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(Sent via Electronic Mail)

Lt. Col. John Litz, Commander
Charleston District, Corps of Engineers
69A Hagood Avenue
Charleston, South Carolina 29403-5107

Dear Lt. Colonel Litz:

NOAA's National Marine Fisheries Service (NMFS) Habitat Conservation Division (HCD) has reviewed *Charleston Harbor Post 45 Draft Integrated Feasibility Report and Environmental Impact Statement* (Draft EIS), dated October 2014 and prepared by the U.S. Army Corps of Engineers (USACE); Draft EIS Appendix H is an Essential Fish Habitat (EFH) Assessment. The Draft EIS examines impacts from deepening and widening the federal channel and turning basins in the Cooper and Wando Rivers, and Charleston Harbor and deepening and lengthening the Entrance Channel oceanward. Draft EIS Section 3.2 provides the project needs and purpose. The needs for the action are transportation delays to container ships and navigational safety. While existing channel depths accommodate vessels with a draft up to 48 feet, the ships are limited to tide windows of approximately two hours per day unless light loaded. Charleston Harbor pilots and the U.S. Coast Guard believe the risk of allisions, collisions, and groundings is unnecessarily high at four locations. The purpose of the project, as stated in the Draft EIS, is to reasonably maximize Charleston Harbor's contribution to national economic development, consistent with protecting the Nation's environment, by addressing the physical constraints and inefficiencies in the existing infrastructure's ability to safely and effectively serve the forecasted vessel fleet and process the forecasted cargo volume.

National Environmental Policy Act (40 CFR §1503.2)

The National Environmental Policy Act (NEPA) directs federal agencies to comment on an EIS when the federal agency has jurisdiction by law or special expertise with respect to any environmental impact resulting from an agency action, such as this Charleston Harbor project. The following comments pursuant to NEPA focus on the project description and alternatives analysis.

Description of the Proposed Action

Under the Tentatively Selected Plan (TSP), known as the "52/48 foot alternative" after the proposed depths of the lower harbor channels leading to the Wando Welch Terminal and proposed lower depths in the upper harbor channels leading to the North Charleston Terminal,

respectively, the USACE and the South Carolina Ports Authority (the project's local sponsor) would:

- Deepen the 800-foot-wide Entrance Channel from -47 feet Mean Lower Low Water (MLLW) to -54 feet MLLW (plus 2 feet for allowable overdepth and 2 feet for advanced maintenance) and lengthen the Entrance Channel three miles oceanward;
- Reduce the existing 1,000-foot-wide Entrance Channel to 944 feet and increase the depth from -42 feet MLLW to -49 feet MLLW;
- Deepen inner harbor channels leading to the Wando Welch Terminal and Navy Base Terminal from the existing -45 feet MLLW to -52 feet MLLW (plus 2 feet for allowable overdepth and 2 feet for advanced maintenance*);
- Deepen the upper harbor channel from the Navy Base Terminal to the North Charleston Terminal from -45 feet MLLW to -48 feet MLLW (plus 2 feet for allowable overdepth and 2 feet for advanced maintenance*);
- Enlarge the diameter of turning basins to 1,800 feet at the Wando Welch Terminal and Navy Base Terminal and to 1,650 feet at the North Charleston Terminal**;
- Widen the entire length of the North Charleston, Filbin, Wando River Lower, Hog Island, and Bennis reaches and portions of the Daniel Island, Drum Island, Horse, Rebellion, and Mount Pleasant reaches to widths capable of accommodating post-Panamax vessels;**
- Construct a port bulkhead and two to three contraction dikes at the Wando Welch Terminal; and
- Raise dikes up to 5 feet at the Clouter Creek, Yellow House Creek, and/or Daniel Island upland confined disposal facilities.

Project construction is expected to begin in 2018 and require three to four years to complete. Approximately 43.9 million cubic yards (cy) of material would be dredged. Disposal would occur in the Charleston Ocean Dredged Material Disposal Site (ODMDS) (29 million cy), Daniel Island Disposal Area (2.9 million cy), Clouter Creek Disposal Area (900,000 cy), and Yellow House Creek Disposal Area (2.3 million cy). Dredged material also would be used for constructing reefs (360,000 cy for mitigation reefs, 1.9 million cy for reefs along the Entrance Channel, and 240,000 cy for artificial reefs managed by the South Carolina Department of Natural Resources [SCDNR]) and containment berms at the Charleston ODMDS (6.3 million cy). Draft EIS Sections 2.3.4.3 and 3.4 indicate the Charleston ODMDS is near its design capacity, and an expanded ODMDS is an assumed future condition.

Hydraulic cutterhead, hopper, and clamshell dredges would be used. The dredge types listed in Draft EIS Table 4-1 do not match the description of dredge types in Section 4.2.3 (e.g., rock cutter vs. pipeline dredge). The USACE estimates annual maintenance dredging would move approximately 1,374,532 cy of material to the Charleston ODMDS and 1,026,743 cy to upland disposal sites (Draft EIS Table 4-2). The Draft EIS notes beneficial uses of dredged material at

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* Currently, six specific reaches of the federal channel have either 4 feet or 6 feet of advanced maintenance dredging authorized due to locally high shoaling rates. It is unclear if these reaches would retain their current advanced maintenance dredging authorizations under the TSP, or whether the 2 feet of advanced maintenance dredging described in the TSP would take precedence.

** The Draft EIS evaluates the maximum federal channel widths and turning basin expansions that would be sought. Final dimensions would be determined during the Preconstruction Engineering and Design (PED) phase.

Crab Bank, Shutes Folly, and nearshore of Morris Island would be evaluated during the PED phase. The Draft EIS provides little detail on these potential beneficial uses of dredged material. Presumably the dredged material would be from the initial deepening of channels or expansion of turning basins, not from maintenance material. As a general rule, NMFS opposes open-water disposal of dredged material and expects the USACE to reinitiate EFH consultation should open-water disposal be added to the project during the PED phase.

Other key project components are not well described in the Draft EIS. For example, Draft EIS Section 5.4.9 briefly discusses construction of two or three contraction dikes. No detail is provided on design or impacts other than the "dikes would directly affect a relatively small acreage of tidal fringing salt marsh at the southern end of Daniel Island across from the Wando Welch Terminal." The EFH Assessment provides a few details. The dikes would be perpendicular to the western bank of the Wando River near the Wando Welch Terminal and Wando reach of the navigation channel and would range from 350 to 840 feet in length. Neither the Draft EIS nor the EFH Assessment discuss habitat impacts from the contraction dikes. The Final EIS should clarify the design of the contraction dikes and impacts associated with their construction and operation. As an additional example and as noted above, the USACE assumes the U.S. Environmental Protection Agency (EPA) will expand the Charleston ODMDS to accommodate project dredged material. It is unclear if placement of material on the L-shaped berm within the ODMDS is part of the TSP, as opposed to a separate action. The Final EIS should describe EPA's process and schedule for expanding the Charleston ODMDS. Lastly, the Final EIS should provide a more clear explanation of the estimated construction duration, which is three to four years, while the duration listed in Draft EIS Table 4-1 totals over 95 months. In addition, knowing which channel reaches are likely to be dredged concurrently is valuable for examining impacts to fishes susceptible to entrainment or high concentrations of suspended sediments.

Alternatives Analysis and Plan Selection

The Draft EIS evaluates a No Action alternative and six deepening alternatives, referred to as 48/47, 48/48, 50/47, 50/48, 52/47, and 52/48 foot alternatives based on the proposed depths of the lower and upper harbor channels. The No Action alternative would be the 45/45 foot alternative. The widths of the channel and turning basins evaluated in the Draft EIS are the maximum believed necessary to meet project goals, and these widths would be refined (presumably reduced) during the PED phase. Based on the information provided, NMFS believes the Draft EIS evaluated an appropriate range of alternatives.

The discussion of environmental impacts in the Draft EIS focuses on the TSP, while information on impacts from the other alternatives are generally limited to Table 3-5 and various locations within the appendices. It would be beneficial for the Final EIS to include a more comprehensive discussion of the impacts from each alternative. The Final EIS also should discuss how each alternative would affect maintenance dredging rates. Consolidating information on topics repeated throughout the Draft EIS (e.g., similar descriptions of hardbottom mitigation can be found beginning on Draft EIS pages 3-47, 4-5, 4-12, 4-16, 4-18, and 5-32) would make room available for more robust discussion of the differences in impacts among the alternatives while abiding by the page limits the USACE has for the Final EIS.

The 52/48 foot alternative is the TSP and the Locally Preferred Plan (LPP), the 50/48 foot alternative is the National Economic Development (NED) plan. The USACE has selected the LPP as the TSP because the South Carolina Ports Authority is willing to pay 100 percent of the cost difference between the NED plan and LPP. While the local sponsor's willingness to pay is essential to selecting an LPP over a less costly NED plan alternative, net economic benefits and environmental impacts also should be considered.

Draft EIS Section 3.6 and Appendix C (Economic Analysis) indicate the annual net benefits forecasted for the LPP, which accrue through reduced transportation costs, exceed those of the NED plan by $1.8 million ($79.9 million vs. $78.1 million). However, as expected, the LPP has a lower benefit-to-cost ratio than the NED plan (Figure 1). The LPP is not the optimum plan economically, and the net annual benefits of the LPP may not differ from those of the NED plan when considering the error normally inherent in such estimates.

The environmental impacts expected from the LPP significantly exceed those expected from the NED plan. While the expected impacts to offshore habitats from the LPP and NED plan are the same because the Entrance Channel dimensions are the same under these two alternatives, the impacts to wetlands along the Cooper, Wando, and Ashley Rivers from salinity intrusion differ substantially. Draft EIS Appendix L (Wetland Impact Assessment) Table 2 shows the LPP would convert 493.41 acres of tidal freshwater wetlands to brackish wetlands, whereas the NED plan alternative would convert 288.34 acres. In short, to achieve a 2.3 percent gain in benefits, the LPP incurs a 71.1 percent increase in environmental impacts relative to the NED plan.

Summary of NEPA Recommendations

- The Final EIS should provide a likely dredging schedule by channel reach and clarify the advanced maintenance dredging allowed for the six reaches identified in Draft EIS Table 2-22.
- The Final EIS should provide an overview of the evaluation process and schedule EPA will use for expanding the Charleston ODMDS and how its expansion relates to the L-shaped berm creation.
- The Final EIS should include a more robust discussion of the differences in impacts among the alternatives and the differences in expected maintenance dredging requirements.
- The Final EIS should commit to reinitiating consultations with resource agencies if new disposal options are pursed (e.g., beneficial uses of dredged material at Crab Bank, Shutes Folly, and nearshore of Morris Island), contraction dikes are built, or the final dimensions of any turning basin are larger than proposed in the Final EIS.
- The Final EIS should identify the NED plan as the selected alternative given the lower economic efficiency and higher environmental cost of the LPP.

Magnuson-Stevens Fishery Conservation and Management Act (16 U. S. C. SS 1801 et seq.)

Page 65 of the EFH Assessment (Draft EIS Appendix H) provides the impact determination required by 50 CFR 600.920(e)(3)(iii). The USACE concludes the proposed direct impacts to

hardbottom habitats and indirect impacts to tidal freshwater wetlands, individually or in sum, are not anticipated to significantly affect managed species or EFH. As the nation's federal trustee for the conservation and management of marine, estuarine, and anadromous fishery resources, the following comments and recommendations are provided pursuant to authorities of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). As described below, the USACE's conclusion does not appear to reflect consideration of indirect impacts to hardbottom habitat and direct impacts to shallow subtidal bottom.

Adequacy of the EFH Assessment

NMFS uses 50 CFR 600.920(e) to guide evaluation of an EFH Assessment, namely, does the EFH Assessment include: a description of the proposed action, an analysis of the potential adverse effects of the action on EFH and managed species, the federal agency's conclusions regarding the effects of the action on EFH, and proposed mitigation for the unavoidable impacts to EFH. Where necessary, these elements should be supported by a review of pertinent literature, results of site-specific surveys, views of recognized experts with local knowledge of the habitat or species that may be affected, and an analysis of alternatives that could avoid or minimize adverse effects on EFH.

The project description in the EFH Assessment is unclear and incomplete. The deficiencies in the EFH Assessment project description are the same as those noted for the main body of the Draft EIS and identified in the NEPA section of this letter. An error that appears limited to the EFH Assessment is the inconsistent identification of the TSP. EFH Assessment page 2 identifies the 50/48 foot alternative as the TSP.

Draft EIS Sections 3.0 and 4.0 describe EFH and Habitat Areas of Particular Concern (HAPCs), respectively, and should be revised for the Final EIS. EFH and HAPC designations are made under federal fishery management plans (FMP), and these plans should be used as the organizing framework for the impact evaluation. This approach ensures consistent terminology when describing specific habitats, draws attention to the functions of habitats in supporting federally managed fishery species, and provides a filter for EFH and HAPC evaluations based on the presence/absence of the federally managed species in the project area. Specific errors or inconsistences in Sections 3.0 and 4.0 include:

- EFH Assessment Section 3.0 should omit discussion of species not federally managed, because they do not have EFH designations. This section also should omit discussion of habitats, such as non-tidal palustrine freshwater wetlands, which are not designated EFH.
- EFH Assessment Section 3.0 should include discussion of tidal palustrine forested wetlands (see the EFH designation in the South Atlantic Fishery Management Council [SAFMC] FMP for penaeid shrimp).
- While EFH Assessment Section 4.0 uses federal FMPs to organize HAPC discussion, Section 3.0 does not and has few references to federally managed fishery species. Section 3.0 would be improved by using the same organizational structure as Section 4.0.
- References to "all state-designated habitats of particular importance to shrimp" in Section 4.0 should be replaced with "all state-designated nursery habitats of particular importance to shrimp" to match actual HAPC designation language.

- References to mangroves and the Oculina Bank in Section 4.0 should be deleted since these HAPCs occur along or off the Florida coast well outside the Charleston Harbor study area.
- Section 4.0 should be corrected to note the SAFMC FMP for coastal migratory pelagic species lists Broad River (South Carolina) as an HAPC for cobia, not mackerel. The Broad River also is well outside the project study area and could be deleted from the EFH Assessment.
- The HAPC for summer flounder should be "all native species of macroalgae, seagrasses and freshwater and tidal macrophytes in any size bed as well as loose aggregations."
- Bluefish should be omitted from the HAPC discussion because no such HAPC occurs in the Charleston Harbor study area.

EFH Assessment Section 5.0 first describes groups of federally managed fish generally and then provides more specific information on representative species. This section would be improved by more judicious selection of the representative species based on abundance within the Charleston Harbor study area. For example, king mackerel is the representative species for coastal migratory pelagic species despite this species' life cycle is spent mostly offshore. Spanish mackerel, which spends nearly all its life cycle in estuaries and nearshore waters, would be a better selection for evaluating project impacts. Another example is the snapper-grouper discussion, which primarily references literature pertinent to Florida, rather than drawing the considerable amount of information available for the Charleston Harbor study area. The EFH discussions also could be improved by more clearly separating EFH designations made by fishery management councils and NMFS from general habitat discussions in the scientific literature. For example, the association of gray snapper with jetties and pilings is commonly reported in the scientific literature, but these structures are not designated EFH in the SAFMC FMP for the snapper/grouper complex.

Impacts to Federally Managed Fisheries and EFH

Entrainment

Direct impacts to fisheries and their prey from dredging operations includes uptake of aquatic organisms by the suction field generated at the draghead resulting in injury or mortality (i.e., entrainment). There is a paucity of entrainment rate information, and none available for Charleston Harbor. Drabble (2012) reviews entrainment impacts and notes impacts to mobile, pelagic species are generally lower than impacts to demersal, slow-moving species. Larval fishes and benthic invertebrates are more susceptible to entrainment than larger swimming species. To minimize impacts, the USACE proposes an April-September restriction on dredging in the Mount Pleasant, Rebellion, and Fort Sumter reaches. This window is based on sciaenid spawning and would benefit other species as well. The EFH Assessment could be improved by describing the life cycles of various federally managed fisheries, use of the inlet to facilitate transport, and how this dredging window will minimize impacts to these species. For example, postlarval penaeid shrimp move from the ocean to the Charleston estuary from February through September with peaks occurring February to March for brown shrimp, June to July for white shrimp, and August for pink shrimp (Wenner and Beatty 1993, DeLancey et al. 1994). The proposed window would protect white and pink shrimp, but not brown shrimp. The USACE

should also investigate best management practices used by other USACE Districts, such as not turning on suction until the draghead is at or near the sea bottom, to reduce the number of organisms entrained.

Shallow Water Habitat

Neither the Draft EIS nor the EFH Assessment discuss impacts to shallow water habitat from enlarging the turning basins. Benthic infauna that are prey for federally managed fishery species commonly occur in muddy sand sediments, particularly in waters less than 20 feet deep. Based on NOAA nautical charts, it appears the proposed expansion of the turning basins and Daniel Island Reach may impact river bottom in waters less than 20 feet deep through dredging or sloughing as side slopes of newly dredged areas equilibrate to environmental conditions. The USACE should quantify and characterize the amount of shallow water bottom that would be impacted and mitigate based on the severity and duration of the impacts to prey species.

Dissolved Oxygen Concentrations

Indirect impacts to fishery species and EFH will result from altering the concentration of dissolved oxygen (DO) within the estuary by the project. The most important time of year for examining altered DO concentrations is July to September because this is the time of year when organisms often experience stressful low DO conditions. While EFH Assessment Tables H-1 through H-13 list project impacts on DO concentrations during these months, the discussion is based on averages over May to October from an unrelated and different set of tables. NMFS recommends the Final EIS and EFH Assessment include a discussion focusing on the summer months when organisms often experience stressful low DO conditions.

Tidal Freshwater Wetlands

The primary indirect impact from the project is expected to be saline waters moving farther up the Cooper, Ashley, and Wando Rivers. The Draft EIS indicates the largest salinity increase will occur within the Wando River. While the salinity models were not run in a manner allowing effects of the deepened channel to be separated from those of the widened turning basin, the USACE considers the latter to be the likely major contributor. Since the proposed turning basin dimensions may decrease during the PED phase, the extent of project-related salinity intrusion in the Wando River may be less than currently forecasted. The federally managed fishery species using the Charleston estuary occur over a range of salinities and will likely not alter their distribution significantly as a result of the project. The habitat range of oysters, which are an HAPC under the FMP for the snapper/grouper complex, may increase as the salinity wedge moves farther upriver. SCDNR has created many intertidal oyster reefs within and near the Wando River, and monitoring these reefs for impacts from the Charleston Harbor project should be part of the monitoring and adaptive management plan.

Movement of saline waters upriver will also affect marsh communities. The USACE tentatively concludes no direct impacts (e.g., filling, clearing) to wetlands would occur from the project; this conclusion is dependent upon the USACE's final decision about the contraction dikes. The projected salinity increases would primarily convert brackish marsh to salt marsh and convert

tidal freshwater marsh and tidal palustrine forests to brackish marsh. As described in EFH Assessment Section 6.0, increases in salinity will alter habitat functions by changing soil chemistry and plant communities. Tidal forested wetlands will be replaced by more salt tolerant emergent wetlands reducing plant diversity and canopy cover and altering faunal use. The acreages of tidal freshwater marshes and tidal forests converting to brackish marsh were forecasted for 2022 (i.e., soon after construction, likely within a year) and 2071 (i.e., 50 years after construction). The only difference between the salinity models used in these forecasts is the 2022 condition has roughly six inches less sea level rise than the 2071 condition. These salinity models are used to predict the location of the 0.5 parts per thousand (ppt) isopleth, which is the most practicable indicator of where tidal freshwater wetlands transition to brackish wetlands. For the Cooper River, the 2022 future without project (FWOP) conditions move the 0.5 ppt isopleth 1,092 feet upriver under the LPP, and the 2071 FWOP conditions move the isopleth 7,039 feet upriver. Figure 2 shows the additional distances the 0.5 ppt isopleth would move up the Cooper River under each alternative. By 2071, the isopleth is expected to be 5,210 feet farther upriver under the LPP, whereas under the NED plan alternative, the isopleth would be 2,996 feet farther up river. As noted in the NEPA section of this letter, impacts under the LPP would be significantly higher than under the NED plan alternative.

The USACE is proposing to mitigate for the loss of 280.96 acres of tidal freshwater wetlands. This impact acreage is predicted by comparing the 2022 FWOP and future with project (FWP) conditions. It is important to note the USACE acknowledges in the Draft EIS that the synergy between new channel geometries and environmental conditions will cause the project impacts to increase throughout the life of the project. Using the 50-year project life mandated by USACE planning guidelines (i.e., comparing the 2071 FWOP and FWP conditions), 493.41 acres of tidal freshwater wetlands would convert to brackish marsh because of the project. It is important to note this acreage factors out changes expected from sea level rise alone because the USACE and NMFS agree the project should not mitigate for marsh conversion resulting solely from sea level rise. The justification the USACE provides in Draft EIS Section 5.4.9 and Appendix L (Wetland Impact Assessment) for using the 2022 impact forecast, rather than the 2071 impact forecast, is not clear and implies this decision was supported by the Interagency Coordination Team. NMFS has no recollection of this discussion. Lastly, it is not clear how the USACE could justify this approach when all other impacts and benefits from the project are assessed under a 50-year scenario. The mitigation proposed in the Final EIS and EFH Assessment should account for long-term impacts from the project and the loss of 493.41 acres of tidal freshwater wetlands.

The USACE chose the Uniform Mitigation Assessment Method (UMAM) to determine the amount of mitigation needed to offset impacts to 280.96 acres of tidal freshwater wetlands. UMAM was developed by the Florida Department of Environmental Protection (FDEP) and partners and is required to be used under Chapter 62-345, Florida Administrative Code, to determine the amount of mitigation needed, in UMAM functional units, to offset wetland impacts authorized by the State of Florida. Evaluating mitigation for direct impacts to freshwater wetlands was UMAM's initial focus and remains its strength. While UMAM is used for evaluating mitigation for direct impacts to tidal habitats and indirect impacts to all habitats, FDEP acknowledges such uses are outside of UMAM's primary utility. Accordingly, FDEP has teams working to revise UMAM to make it more robust for tidal habitats; NMFS is not aware of an effort underway at FDEP to improve UMAM for assessing indirect impacts, such as salinity

intrusion. NMFS can support using UMAM for evaluating project impact and mitigation requirement, however, this would be contingent upon tailoring UMAM to Charleston Harbor conditions in a manner similar to the extensive tailoring efforts FDEP has done for Florida.

The two assessment areas used by the USACE in the UMAM for Charleston Harbor were made by lumping wetlands-based habitat type, tidal freshwater marsh and tidal palustrine forest. This is an unconventional use of UMAM. Chapter 62-345, Florida Administrative Code, defines a UMAM assessment area as "all or part of a wetland or surface water impact site, or a mitigation site, that is sufficiently homogeneous in character, impact, or mitigation benefits to be assessed as a single unit." To achieve the required homogeneity in character and impact severity, a typical UMAM evaluation divides an impact area into several polygons, with larger impact areas typically having more polygons than smaller impact areas because of the spatial variation in wetland characteristics and the modes and severity of project impacts. For Charleston Harbor, the USACE has treated the ecological significance of impacts to tidal freshwater marsh and tidal palustrine forest to be the same across all reaches of the Ashley, Wando, and Cooper Rivers. No justification has been provided in the Draft EIS or EFH Assessment for making this decision.

To offset impacts to 280.96 acres of tidal freshwater wetlands, the USACE proposes to purchase and preserve 831 acres of privately-owned land associated with the Francis Marion National Forest, which will then be managed by the U.S. Forest Service. Draft EIS Appendix P (Mitigation, Monitoring, and Adaptive Management) identifies Cainhoy Plantation and parcels within the west branch of the Cooper River as alternative purchase/preservation areas. These sites are more thoroughly described in the Draft EIS and more directly associated with the impacts in the Cooper and Wando Rivers. While NMFS does not oppose inclusion of wetland preservation in a mitigation plan, NMFS does not support preservation as the sole mitigation measure, especially when the threat of development is speculative and presumes Clean Water Act permits would be issued for impacts to regionally significant wetlands. NMFS previously provided the USACE with candidate tidal creek restoration areas for the Charleston Harbor project and recommends the USACE include these in the final mitigation plan.

In summary, the mitigation plan for impacts to wetlands should be based on 493.41 acres of lost tidal freshwater wetlands, the UMAM should be redone to provide a sharper focus on the variations between impact areas, and the mitigation should include elements other than purchasing and preserving wetlands.

Hardbottom Habitat

The Entrance Channel dredging would directly impact hardbottom habitat and associated organisms by physically removing the habitat. Indirect impacts would result from sediments suspended by the dredging or later ship traffic. While burial of hardbottom habitat is possible as the new channel side slopes equilibrate to environmental conditions, the USACE has proposed a channel design to minimize impacts from sloughing. The new channel side slopes would continue the side slopes of the existing channels to the proposed new depths. This design maintains the current channel width at grade, and the USACE estimates this design reduces direct impacts to hardbottom by 8.5 to 19.2 acres. In addition, in the unlikely event the

contractor uses a cutterhead dredge to extend the Entrance Channel, placement of dredge anchors in hardbottom habitat would not be allowed.

Draft EIS Appendix I (Hardbottom Habitat) describes a hardbottom habitat mapping effort adjacent to the existing Entrance Channel and within and adjacent to the proposed Entrance Channel extension. The USACE did not survey for hardbottom within the existing Entrance Channel in this effort because the USACE believed mitigation is not necessary for impacts to hardbottom within a previously dredged federal navigation channel. The mapping used a robust combination of side-scan sonar, sub-bottom profiling, magnetometer surveys, and groundtruthing via towed video transects and found 308.1 acres of hardbottom habitat (78.1 acres of confirmed hardbottom and 230.0 acres of probable hardbottom habitat). The hardbottom found occurs adjacent to the existing Entrance Channel and not within or adjacent to the proposed Entrance Channel extension. After the survey was completed, the USACE discovered a portion of the existing Entrance Channel that had not been dredged previously (because its natural depths exceeded the currently authorized depth of the Entrance Channel) and determined this area likely contained hardbottom habitat based on proximity to mapped hardbottom areas. Because this discovery occurred late in project planning, the USACE was unable to survey this area but was able to tentatively estimate 28.6 acres of hardbottom are present by extrapolating from other data sources.

The USACE concludes 26.8 acres of hardbottom would be impacted by direct removal and 186.3 acres of hardbottom habitat along channel margins would be indirectly impacted. It is not clear in the Draft EIS how the USACE determined the indirect acreage since all 308.1 acres found were within 75 meters of the channel edge. It is important to note the amount of hardbottom habitat that would be directly impacted is likely much greater than 26.8 acres. The USACE did not survey the bottom of the existing Entrance Channel, much of which was last dredged before passage of the EFH amendment to the Magnuson-Stevens Act. On several occasions, NMFS requested the USACE survey the Entrance Channel for hardbottom and to identify the areas not dredged since enactment of the EFH amendment, but the USACE has not provided this information.

To compensate for the loss of 26.8 acres of hardbottom habitat, the USACE would use dredged limestone to create eight "mitigation reefs" on the northern and southern sides of the Entrance Channel in waters 35 to 50 feet deep. The USACE claims only one of the reefs is required to offset the loss of 26.8 acres of hardbottom and views the other seven as a beneficial use of dredged material. Each reef site would consist of 16 cells (300 feet by 300 feet) creating a 33-acre patch reef approximately 600 feet wide and 2,400 feet long. For two reef sites, including the one used as mitigation, the 16 cells would have a target peak vertical relief of 3.5 to 4.5 feet (after settling) with target coverage by rock of 75 percent within each cell. This design would require 8,000 to 12,000 cy of rock material per cell, or 128,000 to 192,000 cy per reef. All of the material used to construct the reefs would be excavated using a clamshell dredge. Each of the other six reef sites would also be 33 acres and have the same length and width dimensions as the two sites described earlier; however, the target peak height would be 10 feet (after settling) and target bottom coverage would be 100 percent. Each of these sites would require 320,000 cy of material. Smaller rocks collected by the hopper dredges would be used to create a base that would then be covered with larger rocks collected by clamshell dredges. It is unclear why the

USACE would vary the relief between the mitigation reef and the beneficial use reefs and which relief is more disposed to creating hardbottom features that will ecologically resemble the natural reefs off Charleston's coast. The locations of the eight mitigation reefs would be surveyed prior to construction to ensure no natural existing hardbottom habitat would be impacted by the mitigation reefs. Exact locations of the mitigation reefs would be coordinated with the resource agencies prior to construction. In addition to the eight mitigation reefs, the USACE would place approximately 240,000 cy of rock material at the 25-acre Charleston Nearshore Artificial Reef managed by SCDNR.

The USACE used Habitat Equivalency Analysis (HEA) to determine how much mitigation is needed to compensate for direct impacts to hardbottom. A key input variable for this HEA is the extent the mitigation reef provides the ecosystem services of the impacted hardbottom and the time required for the mitigation reef to achieve that level of services. For its HEA, the USACE used 100 percent services after 3.5 years. The USACE provides little justification for this exceptionally fast, high rate of services from a rock pile in comparison to natural hardbottom habitat. For a general comparison, in the HEA for Port Everglades, the USACE Jacksonville District used 10 percent initial services from rock placement that incrementally accrued to 50 percent after 50 years for coral habitat. The inputs for the Port Everglades HEA were developed over a series of meetings involving numerous USACE, NMFS, and university scientists actively conducting research on coral habitat. The USACE Charleston District has not similarly coordinated with agency and university scientists to develop inputs for its HEA.

NMFS recommends the USACE use a similar team to revise the HEA for the Charleston project to include scientifically based levels of ecosystem services for the mitigation reef and the time required for the mitigation reef to achieve that level of services. Material type, orientation (e.g., horizontal vs. vertical), and proximity to natural hardbottom areas influence the complexity of biotic assemblages on artificial reefs within the Charleston study area. Wendt et al. (1989) investigated four artificial reefs ranging from 3.5 to 10 years old. Octocorals, scleractinian corals, and sessile mollusks comprised a greater proportion of total biomass on 4.5 to 10 year old reefs than 3.5 year old reefs. Absence of large sponges and corals (which were common in adjacent hardbottom habitats) was noted on all reefs, strongly indicating 100 percent services had not been achieved in 3.5 years. In 1997 and 2003, SCDNR deployed two structurally identical concrete reefs off the coast of Charleston to assess the development of epifaunal invertebrate assemblages on a 2-year-old reef ("Area 53") and an 8-year-old reef ("Area 51") compared to an adjacent natural reef, "Julian's Ledge" (characterized by rocky ledges and overhangs, which provided up to 2-4 feet of vertical relief) (Burgess 2008). The two artificial reefs appeared to be visibly distinct at the time of sampling. Area 51 displayed more complexity due to the presence of large hydroids and sponges and there was a higher level of similarity between Julian's Ledge and Area 51 than between Julian's Ledge and Area 53. These results affirm those from Wendt et al. (1989). The Final EFH Assessment should better describe the quality of hardbottom impacted by the project, and use in the HEA literature-based colonization and growth rates for the more ecologically significant species in the hardbottom community. The USACE should not discount the possibility of using more than one rate in the HEA based on differences in species composition between low-relief hardbottom and high-relief hardbottom.

Monitoring and Adaptive Management

Draft EIS Appendix P describes monitoring plans to determine if wetlands, water quality, and hardbottom reef sites are responding to the project as predicted and take adaptive management actions, if needed. For wetlands, the USACE would characterize the percent change in the vegetative community two and four years after the project is complete. Water quality would be monitored continuously pre-construction and up to five years post-construction at eleven existing U.S. Geological Survey gauges and four to-be-installed gauges. Each gauge may monitor all or a subset of the following parameters: salinity, DO, velocity, temperature, water level, and pH. Water quality and total suspended solids would also be monitored at the disposal site outfalls before and up to five years post-construction. Monitoring of the hardbottom mitigation reefs would occur within six months of completion of the reefs and continue once a year for four years. If monitoring reveals a divergence from model predictions or hardbottom success criteria (percent cover by sessile invertebrates, sessile species size, abundance, and diversity, and fish assemblage abundance and diversity) are not met at the end of four years, the USACE commits to consulting with the resource agencies to identify if corrective actions are needed and, if so, develop adaptive management plans. NMFS believes this approach is reasonable and is available for such plan development.

Conservation Recommendations

NMFS finds the proposed dredging will adversely affect EFH. Section 305(b)(4)(A) of the Magnuson-Stevens Act requires NMFS to provide EFH conservation recommendations when an activity is expected to adversely affect EFH. Based on this requirement, NMFS provides the following:

EFH Conservation Recommendations

- The final proposed project depths shall be those in the NED plan alternative.
- Spatial restrictions on simultaneous dredge operations shall be evaluated to minimize impacts to federally managed species from turbidity and entrainment.
- Dredge operators shall not turn on suction until the draghead is on the seafloor bottom and shall turn off suction as close to the seafloor bottom as practicable.
- Mitigation for hardbottom impacts from dredging the Entrance Channel shall account for direct and indirect impacts. The mitigation amount shall be based on a HEA that uses scientifically defensible input variables for the percent of services replaced and the time period necessary for the rock piles to reach that level of services.
- Mitigation for impacts to tidal freshwater wetlands shall be based on the project caused impacts forecasted to occur during the 50-year planning life of the project. Mitigation for these impacts shall not be solely based on preservation.
- Mitigation shall be provided for the impacts to river bottom less than 20 feet deep.

Section 305(b)(4)(B) of the Magnuson-Stevens Act and implementing regulation at 50 CFR Section 600.920(k) require the USACE to provide a written response to this letter within 30 days of its receipt. If it is not possible to provide a substantive response within 30 days, an interim response should be provided to NMFS. A detailed response then must be provided 10 days prior to final approval of the action. The detailed response must include a description of measures

proposed by the USACE to avoid, mitigate, or offset the adverse impacts of the activity. If the response is inconsistent with an EFH conservation recommendation, a substantive discussion justifying the reasons for not following the recommendation must be provided.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA), under amendments enacted in 1946, directs all federal agencies to consult with the Fish and Wildlife Service (NMFS was added under the Reorganization Plan of 1970) and the fish and wildlife agencies of states where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted . . . or otherwise controlled or modified" by any agency under a federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources." NMFS offers the following comments pursuant to the FWCA.

Anadromous Fish Habitat

The Habitat Suitability Index (HSI) models for shortnose sturgeon (Draft EIS Appendix K) do not adequately represent potential impacts caused by the TSP on the foraging habitat of this species. Long-term acoustic monitoring of shortnose sturgeon shows they exhibit strong site fidelity from river kilometers 38 to 45, which corresponds to the existing freshwater-saltwater transition zone (South Carolina Department of Natural Resources 2014). In this area, the Cooper River is sinuous with multiple shallow sandbars approximately 2 to 17 feet deep. Just to the north of the existing 0.5 ppt isopleth, these sandbars disappear and river depth increases to 20 to 40 feet with a 65-foot hole at the "T." The substrate also transitions from sand to more rocky material. Young shortnose sturgeon have been collected on the sandbars, and the benthic community (i.e., prey base) on the sandbars likely differs from that of the deeper, harder substrates upriver (personal communication, Bill Post, September 2014). The HSI model does not take into account water depth and it is not clear if the substrate inputs in the model reflect sandbars. Finally, the HSI model for foraging habitat does not account for the habitat benefits the sandbars provide shortnose sturgeon. Because shortnose sturgeon are salinity sensitive, it is unclear if they will remain where river conditions provide the best prey base and nursery habitat or move upstream to less suitable habitat. The USACE should undertake a more thorough analysis of potential shortnose sturgeon impacts with respect to habitat shifts.

Freshwater Releases from Pinopolis Dam

Currently, freshwater is released from Pinopolis Dam to prevent salinity intrusion into the Bushy Park Reservoir. This freshwater reservoir was created by impounding Back River and provides water to local industry and the City of Charleston. Currently, tide and salinity meters around and within the reservoir indicate if normal freshwater releases from the Pinopolis Dam need augmenting to keep saltwater from entering the reservoir. The Draft EIS does not assess how the proposed deepening of Charleston Harbor may affect the frequency of augmented releases from the Pinopolis Dam to protect the reservoir. Historically, high freshwater releases from the Pinopolis Dam increased sediment deposition into the Cooper River, exacerbating maintenance dredging and potentially increasing sedimentation within marshes and tidal creeks connected to the Cooper River. The Final EIS should more thoroughly examine effects of the project on water

releases from Pinopolis Dam and the effects of those water releases on competing demands for water at the Wilson Dam and St. Stephen Hydropower Project.

Endangered Species Act (16 U.S.C. § 1531 et seq.) and Marine Mammal Protection Act (16 U.S.C. § 1361 et seq.)

In accordance with section 7 of the Endangered Species Act of 1973, as amended, it is the responsibility of USACE to review and identify any proposed activity that may affect endangered or threatened species and their designated critical habitat. Draft EIS Appendix F is a Biological Assessment and includes determinations on impacts of the project on endangered or threatened species and their designated critical habitat. The USACE has already requested consultation from the NMFS Protected Resources Division (PRD) on the basis of the Biological Assessment. Because our comments on anadromous fish habitat and freshwater releases from Pinopolis Dam bear directly on potential impacts to endangered species, the USACE should provide its responses to these comments to PRD as well. Please direct this information to Karla Reece, Consultation Biologist, at Karla.Reece@noaa.gov with reference to project number SER-2014-15433.

The Marine Mammal Protection Act of 1972, as amended, prohibits, with certain exceptions, the take of marine mammals in U.S. waters. If the proposed action may incidentally take a marine mammal, USACE must contact the Office of Protected Resources, at NMFS Headquarters, Silver Spring, Maryland for further information about whether there is a need for an Incidental Harassment or Incidental Take Authorization under the Marine Mammal Protection Act (see: http://www.nmfs.noaa.gov/pr/permits/incidental/).

NMFS appreciates the opportunity to provide these comments. Please direct related correspondence to the attention of Ms. Jaclyn Daly-Fuchs at our Charleston Area Office. She may be reached at (843) 762-8610 or by e-mail at Jaclyn.Daly@noaa.gov.

Sincerely,

Virginia M. Fay
Assistant Regional Administrator
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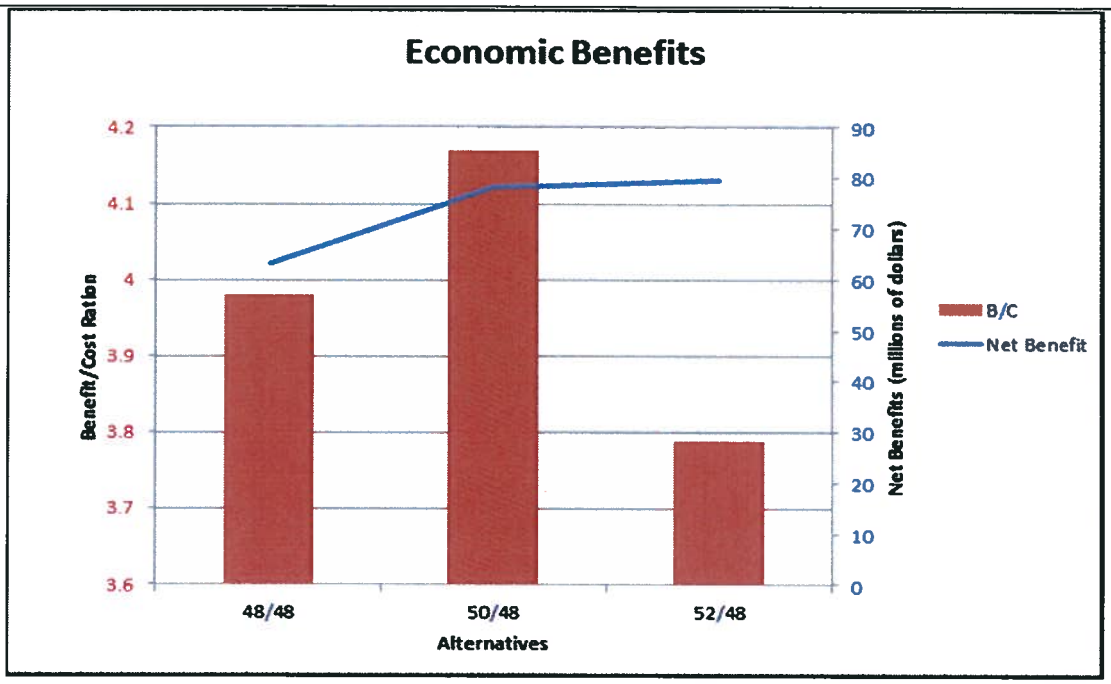

Figure 1. Comparison of benefit/cost ratio and net dollars generated by three depth alternatives. The Draft EIS does not present full economic evaluations for the other depth alternatives.

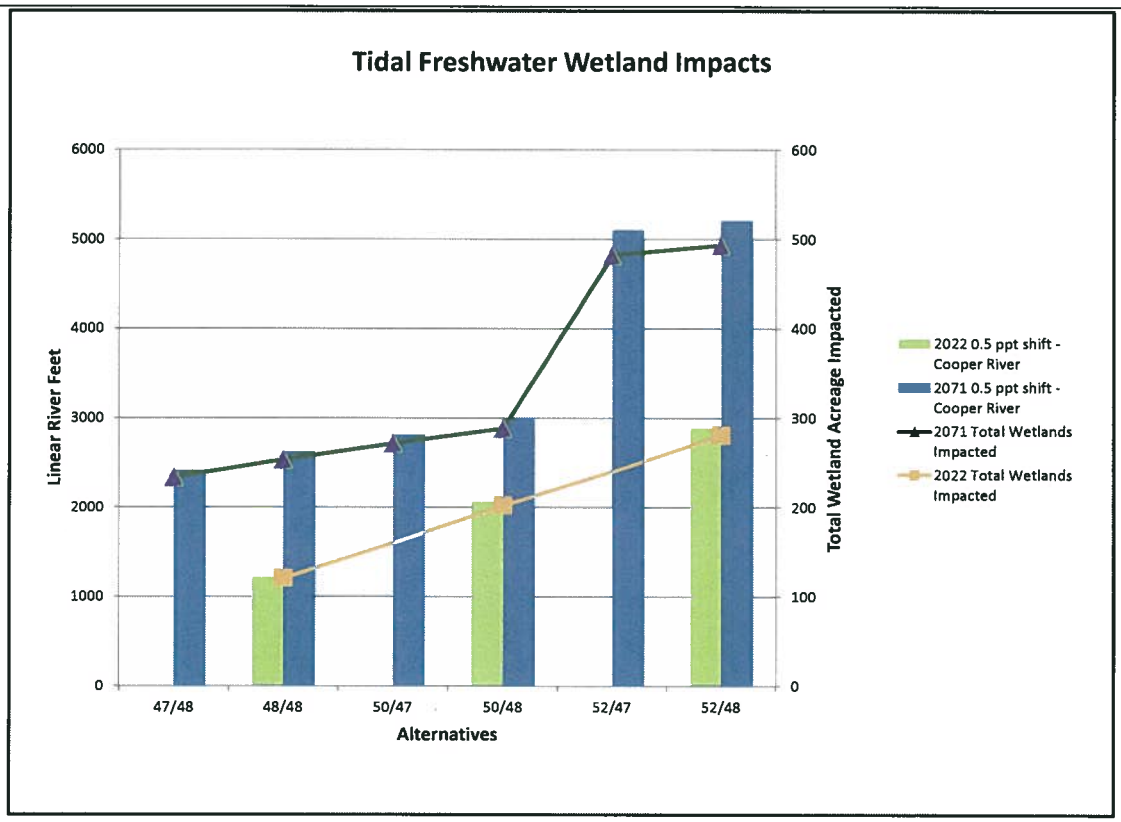

Figure 2. Salinity impacts on wetlands for each alternative as measured by upriver movement of the 0.5 part per thousand isopleth on the Cooper River (bars) and loss of tidal freshwater wetlands within the Cooper, Wando, and Ashley Rivers (lines and symbols). Both sets of sets factor out effect of sea level rise and show only project-related impacts.