UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
GREATER ATLANTIC REGIONAL FISHERIES OFFICE
55 Great Republic Drive
Gloucester, MA 01930-2276

APR 12 2017

James W. Haggerty
Regulatory Program Manager
U.S. Army Corps of Engineers
North Atlantic Division
302 General Lee Avenue
Brooklyn, NY 11252

RE: GARFO-PRD USACE-NAD 2017 NLAA Program: Programmatic Consultation

Dear Mr. Haggerty:

We have completed an informal, programmatic consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended, for six categories of projects regularly permitted, funded, or otherwise carried out by the U.S. Army Corps of Engineers (USACE). USACE has determined that these activity categories, provided they meet the project design criteria (PDC) outlined in this programmatic consultation, are not likely to adversely affect (NLAA) ESA-listed species and designated or proposed critical habitat; thus, conference on proposed Atlantic sturgeon critical habitat is not necessary at this time. USACE and NOAA Fisheries Greater Atlantic Regional Fisheries Office ["GARFO"] agreed upon a collaboration to create the 2017 NLAA Program during a January 10, 2017 meeting at USACE's North Atlantic Division (NAD) in New York. Through this collaboration, USACE prepared a Biological Assessment which consists of specific procedures, project types, and species-specific criteria to minimize adverse effects to listed species and their habitats from projects, individually or in aggregate, to insignificant and/or discountable levels. We concur with USACE that the six activity categories addressed herein are not likely to adversely affect ESA-listed species and designated critical habitat under our jurisdiction. This programmatic consultation is effective upon date of signature of this letter. Together with the activity categories, PDC, verification form, and standard operating procedures (SOPs) that are attached to this document, this programmatic consultation and concurrence form the basis of the GARFO-USACE 2017 NLAA Program.

Programmatic section 7 consultation can achieve several objectives with positive administrative benefits including streamlining the consultation process between the action agency and us. In this specific case, we have worked cooperatively with you to develop specific PDC to be applied programmatically to projects undertaken by Civil Works Divisions or proposed for authorization under permits originating from Regulatory Divisions (e.g., GPs, LOPs, etc.). These PDC will ensure that all activities, individually and in the aggregate, that "may affect" listed species and critical habitat under our jurisdiction are "not likely to adversely affect" these species nor critical habitat, and that any effects from those activities to species and critical habitat proposed, listed, or designated by us would be insignificant, discountable, or wholly beneficial. Insignificant effects are so minimal they cannot be measured, whereas discountable effects are those extremely unlikely to occur, and beneficial effects are those with positive impacts and no associated adverse impacts.

You have made the determination that the authorization of projects that generally fall into six categories and fall at or below certain stressor thresholds outlined in this programmatic consultation, may affect but are not likely to adversely affect the following species and critical habitats listed by us (see Table 2, Table 3,

Table 4, and Table 5).

You made the preceding determinations based on several factors including the implementation of the PDC. You have proposed a framework for a project screening process that will ensure activities that need further review by us will be selected to receive such review. Our analysis and support for our concurrence with your "not likely to adversely affect" determination on the six activity categories and stressor thresholds is provided below.

Programmatic Consultation Background Information

We have developed a range of techniques to streamline the procedures and time involved in consultations for broad agency programs or numerous similar activities with predictable effects on listed species and critical habitat. Some of the more common of these techniques, and the requirements for ensuring that streamlined consultation procedures comply with section 7 of the ESA and its implementing regulations, are discussed in the October 2002 joint Services memorandum, *Alternative Approaches for Streamlining Section 7 Consultation on Hazardous Fuels Treatment Projects* (https://www.fws.gov/endangered/esa-library/pdf/streamlining.pdf). Pursuant to this guidance, programmatic consultations may be conducted on any Federal agency's proposal to apply specified standards or design criteria to future proposed actions. Programmatic consultations can be used to evaluate the expected effects of groups of similar agency actions expected to be implemented in the future, where specifics of individual projects such as project location are not definitively known. A programmatic consultation must identify PDC and/or standards that will be applicable to all future projects implemented under the program, or in this case, a suite of activity categories and associated stressor thresholds. The PDC for the 2017 NLAA Program include the measures contained within your BA to avoid and minimize impacts, and define which projects can be consulted on under this programmatic consultation, versus those that need individual section 7 consultation (informal or formal). These criteria serve to ensure effects from activities that are part of the 2017 NLAA Program on listed species and critical habitat are insignificant, discountable or wholly beneficial (informal consultation).

Programmatic consultations allow for streamlined project-specific consultations using a verification form because the effects analysis is completed up front in this programmatic consultation document. At the project-specific consultation stage, a proposed project is reviewed to determine if it can be implemented in accordance with the PDC identified in the programmatic consultation. Consistent with the joint Services' memo referenced above, the following elements should be included in a programmatic consultation to ensure its consistency with ESA section 7 and its implementing regulations.

1. PDC to prevent or limit future adverse effects on listed species and critical habitat;

2. Description of the manner in which projects to be implemented under the programmatic consultation may affect listed species and critical habitat and evaluation of expected level of effects from covered projects;

3. Process for evaluating expected, and tracking of actual, aggregate or additive effects of all projects expected to be implemented under the activity category. The programmatic consultation document must demonstrate that when the PDC or standards are applied to each project, the aggregate effect of all projects either are not likely to adversely affect listed species or their critical habitat, or are likely to adversely affect but are not likely to jeopardize listed species or result in destruction or adverse modification of critical habitat;

4. Procedures for streamlined project-specific consultation. As discussed above, if an approved programmatic consultation document is sufficiently detailed, project-specific consultations ideally will consist of findings made by action agency biologists and consulting agency biologists, respectively. An action agency will provide a description of a proposed project, or batched projects, and an assurance that the project(s) will be implemented in accordance with the PDC. The consulting agency reviews the submission and either concurs with the action agency, or identifies adjustments to the project(s) necessary to make it (them) consistent with the programmatic consultation document;

5. Procedures for monitoring projects and validating effects predictions; and,

6. Comprehensive review of the program, generally conducted annually.

Description of the Proposed Action

We have determined that the following activity categories are not likely to adversely affect species listed by NOAA Fisheries and are eligible for inclusion under the 2017 NLAA Program. Please see the PDC below for specific information regarding restrictions on size, timing, etc.:

1. Aquaculture (shellfish) and artificial reef creation
2. Routine maintenance dredging and disposal/beach nourishment
3. Piers, ramps, floats & other structures
4. Transportation and development (e.g., culvert construction, bridge repair)
5. Mitigation (fish/wildlife enhancement or restoration)
6. Bank stabilization, dam maintenance

Projects can still be eligible for programmatic consultation provided that they do not introduce any new stressors or any new direct or indirect effects that are not considered in the Stressor

Specific PDC section below, and in the analysis within the complementary consultation document. Projects must also meet all of the PDCs, or provide proper justification for why the project does not meet particular PDCs, but is still NLAA ESA-listed species or critical habitat.

To estimate the volume of projects that may be eligible for consultation under the 2017 NLAA Program, we asked you (USACE) to provide a summary table using your ORM database of all of the projects that the NAD Districts determined were NLAA NOAA Fisheries ESA-listed species or critical habitat over the past five years. Table 1 shows a summary of data you provided by from your ORM database as modified for the purposes of this programmatic with us.

Table 1: USACE (NAD) NLAA Determinations for NOAA Fisheries ESA-Listed Species or Critical Habitat (Feb. 15, 2012-Feb. 14, 2017)

Permit Categories	NAB	NAE	NAN	NAO	NAP	TOTAL
Aquaculture (shellfish)	9	73	0	3	5	90
Dredging/Disposal	1	94	81	30	13	219
Piers, Ramps, Floats & Other Structures	6	273	330	179	24	812
Transportation and Development (bridges, culverts, infrastructure, etc.)	2	56	2	4	9	73
Mitigation (fish/wildlife enhancement or restoration)	0	9	4	3	0	16
Bank stabilization, dam maintenance	2	25	10	39	50	126
TOTAL*	**20**	**530**	**427**	**258**	**101**	**1336**

* Excludes Energy Generation (6) and Aquaculture: Plants & Finfish (6) for a total of 12 excluded projects from the original ORM report. Also, GARFO added 38 projects to NAE's Aquaculture (shellfish) category that were not accounted for in the original ORM report.

NOTE: NAB = Baltimore District; NAE = New England District; NAN = New York District; NAO = Norfolk District; NAP = Philadelphia District

We believe this five year total (1,336 projects) to be a conservative estimate of the rate we will receive projects eligible for the 2017 NLAA Program because it is unlikely that all 1,317 projects would have met all of the required PDC set forth in this programmatic consultation (e.g., this total includes projects that were reviewed under existing programmatic consultations, as well as those that required individual consultation).

<u>Project Design Criteria (PDC)</u>

Certain activity measures included within your BA to avoid or minimize project impacts have been incorporated into the eligible activity categories in order to prevent or limit future adverse effects on ESA listed species and critical habitat. Activities outside the scope of these PDC are not authorized without further review, which consists of an individual section 7 consultation, unless proper justification for the project's inclusion in the 2017 NLAA Program is provided. Activities within the scope of the PDC may be processed under the appropriate activity category and have been determined "not likely to adversely affect." Additional conditions that exist as intrinsic parts of the permits, and your Standard Operating Procedures (SOPs) will also aid in limiting the scope of activity effects on our species/critical habitat to insignificant and/or discountable.

Framework for Further Project Review

All activities proposed for authorization under this programmatic consultation will require your review (i.e., by a USACE project manager/biologist) in order to be covered by this ESA section 7 consultation. For those projects that you determine fit within the scope of activity categories of this programmatic consultation, you will submit a verification form to us requesting our concurrence. The verification form demonstrates that an activity is in compliance with the requirements of the ESA and meets the PDC outlined in this programmatic consultation. Projects which do not meet all of the PDC and relevant thresholds for associated stressors will require an individual section 7 consultation, which will result in us issuing a letter of concurrence (LOC) or a Biological Opinion. These projects require a more extensive analysis because the scope of the project appears to be outside the boundaries of the activity categories considered and analyzed in this consultation, or because it is not feasible to assess the effects of such an activity *a priori* without knowing specific details related to the particular action. You have worked cooperatively with us to incorporate a framework you will use to identify the activity types that will need individual consultation. This process will ensure that any activity that "may affect" (if not expressly considered in the programmatic consultation) will be adequately reviewed and consulted upon. If we concur with a "not likely to adversely affect" determination in our LOC during the individual section 7 consultation process, then you may proceed with authorization of the activity under the applicable permit category.

Whenever there is a question about a project's eligibility for consultation under the 2017 NLAA Program via verification form, the USACE project manager/biologist tasked with permitting/authorizing the activity should reach out to a GARFO section 7 biologist for technical assistance (e.g., phone call, email, etc.).

Implementation of Verification Form

For those projects that you determine fit within the scope of activity categories and stressor thresholds included in this programmatic consultation, you will submit a complete verification form to us that demonstrates the activity is in compliance with the requirements of the ESA. The form will also serve as a record to certify that the activity may affect, but is not likely to adversely affect species or critical habitat listed by us, and is consistent with this programmatic consultation. This will also allow any aggregate effects of the activity categories to be tracked and analyzed on an annual basis. A copy of the verification form you have drafted has been included in this consultation package (Attachment A). You will provide the completed form to us with the required information, and we will then review the verification form and note one of the following conclusions:

1. In accordance with the 2017 NLAA Program, we concur with USACE's determination that the action complies with all applicable PDC and is not likely to adversely affect listed species or critical habitat.;

2. In accordance with the 2017 NLAA Program, we concur with USACE's determination that the action is not likely to adversely affect listed species or critical habitat per the justification and/or special conditions provided in [in the verification form];
3. We do not concur with USACE's determination that the action complies with the applicable PDC (with or without justification), and recommends an individual Section 7 consultation to be completed independent from the 2017 NLAA Program.

NOAA Fisheries ESA-Listed Species and Critical Habitat in the Action Area

Table 2, Table 3,

Table 4, and Table 5 summarize the ESA-listed species and critical habitat in the action area. More detailed information on their distribution, life history, and behaviors, as well as the extent and physical and biological features (PBFs) of proposed and designated critical habitat, are summarized in our GARFO Maps and Species Tables which are updated regularly and can be accessed here:
https://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html

Table 2: NOAA Fisheries ESA-Listed Species and Critical Habitat in the Action Area

Species	ESA Status	Expected Life Stages	Expected Behaviors	Expected TOY	Listing Rule/Date	Most Recent recovery plan date	Effect determination
North Atlantic Right Whale	E	Adults; Juveniles	Foraging; Wintering; Migrating	Year round (greatest densities January to April)	73 FR 12024	NMFS 2005	NLAA
Fin Whale	E	Adults; Juveniles	Foraging; Wintering; Migrating; Calving	Year round	35 FR 18319	NMFS 2010	NLAA
Kemp's Ridley Sea Turtle	E	Juveniles	Foraging; Migrating	May to November	35 FR 18319	NMFS *et al.* 2011	NLAA
Leatherback Sea Turtle	E	Adults; Juveniles	Foraging; Migrating	May to November	35 FR 849	NMFS & USFWS 1992	NLAA
Loggerhead Sea Turtle; Northwest Atlantic DPS	T	Adults; Subdults; Pelagic/ benthic juveniles	Foraging; Migrating	May to November	76 FR 58868	NMFS & USFWS 2008	NLAA
Green Sea Turtle; North Atlantic DPS	T	Adults; Juveniles	Foraging; Migrating	May to November	81 FR 20057	NMFS & USFWS 1991	NLAA
Atlantic sturgeon (all 5 DPSs)	T (GOM) E (four others)	All life stages (eggs to adults)	Spawning and Rearing (specific rivers); Foraging; Overwintering; Migrating	Year round	77 FR 5880 and 77 FR 5914	N/A	NLAA

Shortnose sturgeon	E	All life stages (eggs to adults)	Spawning and Rearing (specific rivers); Foraging; Overwintering; Migrating	Year round	32 FR 4001	NMFS 1998	NLAA
Atlantic salmon; Gulf of Maine DPS[1]	E	All life stages (eggs to adults)	Foraging, Migrating, Spawning, Rearing, Overwintering	April to November (marine/estuarine areas); Year round (freshwater areas)	74 FR 29344	NMFS & USFWS 2016	NLAA

For convenience, we have listed the Physical and Biological Features (PBFs) of *proposed* Atlantic sturgeon critical habitat[2], Atlantic salmon, and North Atlantic right whale below:

Table 3: PBFs for *Proposed* Atlantic Sturgeon Critical Habitat

1.	Hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand range) for settlement of fertilized eggs, refuge, growth, and development of early life stages;
2.	Aquatic habitat with a gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites for juvenile foraging and physiological development.
3.	Water of appropriate depth absent physical barriers to passage (e.g., locks, dams, reservoirs, gear, etc.) between the river mouth and spawning sites necessary to support: (1) unimpeded movements of spawning adults to and from spawning sites; (2) as well as seasonal and physiologically-dependent movement of juvenile Atlantic sturgeon to appropriate salinity zones within the river estuary; (3) staging, resting, or holding of subadults or spawning condition adults. Water depths in main river channels must also be deep enough (e.g., ≥1.2 m) to ensure continuous flow in the main channel at all times when any sturgeon life stage would be in the river;
4.	Water, especially in the bottom meter of the water column, with the temperature, salinity, and oxygen values that, combined, support: (1) spawning; (2) annual and interannual adult, subadult, larval, and juvenile survival; and (3) larval, juvenile, and subadult growth, development, and recruitment (e.g., 13°C to 26° C for spawning habitat and no more than 30° C for juvenile rearing habitat and 6 mg/L dissolved oxygen for juvenile rearing habitat)

[1] The U.S. Fish and Wildlife Service (USFWS) has jurisdiction of Atlantic salmon in the freshwater portion of its range (except for work on hydropower dams), while NOAA Fisheries has jurisdiction of Atlantic salmon in tidal and marine portions of its range.
[2] On June 3, 2016, we issued two proposed rules to designate critical habitat for the five listed distinct population segments (DPSs) of Atlantic sturgeon found in U.S. waters (Gulf of Maine, New York Bight, and Chesapeake Bay DPSs: 81 FR 35701; Carolina and South Atlantic DPSs: 81 FR 36078). We anticipate issuing a final rule on or before June 3, 2017.

Table 4: PBFs for Atlantic Salmon (GOM DPS) Critical Habitat[3]

	Spawning and Rearing Critical Habitat
1.	Deep, oxygenated pools and cover (e.g., boulders, woody debris, vegetation) near freshwater spawning sites necessary to support adult migrants during the summer while they await spawning in the fall.
2.	Freshwater spawning sites that contain clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support spawning activity, egg incubation, and larval development.
3.	Freshwater spawning and rearing sites with clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support emergence, territorial development, and feeding activities of Atlantic salmon fry.
4.	Freshwater rearing sites with space to accommodate growth and survival of Atlantic salmon parr.
5.	Freshwater rearing sites with a combination of river, stream, and lake habitats that accommodate Atlantic salmon parrs' ability to occupy many niches and maximize parr production.
6.	Freshwater rearing sites with cool, oxygenated water to support growth and survival of Atlantic salmon parr.
7.	Freshwater rearing sites with diverse food resources to support growth and survival of Atlantic salmon parr.
	Migration Critical Habitat
8.	Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access of adult salmon seeking spawning grounds needed to support recovered populations;
9.	Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation; and
10.	Freshwater and estuary migration sites free from physical and biological barriers that delay or prevent emigration of smolts to the marine environment.

Table 5: PBFs for North Atlantic Right Whale Critical Habitat

1.	The physical oceanographic conditions and structures of the Gulf of Maine and Georges Bank region that combine to distribute and aggregate *Calanus finmarchicus* for right whale foraging, namely prevailing currents and circulation patterns, bathymetric features (basins, banks, and channels), oceanic fronts, density gradients, and temperature regimes;

[3] PBFs are referred to as Primary Constituent Elements (PCEs) in the final rule, but are synonymous to one another.

2.	Low flow velocities in Jordan, Wilkinson, and Georges Basins that allow diapausing *C. finmarchicus* to aggregate passively below the convective layer so that the copepods are retained in the basins;
3.	Late stage *C. finmarchicus* in dense aggregations in the Gulf of Maine and Georges Bank region;
4.	Diapausing *C. finmarchicus* in aggregations in the Gulf of Maine and Georges Bank region.

Project Design Criteria (PDC)
In order to be eligible for streamlined consultation via verification form, all projects must meet the following criteria, regardless of activity category, or provide a justification for why the criteria do not apply. That justification will then be reviewed by our section 7 biologist assigned to the project. If our section 7 biologist does not accept the justification, USACE must complete an individual section 7 consultation.

Table 6: NLAA Activity/Stressor Categories

	Stressor Category					
Activity Category	Entanglement	Sound Pressure	Impingement/ Entrapment/ Capture	Turbidity/ Water Quality	Vessel Traffic	Habitat Mod.
Aquaculture (shellfish) and artificial reef creation	Y	N	N	Y	Y	Y
Routine maintenance dredging and disposal/beach nourishment	N	N	Y	Y	Y	Y
Piers, ramps, floats, and other structures	Y	Y	N	Y	Y	Y
Transportation and development (e.g., culvert construction, bridge repair)	N	Y	N	Y	Y	Y
Mitigation (fish/wildlife enhancement or restoration)	N	N	N	Y	Y	Y
Bank stabilization and dam maintenance	N	Y	N	Y	Y	Y

PDC:

The General PDC, below, are not specific to one of the individual stressor categories referenced in Table 6; instead, they encompass general exclusions that apply to all projects, regardless of activity category and associated stressors. The General PDC, along with the stressor-specific PDC that follow, constrain the types of projects eligible for this 2017 NLAA Program and thus limit the potential for projects to affect ESA-listed species or critical habitat by minimizing effects to insignificant and discountable levels.

Table 7: General PDC

1. No work will individually or cumulatively have an adverse effect on ESA-listed species or designated critical habitat; no work will cause adverse modification or destruction to proposed critical habitat.
2. No work will occur in the tidally influenced portion of rivers/streams where Atlantic salmon presence is possible from April 10–November 7.
3. No work will occur in Atlantic or shortnose sturgeon spawning grounds* as follows:
    i. New England: April 1–August 31
    ii. New York/Philadelphia: March 15–August 31
    iii. Baltimore/Norfolk: March 15–July 1 and September 15–November 1
4. No work will occur in shortnose sturgeon overwintering grounds* as follows:
    i. New England District: October 15–April 30
    ii. New York/Philadelphia: November 1–March 15
    iii. Baltimore: November 1–March 15
5. **Within designated Atlantic salmon critical habitat, no work will affect spawning and rearing areas (PBFs 1-7 in**

   Table 4).
6. Within proposed/designated Atlantic sturgeon critical habitat, no work will affect hard bottom substrate (e.g., rock, cobble, gravel, limestone, boulder, etc.) in low salinity waters (i.e., 0.0-0.5 parts per thousand)(PBF 1 in Table 3).
7. Work will not change temperature, water flow, salinity, or dissolved oxygen levels.
8. If it is possible for ESA-listed species to pass through the action area, a zone of passage with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage).
9. Any work in designated North Atlantic right whale critical habitat must have no effect on the physical and biological features (PBFs 1-4 in Table 5).
10. The project will not adversely impact any submerged aquatic vegetation (SAV).
11. No blasting will occur.

*Best available river kilometer information regarding spawning and overwintering grounds for Atlantic sturgeon, shortnose sturgeon, and Atlantic salmon is found within the species tables provided by GARFO at:
https://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/maps/index.html.
This site should be regularly checked for up to date information as projects are processed through the 2017 NLAA program.

Effects Analysis

<u>Sound Pressure</u>

PDC:

12. If the pile driving is occurring during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold of those species, a 20 minute "soft start" is required to allow for animals to leave the project vicinity before sound pressure increases.
13. Any new pile supported structure must involve the installation of ≤ 50 piles (below MHW).
14. If the project involves steel piles, or non-steel piles > 24-inches in diameter, or any other noise-producing mechanism, the expected underwater noise (pressure) must be < the physiological/injury noise threshold for ESA-species in the action area.

The installation of piles via pile driving can produce underwater sound pressure waves that may affect aquatic species, including ESA listed species. Effects can range from temporary avoidance of an area to death or injury. The type and size of pile, type of installation method (e.g., vibratory vs. impact hammer), type and size of the organism (smaller individuals are more susceptible to effects), 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.

Your incoming request for consultation defines which pile driving activities you have determined are NLAA ESA-listed species or proposed or designated critical habitat.

Pile driving of concrete, timber, or plastic piles between the sizes of 12-24 inches, or sheet piles ≤ 24 inches may be performed via impact or vibratory hammer under the 2017 NLAA Program. If pile driving occurs during a time of year when ESA-listed species may be present, and the anticipated noise is above the behavioral noise threshold of those species, a 20 minute "soft start" is required to allow for animals to leave the project vicinity before sound pressure increases (PDC 12). In order to be eligible for review under the verification form, projects involving steel piles ≥ to 12" in diameter must have underwater sound pressure estimates that fall equal to or above the behavioral threshold and below the injury threshold. Any underwater sound pressure estimates equal to or above the injury threshold for an ESA-listed species will require individual section 7 consultation prior to authorization (PDC 14).

Currently, there are no established thresholds for injury or behavioral disturbance for sea turtles. Increased sound levels in the aquatic environment may affect ESA listed species under our jurisdiction in different ways at different decibel levels. McCauley *et al.* (2000) noted that decibel levels of 166 dB re 1μPa$_{RMS}$ were required before any behavioral reaction (e.g., increased swimming speed) was observed in sea turtles, and decibel levels above 175 dB re 1μPa$_{RMS}$

elicited avoidance behavior of sea turtles. The study done by McCauley *et al.* (2000), as well as other studies done to date, used impulsive sources of noise (e.g., air gun arrays) to ascertain the underwater noise levels that produce behavioral modifications in sea turtles. Pile driving is also an impulse noise. As no other studies have been done to assess the effects of noise sources on sea turtles, McCauley *et al.* (2000) serves as the best available information on the levels of underwater noise that may produce a startle, avoidance, and/or other behavioral or physiological response in sea turtles. Based on this, we believe any underwater noise levels at or above 166 dB re $1\mu Pa_{RMS}$ have the potential to affect sea turtles (e.g., behavioral modification, temporary threshold shifts).

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. Some studies estimate injury thresholds for sea turtles to be as high as 207 dB_{RMS} re $1\mu Pa_{RMS}$ (Young 1991, Keevin and Hempen 1997). However, all available information indicates that injury is not expected upon exposure to impulsive noises less than 180 dB re 1μPa RMS; therefore, we will consider the potential for injury if sea turtles will be exposed to underwater noise >180 dB re 1μPa RMS.

Underwater noise and increased sound pressure created by pile driving may affect fish hearing and damage their air containing organs, such as the swim bladder. An interagency work group, including the U.S. Fish and Wildlife Service (USFWS) and NOAA Fisheries, has reviewed the best available scientific information and developed criteria for assessing the potential of pile driving activities to cause injury to fish (Fisheries Hydroacoustic Working Group (FHWG) 2008). The workgroup established dual sound criteria for injury, measured 10 meters away from the pile, of 206 dB re 1 μPa_{Peak} and 187 dB accumulated sound exposure level (dBcSEL; re: $1\mu Pa^2 \cdot sec$) (183 dB accumulated SEL for fish less than 2 grams). While this work group is based on the U.S. West Coast, species similar to Atlantic sturgeon and shortnose sturgeon were considered in developing this guidance (green sturgeon). As these species are biologically similar to the species being considered herein, it is reasonable to use the criteria developed by the FHWG.

In addition, for purposes of assessing behavioral effects of pile driving at several West Coast projects, NOAA Fisheries has employed a 150 dB re 1 μPa_{RMS} sound pressure level criterion at several sites, including the San Francisco-Oakland Bay Bridge and the Columbia River Crossings. Given the available information from studies on other fish species (Andersson *et al.* 2007, Purser and Radford 2011, Wysocki *et al.* 2007), we consider 150 dB re 1 μPa_{RMS} to be a reasonable estimate of the noise level at which exposure may result in behavioral modifications in sturgeon. As such, for the purposes of this consultation, 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. That is not to say that exposure to noise levels of 150 dB re 1 μPa_{RMS} will always result in behavioral modifications, but that there is the potential, upon exposure to noise at this level, to experience some behavioral response (e.g., temporary startle to avoidance of an ensonified area).

Based on published measurements of underwater noise during pile installation (CalTrans 2015), Table 8 describes non-steel pile driving that could be authorized under the proposed action. It estimates the average underwater noise levels produced by the installation of timber and concrete piles with impact and vibratory hammers. The estimated underwater noise levels (i.e., Peak, Root Mean Square (RMS), Sound Exposure Level (SEL), and Cumulative Sound Exposure Level (cSEL) are taken from a distance of 10 m (33 feet), using data provided in CalTrans 2015.

Table 8: Estimates for Underwater Noise

Diameter and Type of Pile	Hammer Type	Estimated Peak Noise Level (dB_{Peak})	Estimated Pressure Level (dB_{RMS})	Estimated Single Strike Sound Exposure Level (dB_{sSEL})
16-20" Timber	Impact	170	165	148
16-20" Timber	Vibratory	160	155	138
24" Concrete	Impact	185	170	160
24" Concrete	Vibratory	175	160	150
24" Steel Sheet	Impact	205	190	180
24" Steel Sheet	Vibratory	182	165	165

No noise estimates were available for the use of a vibratory hammer on the sized timber and concrete piles in Table 8. Generally, we expect plastic, timber, and concrete piles to have similar noise levels, so the estimates provided in Table 8 cover all non-steel piles, as well as steel sheet piles, less than or equal to (≤) 24 inches in diameter. If specific estimates are not provided, we estimate that vibratory hammers produce noise that is approximately 10 dB less than an impact hammer (Caltrans 2015).

The actual sound levels in this table are dependent on the geometry and boundaries of the surrounding underwater and benthic environment (i.e., shallow/deep water, shoaled portions of channels, obstacles in the waterway), and thus, the values in the table are generalized estimates that represent the noise produced by pile driving measured at 10 meters from the sound source. As the distance from the source increases, underwater sound levels produced by pile driving are known to attenuate rapidly.

Physiological Effects from Non-Steel Piles (≤ 24") and Steel Sheet Piles (≤ 24") on Sturgeon, Salmon, and Sea Turtles

Based on the best available information, noise levels produced by the driving of timber, plastic and concrete piles between ≤ 24 inches and considered in this programmatic consultation will produce underwater noise levels below 206 dB re 1 μPa_{Peak} for sturgeon and salmon. All pile types and installation methods are also below the 180 dB_{RMS} re 1μPa_{RMS} injury threshold for sea turtles, with the exception of 24-inch steel sheet piles installed with an impact hammer (see Table 8). In that scenario, estimated noise exposure above 180 dB_{RMS} could be experienced by sea turtles up to 30m from the pile being installed (see Table 9). However, upon exposure to noise levels at or above 166 dB_{RMS} (during the 20-minute soft start required by PDC 12), we would expect sea turtles to leave the action area in a matter of seconds. As such, it is not anticipated that sturgeon, salmon, or sea turtles will suffer injury due to pile driving conducted under the proposed action from peak or RMS measured noise levels.

Table 9: Estimated Distances to Sturgeon/Salmon/Sea Turtle Injury & Behavioral Thresholds

Diameter and Type of Pile	Hammer Type	Sturgeon/Salmon Thresholds			Sea Turtle Thresholds	
		Distance (m) to Behavioral Disturbance Threshold (150 dB_{RMS})	Distance (m) to 206dB_{Peak} (injury)	Distance (m) to sSEL of 150 dB (surrogate for 187 dBcSEL injury)	Distance (m) to 166 dBRMS (behavior)	Distance (m) to 180 dB RMS (injury)
16-20" Timber	Impact	40.0	NA	NA	NA	NA
16-20" Timber	Vibratory	20.0	NA	NA	NA	NA
24" Concrete	Impact	50.0	NA	30.0	NA	NA
24" Concrete	Vibratory	30.0	NA	10.0	18.0	NA
24" Steel Sheet	Impact	90.0	NA	70.0	58.0	30.0
24" Steel Sheet	Vibratory	40.0	NA	40.0	NA	NA

A single strike SEL of 150 or greater can lead to a cumulative SEL (cSEL) higher than the 187 dB re: $1\mu Pa^2$•sec that is considered a threshold for physiological injury to sturgeon and salmon. The Practical Spreading Loss Model is often used to calculate underwater noise impacts and the distance at which a specific cSEL value is attained. However, as this model is not appropriate in this action area (riverine, coastal, bay environments), we have considered an alternative means to establish a distance from a pile where noise levels with the potential to cause physiological effects to fish could be experienced.[4] We recognize that a single strike SEL below 150 dB will not contribute to the overall cSEL because it has virtually no effect on fish; that is, it will never accumulate to levels reaching 187 dB cSEL and thus was deemed the level of "effective quiet" (Stadler and Woodbury 2009). Therefore, the distance from the pile to where the sSEL level drops to 150 dB is the maximum distance from a pile that a fish may be physiologically impacted, regardless of how many times the pile is struck or how long the pile is vibrated (i.e., at X meters from a pile, SEL=150 dB; thus, further than X meters from a pile, there is no potential

[4] The Practical Spreading Loss Model is based on geometric spreading and assumes that sound propagation is occurring within an open water ecosystem (e.g., middle of the ocean), unbound by geographic features, such as shorelines. This model does not consider important physical factors or features of the aquatic and surrounding environment, such as temperature, bottom topography, depth, or geography of the affected area (e.g., presence of landmasses or shorelines within the affected water body), that are known to greatly affect the propagation/attenuation of sound in water (Bastasch *et al.* 2008; e.g., 78 FR 29705, May 21, 2013). We find that the Practical Spreading Loss Model overestimates the distance at which underwater noise levels are reached in environments such as rivers or narrow bays that are not "open water" (Bastasch *et al.* 2008). Due to the nature of the model, any estimates obtained are unrealistically large and thus do not appropriately represent the acoustic footprint of an action in a confined, non-open ocean environment.

for physiological effects) (Stadler and Woodbury 2009). Calculating this distance, therefore, allows us to establish the size of the area near the pile where physiological effects could be experienced, with any fish outside of the 150 dB isopleth not expected to be exposed to noise levels with the potential to cause physiological effects to fish. According to Table 8, the driving of concrete and steel sheet piles with an impact or vibratory hammer can yield noise levels in excess of 150 dB. Neither of the noise estimates for timber piles exceeded the 150 dB sSEL level of effective quiet. Therefore, based on an attenuation rate of 5 dB for every 10 m, the estimated maximum distance from the pile driving location to the point where noise drops below the threshold of effect for fish is 10-70 m for concrete and steel sheet piles, depending on the installation method (see Table 9).

Therefore, for sturgeon and salmon, the 187 dB_{cSEL} criteria for injurious levels of cumulative noise could be met within the 10-70 m (depending on the installation method) 150 dB SEL isopleth produced while a pile is driven. However, in order to reach the 187 dB_{cSEL} threshold, a fish would need to remain within 10-70 m of the pile being driven for the entirety of each pile installation period. In the unlikely event that a sturgeon or salmon is near the pile when pile installation begins, we expect the noise generated during the required "soft start" will cause an individual to leave the area (see assessment of behavioral impacts below). That is, it is extremely unlikely that a sturgeon or salmon would remain within 10-70 m of any pile being installed for the duration of the procedure. Thus, based on the best available information, it is extremely unlikely that any sturgeon or salmon will be exposed to underwater noise that could result in physiological effects. Therefore, the potential for physiological effects to sturgeon or salmon resulting from the noise effects of driving non-steel piles ≤ 24 inches in diameter and steel sheet piles ≤ 24 inches in width is discountable.

Behavioral Effects from Non-Steel Piles (≤ 24") and Steel Sheet Piles (≤ 24") on Sturgeon, Salmon, and Sea Turtles

As described above, behavioral effects, such as avoidance or disruption of foraging activities, may occur in sea turtles and sturgeon/salmon at noise levels exceeding 166 dB re 1 μPa_{RMS} and 150 dB re 1 μPa_{RMS}, respectively. Using the information in Table 8 and Table 9, noise levels will have attenuated below 166 dB re 1 μPa_{RMS} 18-58m from a 24-inch concrete or steel sheet pile (depending on the installation method); and below 150 dB re 1 μPa_{RMS} 20-90m from the any type of non-steel pile or steel sheet pile ≤ 24-inches. Overall, effects of increased noise levels will be temporary and sporadic and only occupy small areas of a waterbody where work is being undertaken. Structures such as piers, outfalls, bulkheads, and moorings are usually located close to land; therefore, sound will be attenuated by the shoreline.

Based on the information you have provided us, the temporary increase in noise from pile driving does not represent a significant barrier to necessary life functions of sea turtles, sturgeon, or salmon. Within riverine tributaries and coastal bays/inlet habitats that support ESA-listed species, increased noise levels within 18-90 m of temporary pile driving activities, that are limited in size and scope based on the PDC in this programmatic consultation, will still allow passage within applicable waterbodies in the action area for listed species (as required by PDC 8). Therefore, any effects of the authorization of pile driving for non-steel piles ≤ 24 inches in diameter and steel sheet piles ≤ 24 inches in width, as analyzed in this programmatic consultation or confirmed on a project-specific basis, and the resulting increase in underwater noise levels, are so small they cannot be detected, and are therefore, insignificant.

Physiological and Behavioral Effects from Steel Piles (or non-steel piles and steel sheet piles >24") on ESA-Listed Species and Proposed or Designated Critical Habitat

In addition to projects involving non-steel piles and steel sheet piles ≤ 24 inches in diameter/width, projects involving steel piles and non-steel piles/steel sheet piles > 24 inches in diameter/width may also be eligible for consultation using the verification form under this programmatic consultation. However, in these instances, USACE will be responsible for providing noise estimates for the proposed pile installation work that show that underwater noise will not exceed any of the injury thresholds for ESA-listed species in the action area. Furthermore, USACE must show that the isopleths created by proposed pile installation will not adversely affect any behavior or ESA-listed species or their proposed or designated critical habitat (i.e., create a barrier for passage for species that are migrating through the action area, see PDC 8). USACE can make these determinations using our Acoustic Tool (available at: https://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/index.html), or using other methods that rely upon the best available information.

USACE must provide the information they use to make these determinations with their completed verification form. If we do not agree with a determination, the project must undergo individual consultation.

Physiological and Behavioral Effects from any Pile Installation on ESA-Listed Cetaceans

If ESA-listed whales are in the action area, USACE will also need to use the GARFO user spreadsheet for calculating the effect distances (i.e., isopleths) from a source for marine mammal permanent threshold shift (PTS) onset thresholds (available at: http://www.nmfs.noaa.gov/pr/acoustics/guidelines.htm). Using this spreadsheet, USACE must show that proposed pile driving will not injure listed cetaceans.

USACE will also be responsible for showing that proposed pile installation work that the isopleths created by proposed pile installation will not adversely affect any behavior or ESA-listed cetaceans (i.e., create a barrier for passage for species that are migrating through the action area, see PDC 8). USACE can make these determinations using our Acoustic Tool (available at: https://www.greateratlantic.fisheries.noaa.gov/protected/section7/guidance/consultation/index.html), or using other methods that rely upon the best available information.

USACE must provide the information they use to make these determinations with their completed verification form. If we do not agree with a determination, the project must undergo individual consultation.

Sound Pressure Effects on Proposed Atlantic Sturgeon Critical Habitat

For a project to be eligible under this programmatic consultation, it must meet all of the relevant PDC. General PDC 6 and 7 (See Table 7) prohibit any work that may affect PBFs 1 or 4 (See

Table 3). Sound pressure from pile driving will not affect habitat described in PBF 2 (i.e., gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites). Atlantic sturgeon may swim around isopleths created from pile driving, but the sound pressure will not affect the depth of the water or create physical barriers (see PDC 8) that would limit sturgeon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 3). In sum, sturgeon may swim around isopleths associated with these projects, but because noise levels will not rise to a level where passage will be hindered, any alterations in movements related to noise would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Sound Pressure Effects on Designated Atlantic Salmon Critical Habitat

For a project to be eligible under this programmatic consultation, it must meet all of the relevant PDC. General PDC 5 prohibits any work that affects Atlantic salmon spawning or rearing critical habitat (PBFs 1-7)(see

Table 4). It is possible that pile driving projects under this programmatic could overlap with PBFs 8-10. Atlantic salmon may have to swim around isopleths created from pile driving, but the sound pressure will not create physical or biological barriers (see PDC 8) that would limit salmon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBFs 8 and 10). Sound pressure from pile driving projects may temporarily cause avoidance behavior in native fish communities in estuarine environments; however, these effects are extremely unlikely to impact the abundance or diversity of those native fish communities, or their role in serving as a buffer for salmon predation (PBF 9). In sum, salmon may have to swim around isopleths associated with these projects, but any movement would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Impingement/Entrapment/Capture

PDC:

15. Only mechanical, cutterhead, and low volume hopper (e.g., CURRITUCK) dredges may be used.
16. No new dredging in proposed or designated Atlantic sturgeon or Atlantic salmon critical habitat (maintenance dredging still must meet all other PDC). New dredging outside Atlantic sturgeon or salmon critical habitat is limited to one-time dredge events (e.g., burying a utility line) and minor (≤ 2 acres) expansions of areas already subject to maintenance dredging (e.g., marina/harbor expansion).
17. Work behind cofferdams, turbidity curtains, and other methods to block access of animals to dredge footprint is required when operationally feasible and ESA-listed species may be present.
18. Temporary intakes related to construction must be equipped with appropriate sized mesh screening (as determined by the our section 7 biologist and/or according to Chapter 11 of the NOAA Fisheries Anadromous Salmonid Passage Facility Design) and must not have greater than 0.5 feet per second (fps) intake velocities, to prevent impingement or entrainment of any ESA-listed species life stage.

19. No new permanent intake structures related to cooling water, or any other inflow at facilities (e.g. water treatment plants, power plants, etc.).

Mechanical Dredging: Entrapment

Mechanical dredging entails lowering the open bucket or clamshell through the water column, closing the bucket after impact on the bottom, lifting the bucket up through the water column, and emptying the bucket into a barge. The bucket operates without suction or hydraulic intake, moves relatively slowly through the water column and impacts only a small area of the aquatic bottom at any time. In order to be captured in a dredge bucket, an animal must be on the bottom directly below the dredge bucket as it impacts the substrate and remain stationary as the bucket closes. Species captured in dredge buckets can be injured or killed if entrapped in the bucket or buried in sediment during dredging and/or when sediment is deposited into the dredge scow. Species captured and emptied out of the bucket can suffer stress or injury, which can lead to mortality.

Whales
Whales are too large to be susceptible to entrapment by a mechanical dredge. As such, the likelihood that a whale would be captured during any of the dredge events is extremely unlikely and therefore, discountable.

Sea Turtles
Sea turtles are not known to be vulnerable to entrainment in mechanical dredges, presumably because they are able to avoid the dredge bucket. Thus, if a sea turtle were to be present at the dredge site, it would be extremely unlikely to be injured or killed as a result of dredging operations carried out by a mechanical dredge. Based on this information, effects to sea turtles from the mechanical dredge are discountable.

Sturgeon and Salmon
There are no known incidences of Atlantic salmon being captured in a dredge bucket. As Atlantic salmon are highly mobile and not likely to be present when dredging occurs in rivers (see PDC 2 in Table 7) there is little risk of individuals being captured in the relatively slow moving dredge bucket. As such, the likelihood that an Atlantic salmon would be captured during any of the dredge events are extremely unlikely and therefore, discountable.

In 2011, USACE provided us with a list of all documented interactions between dredges and sturgeon reported along the U.S. East Coast; reports dated as far back as 1990 (USACE 2011). This list included four incidents of sturgeon captured in dredge buckets. These include the capture of a decomposed Atlantic sturgeon in Wilmington Harbor in 2001. The condition of this fish indicated it was not killed during the dredging operation and was likely dead on the bottom or in the water column and merely scooped up by the dredge bucket. Another record was of the capture of an Atlantic sturgeon in Wilmington Harbor in 1998; however, this record is not verified and not considered reliable. The report also listed the live capture of an Atlantic sturgeon at the Bath Iron Works (BIW) facility in the Kennebec River, Maine in 2001 as well as a shortnose sturgeon captured at BIW in 2003 that was observed to have suffered death recently at the time of capture. One report of a live shortnose sturgeon captured in a dredge bucket at BIW in 2009 was not included in the report. Observer coverage at dredging operations at the BIW facility has been 100% for approximately 15 years, with dredging occurring every one to two years. Hundreds of mechanical dredging projects occur along the U.S. Atlantic coast each year, and we are not aware of any other captures of sturgeon in mechanical dredges anywhere in the U.S prior to or after 2012.

The risk of interactions between sturgeon and mechanical dredges is thought to be highest in areas where large numbers of sturgeon are known to aggregate. The risk of capture may also be related to the behavior of the sturgeon in the area. While foraging, sturgeon are at the bottom of the river interacting with the sediment. This behavior may increase the susceptibility of capture with a dredge bucket. We also expect the risk of capture to be higher in areas where shortnose sturgeon are overwintering in dense aggregations as overwintering shortnose sturgeon may be less responsive to stimuli which could reduce the potential for a sturgeon to avoid an oncoming dredge bucket. However, PDC 4 prevents work from occurring in shortnose sturgeon overwintering grounds during the fall and winter months when they are expected to be less mobile.

Based on these factors, it is extremely unlikely that any sturgeon will be captured, injured or killed during mechanical dredging activities. Therefore, any effects of impingement from the proposed dredging activities on sturgeon are discountable.

Cutterhead Dredging: Impingement or Entrainment

The cutterhead dredge operates with the dredge head buried in the sediment; however, a flow field is produced by the suction of the operating dredge head. The amount of suction produced is dependent on linear flow rates inside the pipe and the pipe diameter (Clausner and Jones 2004). High flow rates and larger pipes create greater suction velocities and wider flow fields. The suction produced decreases exponentially with distance from the dredge head (Boysen and Hoover 2009). Additionally, cutterhead dredge heads do not begin operating until they are placed within the sediments at the dredge site, making it extremely unlikely for listed species to have exposure to the suction.

Whales
Whales are too large to be susceptible to entrainment or impingement by a cutterhead dredge. As such, the likelihood that a whale would be impinged or entrained during any of the dredge events is extremely unlikely and therefore, discountable.

Sea turtles
Sea turtles are not known to be vulnerable to entrainment in cutterhead dredges. Based on the lack of documented interactions between sea turtles and cutterhead dredges, and that the dredge suction is not turned on until the dredge head is in contact with the substrate, effects to sea turtles from the cutterhead dredge are extremely unlikely, and therefore discountable.

Sturgeon and Salmon
Impingement or entrainment in cutterhead dredges may kill or injure sturgeon and salmon. In order for the fish to be impinged or entrained in the cutterhead dredge, sturgeon or salmon have to be on the bottom. These fish do occur on the bottom, especially sturgeon when engaging in foraging behaviors. However, studies indicate that small, juvenile sturgeon less than 0.6 feet fork length need to be within 4.9- 6.6 ft. of the cutterhead for there to be any potential entrainment (Boysen and Hoover 2009). PDC 2-6 (see Table 7) limit the instances where sturgeon or salmon could be in the action area when a cutterhead dredge would be operating, and we do not expect any early life stage fish (i.e., larvae) to be exposed to cutterhead activities. Based on this information, it is extremely unlikely that a sturgeon or salmon would be impinged or entrained in a cutterhead dredge; therefore, the effects are discountable.

Hopper Dredging: Impingement/Entrainment

With the use of a hopper dredge, dredged material is raised by dredge pumps through dragarms connected to dragheads in contact with the channel bottom and discharged into hoppers built in the vessel. Hopper dredges are equipped with large centrifugal pumps similar to those employed by other hydraulic dredges. Suction pipes (dragarms) are hinged on each side of the vessel with the intake (drag) extending downward toward the stern of the vessel. The draghead is moved along the bottom as the vessel moves forward at speeds up to three knots. The dredged material is sucked up the pipe and deposited and stored in the hoppers of the vessel.

In order to be eligible for consultation using the verification form, a hopper dredging project must use the CURRITUCK, or another similar low volume, low suction hopper. There are several characteristics of the CURRITUCK that minimize the likelihood of impingement or entrainment of species such as sea turtles, salmon, and sturgeon. The CURRITUCK is a small special purpose hopper dredge. This specialized dredge has a maximum bin capacity of 300 cubic yards and operates at speeds between 1 and 3 knots. While in transit to the placement area, the CURRITUCK will be traveling at speeds of approximately 5-8 knots. Gridded baffles subdivide the dragheads to create draghead openings that are no larger than 3-inches by 5-inches.

Most sea turtles, sturgeon, and salmon are able to escape from the oncoming draghead due to the slow speed that the draghead advances (up to 3 mph or 4.4 feet/second). Interactions with a hopper dredge result primarily from crushing when the draghead is placed on the bottom, or when an animal is unable to escape from the suction of the dredge and becomes stuck on the draghead (i.e., impingement). Entrainment occurs when organisms are sucked through the draghead into the hopper. Mortality most often occurs when animals are sucked into the dredge draghead, pumped through the intake pipe and then killed as they cycle through the centrifugal pump and into the hopper.

Interactions with the draghead can also occur if the suction is turned on while the draghead is in the water column (i.e., not seated on the bottom). The Corps implements procedures to minimize the operation of suction when the draghead is not properly seated on the bottom sediments which reduces the risk of these types of interactions.

Whales
Whales are too large to be susceptible to entrainment or impingement by a hopper dredge. As such, the likelihood that a whale would be impinged or entrained during any of the dredge events is extremely unlikely and therefore, discountable.

Sea Turtles
Studies done by the Corps in 1998 have shown that the suction produced by CURRITUCK is low and would not be strong enough to fully impinge a sea turtle in a way that would prevent the turtle from freeing itself. The studies were conducted on a previously dead, juvenile green sea turtle, with a carapace length of 13.5 inches. The studies confirmed that the small draghead openings prevented the small turtle from becoming entrained. Further, the suction force was low enough that the turtle was easily prodded and moved by a pole despite being impinged by the suction force of the draghead. The results of the studies indicated that a small live turtle would likely have the ability to avoid impingement through its strong swimming abilities and, if impinged, would likely have the ability to easily free itself from impingement by its own efforts. This conclusion is supported by the lack of any observed impingement or entrainment of sea turtles on the CURRITUCK, despite the dredge operating several times per year in areas where sea turtles are likely to be present. As such, the low operating speed, low level of suction, the Corps procedure of not turning on the suction until the draghead is properly seated on the bottom, and the small draghead openings indicate that it is extremely unlikely that a sea turtle would become impinged on or entrained in the CURRITUCK. Thus, effects of impingement or entrainment on sea turtles are discountable.

Sturgeon and Salmon
Sturgeon are vulnerable to interactions with hopper dredges larger than the CURRITUCK. The risk of interactions is related to both the amount of time sturgeon spend on the bottom and the behavior the fish are engaged in (i.e., whether the fish are overwintering, foraging, resting or migrating), as well as the intake velocity and swimming abilities of sturgeon in the area (Clarke 2011). Intake velocities at a typical large self-propelled hopper dredge are 11 feet per second, but less for the CURRITUCK. Exposure to the suction of the draghead intake is minimized by not turning on the suction until the draghead is properly seated on the bottom sediments and by maintaining contact between the draghead and the bottom.

In general, entrainment of large mobile animals, such as the sturgeon or salmon, is relatively rare. Several factors are thought to contribute to the likelihood of entrainment. One factor influencing potential entrainment is the swimming stamina and size of the individual fish at risk (Boysen and Hoover 2009). Swimming stamina is positively correlated with total fish length. Entrainment of larger sturgeon and salmon, such as the juveniles, subadults, and adults that may occur in the action area, is less likely due to the increased swimming performance and the relatively small size of the draghead opening (3-inches by 5-inches). PDC 2-6 (see Table 7) limit the instances where sturgeon or salmon could be in the action area when a hopper dredge would be operating, and we do not expect any early life stage fish (i.e., larvae) to be exposed to hopper dredging activities.

Given the precautionary measures ensuring that suction of the draghead is only on when in contact with the bottom, an interaction of a sturgeon or salmon with a hopper dredge is extremely unlikely. The Corps has not reported any interactions with sturgeon or salmon during any past operations of the CURRITUCK at any location. Therefore, effects of impingement or entrainment on salmon and sturgeon are discountable.

Impingement or entrainment effects from temporary intakes on ESA-listed species

PDC 18 requires that temporary intakes related to construction must be equipped with appropriate sized mesh screening (as determined by our section 7 biologist, and documented by USACE through the verification form process) and must not have greater than 0.5 fps intake velocities, to prevent impingement or entrainment of any ESA-listed species life stage.

PDC 2-6 (see Table 7) limit the instances where sturgeon or salmon could be in the action area when temporary intake structure would be operating, and we do not expect any early life stage fish (i.e., larvae) to be exposed to temporary intake structures.

At ≤0.5 fps, it would be extremely unlikely for any non-early life stage fish, sea turtle, or whale to have any risk of impingement or entrainment from a temporary intake structure; therefore, effects are discountable (NMFS & USFWS 2014).

Entrapment, impingement, and entrainment effects on proposed Atlantic sturgeon critical habitat

PDC 6 excludes any project that will affect PBF 1 (see Table 3 and Table 7). It is possible that permitted dredging projects under this programmatic could overlap with PBFs 2, 3, 4. The risk of entrapment, impingement, and entrainment will not affect water quality as described in PBF 4, nor will it affect habitat described in PBF 2 (i.e., gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites). Atlantic sturgeon may have to swim around dredge equipment or a temporary intake structure in critical habitat rivers, but we do not expect any entrapment, impingement, and entrainment to occur, so the equipment will not create barriers (see PDC 8) that would limit sturgeon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 3). In sum, any sturgeon movement to avoid a dredge would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Entrapment, impingement, and entrainment effects on designated Atlantic salmon critical habitat

PDC 5 excludes any project that will affect PBFs 1-7 (see

Table 4 and Table 7). It is possible that permitted dredging projects under this programmatic could overlap with PBFs 8-10. Atlantic salmon may have to swim around dredge equipment within their critical habitat, but we do not expect any entrapment, impingement, or entrainment to occur, so the equipment will not create physical or biological barriers (see PDC 8) that would limit salmon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBFs 8 and 10). The risk of entrapment, impingement, and entrainment will not affect the abundance or diversity of native fish communities serving as a protective buffer against salmon predation in estuarine environments (PBF 9). In sum, salmon may have to swim around dredge equipment associated with these projects, but any movement would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Turbidity/Water Quality

PDC:

20. Work behind cofferdams, turbidity curtains, or other methods to control turbidity are required when operationally feasible and ESA-listed species may be present.
21. In-water offshore disposal may only occur at designated disposal sites that have already been consulted on with GARFO.
22. Any temporary discharges must meet state water quality standards; no discharges of toxic substances.
23. Only repair of existing discharge pipes allowed; no new construction.

Turbidity associated with dredging

Mechanical:
Suspended sediment levels from conventional mechanical clamshell bucket dredging operations have been shown to range from 105 mg/L in the middle of the water column to 445 mg/L near the bottom (210 mg/L, depth-averaged) (USACE 2001). Furthermore, a study by Burton (1993) measured turbidity levels 500, 1,000, 2,000 and 3,300 feet from dredge sites in the Delaware River and were able to detect turbidity levels between 15 mg/L and 191 mg/L up to 2,000 feet from the dredge site. Based on these analyses, elevated suspended sediment levels of up to 445 mg/L may be present in the immediate vicinity of the clamshell bucket, and suspended sediment levels of up to 191 mg/L could be present within a 2,000-foot radius from the location of the clamshell dredge.

Cutterhead:
Based on a conservative total suspended sediment (TSS) background concentration of 5.0 mg/L, modeling results of cutterhead dredging indicated that elevated TSS concentrations (i.e., above background levels) would be present throughout the bottom six feet of the water column for a distance of approximately 1,000 feet (USACE 1983). Based on these analyses, elevated suspended sediment levels are expected to be present only within a 1,000-foot radius of the location of the cutterhead dredge. Turbidity levels associated with cutterhead dredge sediment plumes typically range from 11.5 to 282.0 mg/L with the highest levels detected adjacent to the cutterhead dredge and concentrations decreasing with greater distance from the dredge (Nightingale and Simenstad 2001).

Hopper:
Near-bottom turbidity plumes caused by hopper dredges may extend approximately 2,300 to 2,400 feet downcurrent from either side of the dredge, and approximately 1,000 feet behind the dredge the two plumes merge into a single plume (ACOE 1983). Suspended solid concentrations

may be as high as several tens of parts per thousand (ppt; grams per liter) near the discharge port and as high as a few parts per thousand near the draghead. In a study done by Anchor Environmental (2003), nearfield concentrations ranged from 80.0-475.0 mg/L. Turbidity levels in the near-surface plume appear to decrease exponentially with increasing distance from the dredge due to settling and dispersion, quickly reaching concentrations less than one ppt. Studies also indicate that in almost all cases, the vast majority of resuspended sediments resettle close to the dredge within one hour, and only a small fraction takes longer to resettle (Anchor Environmental 2003).

Dredged Material Disposal (Offshore Disposal, Beach Nourishment, Dewatering)

Offshore disposal:
PDC 21 states that projects with offshore disposal are only eligible for consultation using the verification form if we have existing consultation in effect with you (USACE) or EPA for the disposal site(s) proposed for use (e.g., Eastern Long Island Sound disposal site). You must follow all of the conditions put forth in the consultation document (and associated USACE/EPA permits) for the disposal site (e.g., vessel speed, presence of an observer/designated lookout etc.).

Beach nourishment:
Wilber *et al.* (2006) reported that elevated total suspended sediment (TSS) concentrations associated with the active beach nourishment site were limited to within 1,312 feet of the discharge pipe in the swash zone (defined as the area of the nearshore that is intermittently covered and uncovered by waves), while other studies found that the turbidity plume and elevated total suspended sediment levels are expected to be limited to a narrow area of the swash zone up to 1,640 feet down current from the discharge pipe (Burlas *et al.* 2001). Based on this and the best available information, turbidity levels created by the beach fill operations along the shoreline are expected to be between 34.0-64.0 mg/L; limited to an area approximately 1,640 feet down current from the discharge pipe; and, are expected to be short term, only lasting several hours.

Dewatering:
The release of effluent during the dewatering of dredged sediment may temporarily increase turbidity and/or suspended sediments in the receiving waterbody. However, PDC 20 requires that turbidity producing work occur behind cofferdams, turbidity curtains, or other methods to control turbidity when operationally feasible. Therefore, prior to the effluent entering the receiving waterbody, any remaining sediment in the discharge water will be trapped and able to settle out of suspension, thereby avoiding exposure of listed species to elevated turbidity and suspended sediment levels.

Pile Installation/Removal

The installation of piles will disturb bottom sediments and may cause a temporary increase in suspended sediment in the action area. Using available information, we expect pile driving or removal activities to produce total suspended sediment (TSS) concentrations of approximately 5.0 to 10.0 mg/L within approximately 300 feet of the pile being driven (FHWA 2012). The small resulting sediment plume is expected to settle out of the water column within a few hours.

Effects of increased turbidity on whales:

No information is available on the effects of total suspended solids (TSS) on whales. Whales breathe air, and thus are not subject to the same potential respiratory effects of high turbidity as anadromous fish. TSS is most likely to affect whales if a plume causes a barrier to normal behaviors; however, PDC 8 requires that a project eligible for consultation under this programmatic maintain a zone of passage with suitable habitat. Whales in the action area during project operations may avoid interacting with a sediment plume by swimming around it, and any such avoidance would be so minor a movement as to be too small to be meaningfully measured or detected, and is therefore insignificant. However, if whales do interact with a plume, the TSS levels (≤475.0 mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical), so it is reasonable to assume that these levels would also be below those that would cause adverse effects to whales (Burton 1993). We do not expect temporary increases in turbidity associated with projects under this programmatic consultation to affect whale prey items (i.e., copepods, small schooling fish, krill), and PDC 9 excludes any project that has an effect on the PBFs of right whale critical habitat. Based on this information, any effects of suspended sediment resulting from pile driving, dredging, or dredge material disposal activities on whales will be too small to be meaningfully measured or detected, and are therefore, insignificant.

Effects of increased turbidity on sea turtles:

Limited information is available on the effects of increased turbidity on juvenile and adult sea turtles. Sea turtles breathe air, and thus are not subject to the same potential respiratory effects of high turbidity as anadromous fish. Increased turbidity is most likely to affect sea turtles if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. However, to be eligible for consultation using the verification form, PDC 8 requires that a zone of passage with appropriate migrating habitat be maintained. In addition, PDC 20 requires turbidity causing work to use cofferdams, turbidity curtains, or other methods to control turbidity are when operationally feasible. As sea turtles are highly mobile, they are likely to be able to avoid any sediment plumes caused by the activities authorized by this programmatic consultation. Any minor movement to avoid a sediment plume will be too small to be meaningfully measured or detected, and is therefore, insignificant.

Any far field effects of sedimentation will be temporary and minimal, and benthic resources are likely only to be affected if turbidity levels rise above 390 mg/L (EPA 1986). Leatherback's primary prey item is jellyfish, which occur in the water column; we do not expect jellyfish to be affected by any of the turbidity causing activities mentioned above. PDC 10 requires any project adversely affecting SAV (green sea turtles' primary forage source) to go through individual consultation. Kemp's ridley and loggerhead sea turtles may feed on benthic shellfish or crustaceans, but these species are expected to be able to avoid or uncover themselves from any of the short term turbidity producing projects described above. Therefore, any effects to sea turtle forage items will be too small to be meaningfully measured or detected, and are therefore, insignificant.

Effects of increased turbidity on sturgeon and salmon:

Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). A literature review by Burton (1993) demonstrated that lethal effects on fish due to turbid waters can occur at levels between 580 mg/L to 700,000 mg/L, depending on the species. Studies on striped bass (an anadromous species) showed that prespawners did not avoid concentrations of 954 to 1920 mg/L to reach spawning sites (Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993). While there have been no directed studies on the effects of suspended solids on Atlantic and shortnose sturgeon, juveniles and adults are often documented in turbid water (Dadswell *et al.* 1984). Based on the available information, we assume sturgeon and salmon are at least as tolerant to suspended sediment as other estuarine fish such as striped bass, and will be able to swim through or around a sediment plume without experiencing adverse effects (General PDC 8 requires that a zone of passage with appropriate migrating habitat be maintained). Any such avoidance would be so minor a movement as to be too small to be meaningfully measured or detected, and is therefore insignificant.

PDC 2 and 3 provide time of year restrictions that prevent work from affecting spawning sturgeon and salmon, as well as their eggs and larval life stages. In addition, PDC 20 requires turbidity producing work to use cofferdams, turbidity curtains, or other methods to control turbidity are when operationally feasible. As turbidity levels from dredge activities are anticipated to be below adverse effect thresholds to all post-larval life stages, all effects to Atlantic sturgeon, shortnose sturgeon, and salmon are extremely unlikely. Although the threshold for effects to benthic resources (390 mg/L) is slightly below the expected levels from a couple of the activities discussed above (≤475 mg/L), levels are expected to drop rapidly with increasing distance from the dredge due to settling and dispersion. We expect the vast majority of projects under this programmatic consultation to be maintenance dredging (PDC 16 prohibits new dredging in Atlantic sturgeon or Atlantic salmon critical habitat and restricts new dredging outside of sturgeon and salmon critical habitat to ≤ 2 acre areas that are expansions to areas already subject to maintenance dredging). Therefore, most minor impacts from increased turbidity will occur in previously dredged areas, which will further limit any effects above baseline conditions. Given the information and PDC listed above, effects to sturgeon, salmon, and their forage base will be insignificant or discountable.

If a section 7 biologist believes a project may have an individual or cumulative effect that would adversely affect ESA-listed species beyond levels that are insignificant or discountable, that project would have the potential to violate PDC 1, and would therefore require individual consultation.

Turbidity/water quality effects on proposed Atlantic sturgeon critical habitat

PDC 6 excludes any project that will affect spawning habitat as described in PBF 1 (see Table 3 and Table 7). It is possible that permitted projects under this programmatic could overlap with PBFs 2, 3, 4. PDC 7 excludes work that has the potential to change water temperature, flow, salinity, or dissolved oxygen levels (PBF 4). Projects may have minor and temporary effects on PBF 2 (i.e., foraging and development habitat with a gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites). However, as described above, PDC 16 prohibits new dredging in Atlantic sturgeon (or Atlantic salmon) critical habitat. Therefore, critical habitat areas subject to minor impacts from increased turbidity are limited to previously dredged areas (that will not affect PBF 1 or 4). While the threshold for effects to benthic resources (390 mg/L) is slightly below the expected levels from a couple of the activities discussed above (≤475 mg/L), levels are expected to drop rapidly with increasing distance from the dredge due to settling and dispersion. As described above, the highest levels of turbidity from the activities described above (≤475 mg/L for hopper dredges; (≤445 mg/L for mechanical dredges) would likely only be experienced in the immediate vicinity of the dredge. It is reasonable to assume that the much of the plume would be below the 390 mg/L threshold for benthic resources. Furthermore, we expect benthic invertebrates would quickly recolonize any foraging habitat temporarily lost due to dredging and turbidity (Wilber and Clarke, 2007). Given the expansive habitat available that is not subject to maintenance dredging, minor and temporary reductions in foraging habitat availability from turbidity effects would be too small to detect, and are therefore, insignificant. If the section 7 biologist reviewing a verification form believes the effects to foraging habitat rise above insignificant/discountable, he or she will require USACE to complete an individual consultation.

Atlantic sturgeon may have to swim around turbidity plumes in critical habitat rivers, but PDC 8 requires that passage with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained. Therefore, no project will create barriers that would limit sturgeon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 3). In sum, any sturgeon movement to avoid a turbidity plume would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Turbidity/water quality effects on designated Atlantic salmon critical habitat

PDC 5 excludes any project that will affect PBFs 1-7, or Atlantic salmon spawning or rearing habitat (see

Table 4 and Table 7). It is possible that permitted projects under this programmatic could overlap with PBFs 8-10. Atlantic salmon may have to swim around turbidity plumes in critical habitat rivers, but PDC 8 requires that passage with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained. Therefore, no project will create barriers that would limit salmon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 8 and 10). In sum, any salmon movement to avoid a turbidity plume would be too minor to be meaningfully measured or detected, and is therefore, insignificant. We do not expect turbidity or water quality effects from any project to affect the abundance or diversity of native fish communities serving as a protective buffer against salmon predation in estuarine environments (PBF 9).

Water quality effects from temporary discharges or discharge pipe replacements on listed species and proposed/designated critical habitat:

You have determined that certain activities result in minor and temporary (only last for minutes or hours before returning to the ambient conditions) impacts to water quality within the action area. Water quality impacts considered here mainly focus on increases in turbidity or total suspended sediment (TSS), but also may include discharges related to the replacement of existing discharge pipes or temporary discharges that meet state water quality standards and do not discharge toxic substances (PDC 22 & 23). State water quality standards are promulgated to prevent discharges that would have adverse effects on aquatic animals and their habitat, including listed species, and the replacement of a discharge pipe would either improve or maintain baseline water quality conditions in the action area. If the replacement were to worsen water quality conditions, our section 7 biologist would require USACE to complete an individual consultation. Therefore, following the PDC above, all effects to ESA-listed species or proposed and designated critical habitat are extremely unlikely, and therefore, discountable.

<u>Entanglement</u>

PDC:

24. Shell on bottom <50 acres with maximum of 4 corner marker buoys;
25. Cage on bottom with no loose floating lines <5 acres and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
26. Floating cages in <3 acres in waters and shallower than -10 feet MLLW with no loose lines and minimal vertical lines (1 per string of cages, 4 corner marker buoys);
27. Floating upweller docks in >10 feet MLLW
28. Any in-water lines, ropes, or chains must be made of materials and installed in a manner (properly spaced) to minimize the risk of entanglement by keeping lines taut or using methods to promote rigidity (e.g., sheathed or weighted lines that do not loop or entangle).

You have determined that certain types of small-scale shellfish aquaculture (listed above) are not likely to adversely affect listed sea turtles, whales, salmon, or sturgeon in the action area. Provided that proposed projects meet all of the PDC, and are within the thresholds outlined above, they will be eligible for section 7 review using the verification form.

Effects of entanglement on ESA-listed species

The lines within the water column associated with the aquaculture gear described above, as well as lines associated with buoys, floats, etc., have the ability to wrap around the flippers and fins of sea turtles, while these species forage, migrate, or pursue prey. In order to minimize this risk, you have required that vertical lines be pulled taut, or use methods to promote rigidity (e.g., sheathed or weighted line), in the water column. Lines that are not loose are extremely unlikely to wrap around flippers and fins. Therefore, the risk of entanglement is discountable. The aquaculture cages themselves are highly visible, rigid structures that are unable to entangle or entrap listed species. As such, all effects to sea turtles resulting from lines, ropes, or chains considered by this programmatic consultation are discountable.

Vertical lines set in deeper water have the potential to entangle whales. All lines are required to be taut, or use methods to promote rigidity, which will minimize the risk of entanglement. This consultation does not consider floating cage projects that occur in water deeper than 10 feet, so these projects will not occur in areas where we would expect whales to be migrating. Additionally, due to the economic advantages of raising shellfish in nearshore environments, it is anticipated that most of the shell on bottom and cage on bottom projects will occur in shallower waters where whales are less likely to occur. As all projects eligible for review under the verification form will occur in shallow or intertidal habitat, entanglement is extremely unlikely, and all effects to ESA listed whales will be discountable.

Vertical lines resulting from aquaculture or buoys, floats, etc. will also not present an entanglement risk to sturgeon or salmon for several reasons. Because sturgeon and salmon are active under lowered light conditions (e.g., foraging in the offshore and coastal marine environment), they can presumably sense the presence of stationary aquaculture structures in their environment. The floating gear and cages are rigid structures making the gear visible and palpable to sturgeon and salmon, and thereby, allowing individuals to avoid interaction with the stationary gear. The maneuverability of sturgeon and salmon will allow them to avoid the stationary gear at the surface and the buoy lines. Any movements to avoid the gear would not affect sturgeon or salmon's ability to migrate and forage, and would be too small to be meaningfully measured or detected. The requirement that all vertical lines be taut or rigid also makes the risk of entanglement extremely unlikely. As such, all effects of these aquaculture activities in the action area will be insignificant and discountable.

Shell-on-bottom aquaculture is low profile and creates a natural low-profile reef-like habitat, providing no obstruction to the movement of sturgeon, salmon, or sea turtles. The programmatic consultation limits this type of project to 50 acres or smaller (PDC 24) and excludes projects that result in the conversion of habitat type (PDC 29). These sites will only be marked at the four boundary corners with taut vertical lines and buoys, poles, or stakes. Therefore, any entanglement effects from shell on bottom aquaculture on salmon, sturgeon, and sea turtles are extremely unlikely and therefore, discountable.

Entanglement effects on proposed Atlantic sturgeon critical habitat

All of the aquaculture types considered in this programmatic consultation occur in saline waters, primarily in estuarine environments and bays. Most of the proposed Atlantic sturgeon critical habitat does not extend into the areas where we would expect these aquaculture projects to occur, and none of the aquaculture projects covered by this programmatic consultation will occur in freshwater. Therefore, there will be no effect from entanglement risk on PBF 1 (see Table 3). Any vertical lines associated with non-aquaculture projects (buoys, floats, etc.) will not affect PBF 1 (PDC 6). It is possible that permitted projects resulting in vertical lines under this programmatic could overlap with PBFs 2, 3, 4. The risk of entanglement will not affect water quality as described in PBF 4, nor will it affect habitat described in PBF 2 (i.e., gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites). Atlantic sturgeon may have to swim around lines or gear near the mouth of critical habitat rivers, but the gear will not affect the depth of the water or create barriers that would limit sturgeon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 3). In sum, sturgeon may have to swim around taut or rigid vertical lines associated with these projects, but any movement would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Entanglement effects on designated Atlantic salmon critical habitat

All of the aquaculture types considered in this programmatic consultation occur in saline waters, primarily in estuarine environments and bays. None of the aquaculture projects covered by this programmatic consultation will occur in freshwater; therefore, there will be no effect from entanglement risk on PBFs 1-7 (see

Table 4). Any vertical lines associated with non-aquaculture projects (buoys, floats, etc.) will not affect PBFs 1-7 (PDC 5). It is possible that permitted projects resulting in vertical lines under this programmatic could overlap with PBFs 8-10. Atlantic salmon may have to swim around lines or gear near the mouth of critical habitat rivers, but the gear will not create physical or biological barriers that would limit salmon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBFs 8 and 10). The risk of entanglement will not affect the abundance or diversity of native fish communities serving as a protective buffer against salmon predation in estuarine environments (PBF 9). In sum, salmon may have to swim around taut or rigid vertical lines associated with these projects, but any movement would be too minor to be meaningfully measured or detected, and is therefore, insignificant.

Habitat Modification

PDC:

29. No conversion of habitat type (soft bottom to hard, or vice versa) for aquaculture or reef creation.

All of the project activities covered by this programmatic consultation have some potential to affect ESA-listed species' habitat.

Habitat modification from temporary biological stressors (e.g., turbidity, sound pressure)

PDC are in place to limit disturbance of important habitat. As discussed in the sound pressure and water quality/turbidity sections above, PDC 8 states that if it is possible for ESA-listed species to pass through the action area, passage with appropriate habitat for ESA-listed species (e.g., depth, water velocity, etc.) must be maintained (i.e., physical or biological stressors such as turbidity and sound pressure must not create barrier to passage). Therefore, habitat impacts from temporary biological stressors and permanent physical structures are extremely unlikely to affect ESA-listed species or critical habitat (i.e., Atlantic sturgeon PBF 3; Atlantic salmon PBF 8, 10), and are discountable.

Effects to spawning and overwintering areas

Proposed Atlantic sturgeon and designated Atlantic salmon critical habitat provide overlap with all of the rivers where we expect shortnose sturgeon to spawn. PDC 2, 3, and 4 provide TOY windows that protect sturgeon and salmon spawning and early life stage development, as well as shortnose sturgeon overwintering behaviors. PDC 5 and 6 prohibit activities that have the potential to affect the PBFs necessary for Atlantic sturgeon spawning (PBF 1) and Atlantic salmon spawning and rearing (PBFs 1-7). It is possible for an activity to occur in shortnose overwintering habitat when the habitat is not being used for overwintering (the dates vary by District, see PDC 4); however, we do not expect any project under this programmatic to have a potentially adverse effect on shortnose sturgeon's use of overwintering habitat. If USACE were to submit a verification form for a project that our section 7 biologist believed might adversely affects shortnose sturgeon's future use of overwintering habitat, the project would have the potential to violate PDC 1, and would therefore require individual consultation. With these protections in place, we expect all effects to sturgeon and salmon spawning and shortnose overwintering habitats to be extremely unlikely, and therefore, discountable.

Foraging habitat removal from dredging

Dredging activities have the potential to affect sturgeon, salmon, and juvenile green, loggerhead and Kemp's ridley sea turtle foraging habitat (including Atlantic sturgeon proposed critical habitat, PBF 2, i.e., areas with a gradual downstream,salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites for juvenile foraging and physiological development). We don't anticipate any effects to whale (see PDC 9), leatherback (jellyfish) or adverse effects to adult green sea turtle (aquatic vegetation – see PDC 10) foraging habitat. We also don't anticipate adverse effects to diverse native fish communities to serve as a protective buffer against predation (Atlantic salmon critical habitat, PBF 9).

As detailed previously, PDC 16 limits dredging in Atlantic sturgeon and Atlantic salmon critical habitat to maintenance dredging; and the only new dredging allowed outside of Atlantic sturgeon and salmon critical habitat are one-time dredge events (e.g., burying a utility line) and minor (≤ 2 acres) expansions of areas already subject to maintenance dredging (e.g., marina/harbor expansion). Dredging (both in and outside of critical habitat rivers) will mainly involve work in existing harbors/marinas, shipping channels, and shipping terminals. Sturgeon, salmon, and loggerhead and Kemp's ridley sea turtles may opportunistically forage in the substrate of these areas, but they make up a small portion of the available foraging habitat (both in and outside of critical habitat rivers), and depending on the dredge frequency, may be available for foraging between dredge cycles. Studies reviewed by Wilbur and Clarke (2007) demonstrate that benthic communities in temperate regions occupying shallow waters with a combination of sand, silt, or clay substrate reported recovery times between 1-11 months after dredging. Thus, we expect benthic communities to recover in less than one year. Only areas of with the highest rates of shoaling need to be maintenance dredged every year, so many dredged areas will be intermittently accessible to sturgeon, salmon, and sea turtles. Therefore, given that areas impacted by maintenance dredging represent a small portion of available foraging habitat for ESA-listed species, and that some of those impacted areas will still be intermittently available for foraging between dredge cycles, effects from the loss of foraging habitat from maintenance dredging will be too small to be meaningfully measured or detected and are insignificant.

Foraging habitat displacement and shading from pile supported structures and fill

The placement of structures such as pilings and piers, as well as shoreline fill and structures such as bulkheads and boat ramps, may displace or shade available benthic habitat throughout the action area. Therefore, foraging habitat for sturgeon (including Atlantic sturgeon proposed critical habitat, PBF 2), salmon, and juvenile green, loggerhead, and Kemp's ridley sea turtles could be affected.

Structures involving pile placement and shoreline fill will occur in nearshore environments (i.e., structures are typically attached to terrestrial properties), and are often in extremely shallow, intertidal areas. Under this programmatic, new pile supported structures are limited to ≤50 piles (PDC 13) and can only result in the net increase of ≤2 non-commercial vessels (PDC 32). Following these criteria, we expect new pile supported structures to be limited to residential piers, docks, and floats or minor expansions to existing commercial facilities. Associated shading (i.e., under piers, docks, floats) may reduce benthic prey and forage items that depend on light and photosynthesis for primary production in the aquatic system by limiting their access to light and resources essential to growth.

Because we expect habitat displacement and shading permitted under this programmatic to be limited to residential piers, docks, and floats or minor expansions to existing commercial facilities in primarily shallow and/or intertidal waters, we anticipate all effects on listed species foraging above baseline conditions to be too small to be meaningfully measured or detected, and therefore, insignificant. If our section 7 biologist believes a project may have an individual or cumulative effect that would adversely affect ESA-listed species foraging beyond levels that are insignificant or discountable, that project would have the potential to violate PDC 1, and would therefore require individual consultation.

Foraging habitat displacement from aquaculture
Aquaculture projects under this programmatic are limited to shellfish projects that meet the following criteria (see PDC 24-27):

- Shell on bottom <50 acres with maximum of 4 corner marker buoys;
- Cage on bottom with no loose floating lines <5 acres and minimal vertical lines (1 per string of cages);
- Floating cages in <3 acres in waters and shallower than -10 feet MLLW with no loose lines and minimal vertical lines (1 per string of cages);
- Floating upweller docks in >10 feet MLLW

In addition, PDC 28 states that no project can result in the conversion of habitat type (soft bottom to hard, or vice versa) for aquaculture or reef creation. With these PDC in place, aquaculture projects still may alter or displace benthic foraging habitat availability for sturgeon, salmon, and juvenile green, loggerhead, and Kemp's ridley sea turtles. This habitat will occur in shallow, estuarine environments where the salinity (brackish water) is appropriate for oyster cultivation. We do not expect these projects to overlap with proposed Atlantic sturgeon critical habitat (PBF 2), and these projects will not affect diverse native fish communities that serve as a protective buffer against Atlantic salmon predation (PBF 9).

The limited scope and area of the activities (shallow estuarine habitat with acreage limits) is relatively small compared to the available habitat in the action area that serves as productive benthic habitat for listed species. Shell on bottom projects are further limited to prevent habitat conversion, and as such, should only have minimal effects on benthic foraging. With the PDC in place, reductions in habitat availability would be too small to detect, and therefore, all effects of habitat modification or removal of benthic habitat due to aquaculture will be insignificant. If our section 7 biologist believes a project may have an individual or cumulative effect that would adversely affect ESA-listed species foraging beyond levels that are insignificant or discountable, that project would have the potential to violate PDC 1, and would therefore require individual consultation.

Vessel Traffic

PDC:

30. Speed limits below 10 knots for project vessels with buffers of 150 feet for all listed species (1,500 feet for right whales).
31. While dredging, dredge buffers of 300 feet in the vicinity of any listed species (1,500 feet for right whales), with speeds of 4 knots maximum.
32. The number of project vessels must be limited to the greatest extent possible, as appropriate to size and scale of project.
33. A project must not result in the permanent net increase of commercial vessels (e.g., a ferry terminal). The permanent net increase in vessels resulting from a residential project (e.g., dock/float/pier) must not exceed two vessels.

Effects of vessel strikes on ESA-listed species

Vessel strikes are a concern for all of our listed species in the action area. The factors relevant to determining the risk to these species from vessel strikes may be related to the number, size, and speed of the vessels, as well as the navigational clearance (i.e., depth of water and draft of the vessel) and the behavior of individuals in the area (e.g., foraging, migrating, overwintering, etc.). Vessel traffic may be increased during construction and dredging activities as authorized under this programmatic. Additionally, with the construction of new piers, boat ramps, and rearrangement of existing marinas to provide more slips, non-commercial vessel traffic may also be increased within the action area (see PDC 33).

Vessel buffers of 150 feet for all species (with 1,500 feet required for right whales) with vessel speeds of less than 10 knots, and dredge buffers of 300 feet with speeds of 4 knots are required to ensure that interactions between vessels and listed species do not occur for activities authorized under the permit (PDC 30 & 31).

According to PDC 32, USACE must limit the number of project vessels to the greatest extent possible, as appropriate to size and scale of project. USACE will report the number of construction vessels on the verification form for our review. As the activities considered in this programmatic consultation that involve project (construction) vessels are located near shore and involve minor and temporary increases in vessel traffic, any increase in the risk of interaction with ESA-listed species cannot be meaningfully detected, and is insignificant. Projects involving offshore disposal of dredged material are only eligible under this programmatic if there is an existing consultation on the disposal site. In that case, USACE must require all of the ESA conditions outlined in those consultations. When we consider the effects of increases in vessels added to the baseline (not to exceed two non-commercial vessels per project) as a result of new pier, boat ramp, or float, we still expect that increased risk of interactions between vessels and ESA-listed species will not be able to be meaningfully measured or detected, and is therefore, insignificant.

Vessel traffic effects on proposed Atlantic sturgeon critical habitat

PDC 6 excludes any project that will affect PBF 1 (see Table 3 and Table 7). It is possible that vessel traffic resulting from projects permitted under this programmatic could affect PBFs 2, 3, 4. However, vessel traffic associated with projects permitted under this programmatic will be largely minor and temporary, and permanent vessel traffic will be limited ≤ two non-commercial vessels (PDC 33). Therefore, we expect effects on water quality as described in PBF 4 to be too small to be meaningfully measured or detected, and therefore, effects are insignificant. Vessel traffic will not affect habitat described in PBF 2 (i.e., gradual downstream salinity gradient of 0.5-30 parts per thousand and soft substrate (e.g., sand, mud) downriver of spawning sites). As described above, we expect the increase in vessel traffic to be extremely low, and therefore vessels will not create barriers (see PDC 8) that would limit sturgeon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBF 3). In sum, effects of vessel traffic on Atlantic sturgeon critical habitat are insignificant.

Vessel traffic effects on designated Atlantic salmon critical habitat

PDC 5 excludes any project that will affect PBFs 1-7 (see

Table 4 and Table 7). It is possible that vessel traffic resulting from projects permitted under this programmatic could affect PBFs 8-10. As described above, we expect the increase in vessel traffic to be extremely low, so vessels will not create barriers (see PDC 8) that would limit salmon's ability to migrate to or from areas within critical habitat rivers necessary for foraging, staging, spawning, rearing, etc. (PBFs 8 and 10). The risk of vessel strike will not affect the abundance or diversity of native fish communities serving as a protective buffer against salmon predation in estuarine environments (PBF 9). In sum, effects of vessel traffic on Atlantic salmon critical habitat are insignificant.

Aggregate Effects and Monitoring

The 2017 NLAA Program does not have an expiration date, but annual reporting is required, and both agencies will review the merits of the program on an annual basis. Under the program, many individual activities will be one-time events with minimal individual effects; however, over the duration of the program, authorizations of many activities will occur concurrently. As such, we must assess the potential for effects that arise from concurrent activities, as well as assess the effects of all the permitted activities consulted on under the 2017 NLAA Program for the potential of aggregate effects in the action area.

Effects from activities considered under this programmatic consultation may be both temporary and permanent. Permanent, long-term effects associated with numerous activities determined in this programmatic consultation as not likely to adversely affect are anticipated to have insignificant or discountable effects to Atlantic sturgeon, shortnose sturgeon, Atlantic salmon, sea tortles, whales, proposed Atlantic sturgeon critical habitat, and designated Atlantic salmon critical habitat in the action area (see Table 2, Table 3,

Table 4). The general and stressor specific PDC greatly constrain projects eligible for review under this programmatic via verification form. Following the PDC, permanent shifts in habitat will be small in scope, and will not measurably limit the availability of appropriate habitat for life functions of listed species, nor will it measurably limit prey resources for these species, and all aggregate effects will be insignificant. Additionally, effects from vessel traffic from multiple activities occurring throughout the action area in the short and long term are not expected to increase the risk of a vessel strike in measurable way, and as such, any effects in the aggregate are insignificant. Activities that may generate shorter-term effects, such as fill placed in aquatic habitat, dredging activities, or turbidity from construction of jetties, piers, etc., are expected to be small in scope, and are individually found to have insignificant and/or discountable effects. Temporary effects are only anticipated to occur during project construction or implementation and are only anticipated to occur over short durations on the order of minutes, hours or intermittently over a few days. Based on our analysis of these activities, we do not expect that any of these activities, when taken together, will rise to a level where adverse effects may occur, thus any short-term aggregate effects will also be insignificant and/or discountable.

Predicting the exact spatial and temporal occurrences of activities throughout the action areas is very difficult; however, to ensure that adverse effects do not occur as a result of ongoing authorizations of activities over the duration of the program, you have designed a monitoring plan to track activities and the potential for aggregate effects in the future. Each activity that may affect ESA-listed species or critical habitat, as detailed throughout this programmatic consultation, must be reviewed by us via second tier consultation in the form of the streamlined verification form or separate, project-specific section 7 consultation. The verification forms will contain information about the proposed activity, location and will provide an opportunity for us to certify that a project is consistent with 2017 NLAA Program and this programmatic consultation. The forms will also be used to create a log of activities that have been consulted on under the program. You have agreed to track several attributes of these projects including: type of activity, latitude and longitude of activity, activity description, impacts to listed species, and dates of the consultation. For each calendar year that the 2017 NLAA Program is in place, you will provide us with an annual monitoring report on or before March 1 which includes the number and type (by permit type, work type category, and district) of authorized activities that "may affect, but are not likely to adversely affect" ESA-listed species and critical habitat under our jurisdiction. This report should include all projects reviewed under the 2017 NLAA Program in the previous calendar year. Per the terms outlined in your BA, failure to meet the annual reporting requirement will result in reinitiation/revocation of concurrence on the 2017 NLAA Program. This programmatic concurrence does not apply to USACE activities that individually or in aggregate are likely to adversely affect a species through direct or indirect effects to either the species or its habitat. Thus, if information obtained through monitoring, or other sources, indicates that USACE activities consulted on under the 2017 NLAA Program are resulting, individually or in aggregate, in adverse effects to listed species or critical habitat, this would represent new information and reinitiation of consultation would be required.

Conclusion

Based on the analysis that all effects to listed species and critical habitat will be insignificant or discountable, we are able to concur with your determination that projects consulted on under the 2017 NLAA Program are not likely to adversely affect any ESA-listed species or critical habitat under our jurisdiction. Therefore, no further consultation pursuant to section 7 of the ESA is required. Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the project has been retained or is authorized by law and: (a) if new information reveals effects of the project 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 project 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 project. No take is anticipated or exempted. If there is any incidental take of a listed species, re-initiation would be required. Should you have any questions about this correspondence please contact Zachary Jylkka at (978) 282-8467 or by e-mail (Zachary.Jylkka@noaa.gov).

Essential Fish Habitat

NOAA Fisheries Habitat Conservation Division (HCD) is responsible for overseeing programs related to Essential Fish Habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act and other NOAA Fisheries trust resources under the Fish and Wildlife Coordination Act. USACE project managers should continue to follow existing procedures for consulting with GARFO HCD.

Sincerely,

Kimberly Damon-Randall
Assistant Regional Manager for Protected Resources

Cc:

GARFO PRD Section 7
Mark Murray-Brown
Zach Jylkka
Christine Vaccaro

GARFO HCD
Chris Boelke
Karen Greene

USACE NAB Regulatory
Bill Seib

USACE NAB Civil Works
Ronald Maj

USACE NAE Regulatory

USACE NAE Civil Works

Jennifer McCarthy

USACE NAN Regulatory
Jodi McDonald

USACE NAO Regulatory
Tom Walker

USACE NAP Regulatory
Edward Bonner

Lawrence Oliver

USACE NAN Civil Works
Peter Weppler

USACE NAO Civil Works
Michael Darrow

USACE NAP Civil Works
Peter Blum

Attachments (BA, SOPs, VF)

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