile driving activity that exceed these criteria are presented in

Table 2.

Table 2. Estimated Acoustic Area of Effect for Fish from Pile Driving Activities (PSEG 2015-TN4234).

Acoustic Criteria	Exceedance Distance in m			
	Intake Structure	Haul Road Bulkhead	Barge Caissons	Causeway
Peak Pressure (206 dB)	0	0	0	1
Cumulative Sound Exposure Level (187 dB)	40	40	40	216
Potential Behavioral Effects (150 dB)	74	74	74	1166

Currently there are no established thresholds for injury or behavioral disturbance for sea turtles. While there is some information suggesting the noise levels that might result in injury to sea turtles from exposure to underwater explosives, no such information is available for non-explosive sound sources. However, the scientific studies referenced above indicate that injury is not expected upon exposure to impulsive noises less than 180 dB re 1µPa RMS. These noise levels occur only within 1 m of the causeway piles and not during installation of the sheet piles. Due to shallow water depths, we do not expect any sea turtles to occur within 1 m of the causeway piles; thus, exposure of sea turtles to injurious levels of noise is extremely unlikely to occur.

Behavioral reactions have been reported for sea turtles in response to airgun noise (McCauley *et al.* 2000a, 2000b; DeRuiter and Doukara 2012). McCauley *et al.* (2000a) noted that decibel levels of 166 dB re 1 µPa RMS were required before any behavioral reaction (*e.g.*, increased swimming speed) was observed. Based on this information, we expect that any sea turtles exposed to underwater noise greater than 166 dB re 1µPa RMS may experience behavioral disturbance and that sea turtles may actively avoid any area with noise levels greater than 166 dB re 1µPa RMS (<74 m for sheet piles and <1,166 m for causeway). Given the temporary duration of pile driving noise and the small area that a sea turtle is expected to avoid, any effects of temporary avoidance would not be able to be meaningfully measured or detected and are, therefore, insignificant.

Figure 1. Acoustic criteria isopleths for in-water and nearshore pile driving activities (PSEG 2015-TN4234).

Turbidity due to Pile Installation

Disturbance of the substrate could cause increased sedimentation during pile installation, however, TSS is most likely to affect sturgeon or sea turtles if a plume causes a barrier to normal behaviors. However, sturgeon and sea turtles are highly mobile and individuals will be able to navigate around any sediment plume they encounter and continue their normal movements. Due to the minor increase in TSS, it is extremely unlikely that a sturgeon or sea turtle would alter its behavior to avoid any plume caused by the installation of piles as proposed. Based on the best available information, the effects of suspended sediment resulting from pile installation on sturgeon and sea turtles will be discountable.

Vessel traffic

Sea turtles and sturgeon may be injured or killed as a result of being struck by boat hulls or propellers. The factors relevant to determining the risk to these species from vessel strikes vary, but may be related to the size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of individuals in the area (e.g., foraging, migrating, overwintering, etc.).

Vessels for site preparation include bulk material delivery scow barges with a draft of 11 feet maximum and a speed of 1 to 7 knots; work vessels (e.g., barge, tugboat, and crane barges) with drafts ranging from 6 to 10.5 feet; and dredges with a maximum draft of 10 feet (PSEG 2015). A total of 247-357 trips by delivery barges are expected to occur over a 3-7 year period to deliver materials to the site. These barges are expected to depart from existing barge terminals located along the Delaware River in Camden, Philadelphia and Salem. Delivery barges operate at slow speeds and travel from the barge terminal within the Delaware River navigation channel to the project site. Existing commercial traffic in the area of the Delaware River that overlaps with the action area is approximately 4,485 vessels annually. The delivery barges represent an increase in annual commercial vessel traffic of 0.8- 2.6%. However, it is important to note that the increase in traffic will be spread out over at least three years and will actually be an increase of about 1 cargo vessel in the action area every three days. Bulk material scow barges (200 feet long by 35 feet wide) and some work craft vessels (up to 300 feet long by 50 feet wide) would be used following completion of the barge unloading facility. Dredge depths would allow for at least 2 feet of clearance at mean low water for the deepest draft vessels at the barge unloading facility and transit area (PSEG 2015). Barges used for dredging (up to 270 ft long by 65 ft wide) in the areas for the intake and barge unloading facility would use a slow approach speed of 1 to 2 knots within 500 feet of the dredge area.

The pre-construction activities will result in a temporary increase in the amount of vessel traffic in the action area. Factors thought to be relevant to increasing risk of vessel strike include high speeds, limited clearance with the bottom, and restrictions or narrow waterways; these factors all seem to contribute to the reduced ability of a sea turtle or sturgeon to avoid an oncoming vessel. Here, the risk of an interaction is reduced by the slow speed of the vessels. All of these vessels are expected to move slowly (less than 7 knots). Slow operating speeds are expected to reduce the risk of vessel strike for sturgeon and sea turtles because they would allow for greater opportunity for individuals to avoid the vessel. There will be at least 2 feet of clearance between even the deepest draft vessels at the shallowest conditions, with more clearance in other conditions and for other vessels; given the size of sturgeon and sea turtles in the action area, a sturgeon or sea turtle should be able to swim under the vessel without getting hit. The Delaware River is approximately 2.5 miles wide at the project site and is free flowing with no obstructions; therefore, there is ample room for a sturgeon or sea turtle to avoid a vessel. Given, the slow operating speeds of the vessels, the clearance between the vessels and the river bottom, and the wide un-impeded geography of the action area, we expect sturgeon and sea turtles to be able to avoid any vessels. We conclude that it is extremely unlikely that a sturgeon or sea turtle will be struck by a project vessel; therefore, effects are discountable.

Conclusions

We agree that activities to be carried out as described herein-- NRC's proposed issuance of an ESP for site approval for a potential new nuclear reactor, and the U.S. Army Corps of Engineers' (USACE) proposed issuance of permits for site preparation activities involving dredging, infilling, pile driving, and barge traffic for installing the haul road bulkhead, building the barge unloading and mooring facility, installing the cooling water intake and discharge structures, and building an access road/causeway-- are not likely to adversely affect any NMFS listed species. As explained above, this conclusion applies only to the pre-construction activities that could be authorized by the ESP and the currently proposed USACE permit. In light of the Supplemental BA, we have not considered the construction and operation of a new NGS to be part of the proposed action, and we have not analyzed the effects from them, including operation of the cooling water intake system,

because they are not reasonably certain to occur at this time. In the event that NRC proposes to issue a construction and operation license in the future, section 7 consultation to consider the effects of that separate action would be required. We anticipate that consultation would consider the effects of any remaining construction as well as the effects of the operation of the facility, inclusive of the effects of cooling water intake and discharge on listed species and the ecosystems on which they depend (prey, habitat, etc.).

Re-initiation of consultation is required and shall be requested by NRC or by NMFS where discretionary federal involvement or control over the action has been retained or is authorized by law and (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or, (c) if a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted for this particular action; take is defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct." If there is any incidental take of a listed species, reinitiation would be required. Any observations of sea turtles or sturgeon should be reported to us immediately.

As discussed with NRC staff, we expect that if an operating license is proposed for issuance in the future, NRC will request consultation with us. We would expect that consultation to consider effects of operation of any new nuclear unit including consideration of the potential for impingement and entrainment of shortnose and Atlantic sturgeon, effects to prey, and effects to habitat, including consideration of the effects of any thermal plume and discharge of any other contaminants. We encourage NRC and PSEG to ensure that the design of any new nuclear unit minimizes the potential for adverse effects to shortnose and Atlantic sturgeon and the ecosystem on which they depend. It is our understanding that any new unit would employ closed-cycle cooling. We support the use of closed-cycle cooling as a way to minimize the amount of water withdrawn from the Delaware River. However, because water would still be withdrawn from the river, impingement, entrainment and other effects to sturgeon are still possible and these effects will need to be assessed in a consultation. As project plans become further developed, we look forward to discussing measures that can be implemented at any new facility to protect shortnose and Atlantic sturgeon.

If you have any questions about this correspondence, please contact David Bean of my staff at (207) 866-4172 or by e-mail David.Bean@noaa.gov.

Sincerely,

David Gouveia

for Kimberly B. Damon Randall
Assistant Regional Administrator for
Protected Resources