South Carolina Department of
Natural Resources
DNR

John E. Frampton
Director

January 25, 2011

Col. Jeffrey M. Hall
US Army Corps of Engineers
Savannah District
100 West Oglethorpe Avenue
Savannah, GA 31401-3640

REFERENCE: Draft General Re-Evaluation Report and Tier II Draft Environmental Impact Statement for the Savannah Harbor Expansion Project Chatham County, Georgia and Jasper County, South Carolina

Dear Col. Hall,

Personnel with the South Carolina Department of Natural Resources (DNR) have attempted to review in a timely fashion both the Draft General Re-Evaluation Report (DGRR) and the Tier II Draft Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project. It should be noted that I formally requested a 120-day public comment period by letter to you dated November 18, 2010. Without direct reply to my request, the US Army Corp of Engineers (USACE) extended the initial 45-day comment period by 15 days, for a total public comment period of only 60 days.

These documents were released for public review immediately preceding the holiday period further burdening reviewers. Given the lengthy delays in final internal USACE review of these documents, I cannot help but believe that it would have been more appropriate to wait until the new year for their public release. There is the appearance that the timing of their release was a deliberate attempt to minimize thorough public and scientific scrutiny. DNR continues to assert that a 60-day period is insufficient to conduct a thorough review of the DEIS and DGRR and provide detailed comments on these large and complex documents. Therefore, DNR intends to submit additional comments following our continuing review of these documents or if new information becomes available regarding the proposed project.

Based on our assessment of the environmental impacts as presented in the DEIS and DGRR, and on the adequacy of the mitigation proposed, DNR has concluded that the only deepening alternatives that could be considered minimally environmentally acceptable are the 44-ft alternative or the 45-ft alternative, provided the proposed mitigation for each of these alternatives proves to be successful. Although, DNR does not support any deepening scenario greater than the 45-ft alternative, it should be noted that comments made by members of the South Carolina Maritime Commission (SRMC) indicate that even the 48-ft alternative would result in a channel that is shallower and narrower than USACE design standards for fully loaded Post-Panamax

ships. This would result in a lower margin of safety and, by extension, a higher risk to the environment from potential vessel groundings. Therefore, none of the alternatives considered would accomplish the goal of ensuring navigational efficiency or safety for these larger vessels. The documents cite the preferred alternative provides "an acceptable level of risk" with respect to under-keel clearance. The SRMC analysis concludes USACE has applied this same level of "acceptable risk" to the narrow passage and passing lanes in the proposed channel. The DNR position is that there is no acceptable level of risk associated with environmental damage that could result from vessel grounding, hull breaching and a catastrophic spill endangering natural resources, public interests, commerce and tourism.

Our analysis concludes that the majority of benefits associated with the project occur in the state of Georgia while the majority of environmental impacts occur in South Carolina or in the Savannah River which is a shared tributary whose natural resources must be apportioned equitably, managed appropriately and respected by the leadership and people of both states.

In view of these concerns, DNR has concluded that a better alternative to consider is to conduct minimal deepening of the channel now and to a depth of -44 or -45 ft in order to alleviate draft restrictions on the existing fleet of vessels, and then to conduct additional studies and hydrodynamic modeling to evaluate the economic and environmental impacts of deepening to a greater depth only as far as the site of proposed Jasper Port Terminal. Since this site is several miles closer to the ocean than the Garden City Terminal, this alternative could potentially reduce the environmental impacts and cost of deepening, while increasing navigational safety and efficiency for the next generation of vessels predicted to call on the proposed Jasper Port Terminal. DNR recommends that this alternative be given serious consideration.

Specific comments on the DEIS appear in the attachment to this letter. Many of these comments apply to the DGRR as well; therefore a copy of this letter and attachment should be included in the administrative record for each of these documents. If you or any member of your staff has any questions regarding DNR comments, please contact Bob Perry of my staff at 803.734.3766 or perryb@dnr.sc.gov.

Very truly yours,

John E. Frampton
Director

Attachment as stated
c: Hon. Nikki R. Haley – Governor of the State of South Carolina
Hon. Lawrence K. Grooms – Senator SC District 37
C. Earl Hunter – Commissioner SC DHEC
Dean Moss – SRMC Chairman
Michael G. McShane – DNR Board Chairman
LTC Jason A. Kirk – USACE Charleston District Commander
William G. Bailey – USACE Savannah District Planning Chief

South Carolina Department of Natural Resources

Analysis of the

DRAFT TIER II ENVIRONMENTAL IMPACT STATEMENT FOR THE SAVANNAH HARBOR EXPANSION

Major Points Addressed in the DEIS:

The stated purpose of the proposed Savannah Harbor Expansion Project (SHEP) is to save current and future shipping costs due to draft restrictions on larger vessels. The DEIS presents an incremental analysis of the impacts of project depth alternatives ranging from 42 ft, the "no action" alternative through 48 ft. The Maximum Authorized Plan of -48 ft is supported by the non-Federal cost share sponsor. The US Army Corps of Engineers (USACE) has tentatively identified the 47-ft depth alternative as the National Economic Development (NED) Plan. The NED Plan is defined as:

> . . . *the plan that maximizes net economic benefits to the Nation and fully complies with Army policy.*

Although it is acknowledged in the DEIS that environmental impacts associated with shallower depths would be less than those associated with the NED Plan, the USACE concludes that:

> . . . *the lesser impacts of the 44-foot depth, 45-foot depth, and 46-foot depth alternatives are not considered sufficient to justify recommendation of these alternatives instead of the NED Plan.*

The DEIS further concludes that all depth alternatives, with the inclusion of proposed mitigation features, are:

> . . . *environmentally acceptable.*

DNR Summary Comment:

DNR disagrees with the conclusions reached in the DEIS and believes that the only 2 deepening alternatives that are environmentally acceptable are the 44-ft and the 45-ft alternatives, provided the proposed mitigation is effective in minimizing any adverse impacts of these alternatives. Obviously, the "no action" alternative, maintaining the channel at the currently authorized depth of 42 ft, would have the fewest adverse environmental impacts.

The NED Plan, the 47-ft alternative, would involve the initial excavation of about 28 million yd^3 of dredged sediment, and would result in both direct and indirect impacts to natural resources. Direct impacts would result from the physical removal and disposal of sediments, while indirect impacts would result from increased salinity intrusion and reduced dissolved oxygen (DO) levels. Overall impacts include adverse effects on managed freshwater wetlands in the Savannah

National Wildlife Refuge (SNWR), loss of tidal freshwater wetlands, impacts to public use of the estuarine/riverine system, loss of foraging and nursery habitat for the endangered shortnose sturgeon (*Acipenser brevirostrum*) (SNS), loss of salt and brackish marsh and loss of habitat for Striped bass (*Morone saxatilis*).

DNR Specific Comments:

Sediment Disposal and Associated Impacts:

Approximately 13 million yd^3 of sediment from the Entrance Channel would be placed in nearshore "feeder berms" off Tybee Island, "submerged berms" near the ocean bar entrance channel or in the EPA-approved Savannah Ocean Dredged Material Disposal Site (ODMDS). Since all of the proposed nearshore and offshore disposal sites are located either in federal waters south of the Entrance Channel or in state waters off the coast of Georgia (GA), DNR will defer to the federal agencies and state of GA regarding the potential environmental impacts of sediment disposal in those areas. DNR generally opposes open-water disposal of dredged material, except in an approved ODMDS or for the purpose of nourishing seriously eroding beaches with beach-compatible sand. Channel and harbor sediments may not be of the quality and size suitable for future beach nourishment.

Approximately 15 million yd^3 of sediment from the Inner Harbor, including new work material, would be disposed in the 8 existing upland confined disposal facilities (CDFs), 6 of which are on the South Carolina (SC) side of the river. Use of specific CDFs would be determined based on their availability and planned maintenance and improvement activities. Sediments collected from the project area in 1997 were tested for contaminants as part of the Tier I EIS. Parameters analyzed included metals, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbons (PAHs), phenols, pesticides, dioxin/furan congeners, cyanide, organotins, and nutrients. Sampling conducted in 2005, and again in 2007, indicated the only analyte of significant ecological concern was cadmium, which occurs naturally in high concentrations in the Miocene clays that would be excavated and/or exposed as part of the deepening project. Bioaccumulation studies suggested that the risk to aquatic organisms exposed to these cadmium-laden sediments is low. The potentially greater risk to avian and terrestrial species foraging in the CDFs where these sediments would be disposed of would be mitigated by "capping" these sediments with a 2-ft layer of comparatively clean sediments from another part of the channel. A detailed protocol for sampling the surficial sediments and vegetation in the CDFs before and after capping is described in Appendix M of the DEIS. Should the project go forward, DNR concurs with this approach to managing the cadmium-laden sediments, and believes the proposed monitoring and contingency plans are adequate to ensure a minimal risk to wildlife.

Wetlands Impacts:

As stated in Section 5.1 of the DEIS, the extent of direct wetland impacts resulting from excavation of channel bend wideners, enlarging Kings Island Turning Basin and removing the Tidegate, would not differ substantially among the 5 deepening alternatives considered. In each

case, a total of 14.08 acres of salt and brackish marsh would be affected.[1] In the absence of an approved saltwater mitigation bank in the Savannah River Basin, USACE proposes to mitigate for these direct losses by grading down approximately 42 acres of a former confined dredge spoil disposal site (CDF 1S) near the confluence of the Front and Middle rivers to an elevation that would support *Spartina alterniflora*. A "feeder" creek system also would be constructed toward the interior of the restored marsh. This area would then be allowed to revegetate naturally. Active planting of *Spartina* would be conducted only if the area did not revegetate naturally at a rate that would provide 15% vegetative cover after 1 year and 80% vegetative cover after 5 years (with interim goals of 25, 40, and 60% cover at the end of 2, 3 and 4 years, respectively). Conceptually, DNR concurs with this approach to mitigating for the direct loss of brackish and saltwater wetlands resulting from any of the deepening alternatives; however, the DNR overriding concern about the indirect effects of harbor deepening on tidal freshwater marsh should be given greater weight.

As stated in Chapter 5 of the DEIS:

> *All of the deepening alternatives would adversely impact tidal freshwater marsh.*

Model predictions indicate that, without mitigation, deepening the harbor would result in the conversion of tidal freshwater marsh to brackish marsh as a result of increased salinity intrusion. Under conditions of average flow and low sea level rise, the acreage of freshwater marsh that would be lost as a result of deepening is predicted to range from 551 acres for the 44-ft alternative to 1,212 acres for the 48-ft alternative, assuming no mitigation is implemented. With the flow-altering modifications proposed as mitigation by USACE, the acreage of freshwater marsh is projected to increase by 332 acres with the 44-ft alternative; whereas, a net loss of freshwater marsh (ranging from 32 acres for the 45-ft alternative to 337 acres for the 48-ft alternative) would still result from the other deepening alternatives, even with mitigation. Considering the substantial loss of tidal freshwater wetlands that has already occurred as a result of past dredging operations and other modifications to the system, DNR considers anything more than a *de minimis* loss of freshwater wetlands to be a significant adverse impact of the proposed deepening project.

USACE proposes to minimize indirect impacts to tidal freshwater wetlands due to increased salinity intrusion by implementing several flow-altering modifications of the Savannah River system. These include diverting more fresh water from the Front River down the Middle and Little Back rivers at McCoy Cut, closing the lower, western arm of McCoy cut, removing the Tidegate abutments and piers from the lower Back River, constructing a broad berm at the lower end of the sediment basin located below the Tidegate, filling in the sediment basin using "new work" material, constructing a submerged sill at the mouth of the Middle River and closing Rifle Cut. USACE used the results of hydrodynamic modeling to develop a flow-alteration plan for each depth alternative and has determined that Plan 6B is the most "cost-effective" plan for the 44-ft depth alternative; whereas, Plan 6A is more "cost-effective" for all of the other depth

[1] It should be noted that this number differs from that cited elsewhere in the DEIS. The acreage of estuarine emergent marsh that would be lost as a direct result of excavation is given as 15.48 acres in Section 6.04, and as 15.68 acres in Appendix C. This apparent discrepancy should be corrected or clarified in the text of the DEIS.

alternatives analyzed including the 45-, 46-, 47- and 48-foot alternatives. Both Plans 6A and 6B would incorporate all flow-altering modifications described above, except that Plan 6A also would include deepening McCoy Cut and the upper portions of the Little Back and Middle rivers; whereas, Plan 6B would not include any such deepening.

USACE proposes to provide compensatory mitigation for unavoidable impacts to tidal freshwater wetlands. Initially, an attempt was made to identify other sites in the Savannah River estuary that could be used for restoration or creation of tidal freshwater marsh; however, neither the USACE nor any of the stakeholders could locate any suitable sites available within the Savannah River Basin. In the absence of any such sites, USACE, in consultation with US Fish and Wildlife Service (USFWS) and other natural resource agencies, used the Savannah District Mitigation Standard Operating Procedure to calculate the minimum acreage required to be acquired and preserved to acceptably mitigate for unavoidable freshwater wetland impacts. Using this procedure, it was determined that the total acreage of wetlands necessary to be preserved ranged from 0 acres for the 44-ft deepening alternative, with flow-altering mitigation, to 2,683 acres for the 48-ft alternative, with flow-altering mitigation. USACE proposes to acquire lands identified in the latest version of the Savannah National Wildlife Refuge (SNWR) Acquisition Plan (dated July 2007), and provide this acreage to the USFWS to manage as additions to SNWR as compensatory mitigation for unavoidable wetland impacts from the deepening project. USACE proposes to give priority to acquiring ecologically valuable properties that provide positive contributions to the goals of SNWR, that enhance fish and wildlife resources and that are dominated by freshwater wetlands. DNR concurs with this approach to mitigating for any unavoidable impacts to tidal freshwater wetlands, particularly since most of the indirect impacts of deepening would occur within the SNWR. However, DNR acknowledges the proposed philosophy of mitigating for loss of one type of wetland that is being converted to another by protecting wetlands which are under no threat of development or degradation is in direct contravention with national policy of no-net loss of wetlands [Executive Order 11988].

Water Quality Impacts:

As discussed in the DEIS, there are significant concerns related to the predicted decrease in DO that would result from the proposed deepening project. Degradation of the DO regime in Savannah Harbor has the potential to adversely affect numerous aquatic species. The primary area of concern for DO is the portion of the Savannah River between Fort Pulaski (river mile 0.0) and the Seaboard Coastline Railroad Bridge (river mile 27.4). This section of the Savannah River estuary would be directly affected by the deepening project. As noted in the DEIS, this segment of the river is on GA's Section 303(d) list as impaired for DO. Modeling studies conducted in support of the development of a Total Maximum Daily Load (TMDL) for DO in Savannah Harbor estimate that the existing DO concentration in Savannah Harbor is 1 mg/l lower than it was during the baseline year (1854) and condition (12-foot controlling depth) because of dredging operations that have been conducted since then. Model predictions from SHEP studies indicate that further deepening will cause additional impacts on the DO regime in Savannah Harbor.

USACE proposes to minimize impacts due to the incremental decrease in DO levels by installing several land-based oxygen injection systems, individual units of Speece Cones, at 3 locations in the estuary where DO levels are predicted to be lower as a result of deepening. The number of oxygen injection units installed would range from 8 to 10, depending on the depth alternative selected. Water would be withdrawn from the river through pipes, then super-saturated with oxygen and returned to the river. The systems would be operated to provide the needed amount of oxygen for the depth alternative selected during July, August and September. The DO system configuration is designed to remove the incremental effect of a deeper channel in 97% of the cells in the hydrodynamic model. As reported in the DEIS, hydrodynamic and water quality modeling conducted in support of the deepening project suggest that the proposed mitigation features, the flow-altering plans and the DO injection systems, would substantially reduce project impacts to tidal freshwater wetlands and certain species of fish including American shad (*Alosa sapidissima*) and Southern flounder (*Paralichthys lethostigma*).

DNR is concerned that a substantial amount of uncertainty remains regarding the predicted magnitude of adverse impacts and the effectiveness of the proposed mitigation measures. While DNR does not necessarily dispute the hydrodynamic and water quality modeling results, it should be noted that stakeholders have not conducted nor can any stakeholder conduct an independent review of all of the modeling assumptions or input parameters based on the documents and time provided for review. In addition, although we have been assured by USACE that the hydrodynamic and water quality models used to predict the impacts of deepening do, in fact, account for the effects of overdepth and advance maintenance dredging, we could locate no specific statement to this effect in either the DGRR or the DEIS. At the request of DNR, SCDHEC provided an analysis of the bathymetry used in developing the base model. This analysis suggests that the base model did not fully account for the combined effect of overdepth and advance maintenance dredging. Therefore, the model used to predict project impacts on salinity, DO, and loss of tidal freshwater wetlands may have underestimated those impacts. This possibility should be fully addressed in the text of both the DGRR and the DEIS. In addition, all assumptions and input parameters used in developing the hydrodynamic and water quality models should be discussed in detail and in layman's terms in both documents.

DNR also is concerned about the effectiveness of the proposed mitigation measures, particularly, the oxygen injection system. The results of a demonstration project conducted to determine the effectiveness of the system in Savannah Harbor were inconclusive. The slight increase in dissolved oxygen in the vicinity of the oxygen injection system was shown to be within the normal range of natural variability due to tidal influences and could not be definitively attributed to the oxygen injection system itself. Furthermore, the long-term effectiveness and viability of a mechanical oxygen injection system in a tidal brackish water environment is highly questionable. The minimal net improvement in DO predicted by the model may not be sufficient to warrant the initial cost of the system or the long-term maintenance costs. Additionally, DNR believes DO levels may deteriorate more than expected after the proposed deepening of the channel and require operation of the oxygen injection system for a longer period of time than the proposed 3-month interval during late summer-early fall. Longer periods of low flow and high temperature are anticipated in an era of climate change and will be magnifiers of the already existing water quality problems. Instead of reliance on an oxygen injection system, DNR recommends that adverse impacts to DO levels be minimized by deepening the project to no more than -45 ft.

SNS Habitat Impacts, Unintended Consequences and Proposed Mitigation:

DNR also is concerned that some or all of the flow-altering modifications could have unintended consequences that result in additional adverse impacts to natural resources. Significantly, the modifications proposed to reduce salinity intrusion into the Back River to protect tidal and managed freshwater wetlands could result in increased salinity intrusion into the Front and lower Middle rivers, where both juvenile and adult SNS are known to concentrate, particularly during the winter when temperatures are below 22° C.[2] [3] In fact, Table 5-30 shows that the loss of adult SNS habitat in winter would be much greater with the flow alterations (maximum loss of 439 acres for the 48-ft alternative) than without them (maximum loss of 44 acres for the 48-ft alternative). Conversely, the loss of adult SNS habitat in summer and juvenile SNS habitat in winter is predicted to be less with the proposed flow-alterations than without them.

The deepening alternative that is predicted to have the least negative impact on SNS habitat overall, including adults and juveniles during winter and summer, is the 44-ft alternative, which would result in a net loss of approximately 60 acres of SNS habitat with flow-altering mitigation, and 151 acres without flow alterations. By comparison, the NED Plan, the 47-ft alternative, is predicted to result in a net loss of 473 acres of SNS habitat overall with the proposed flow alterations, or a loss of 545 acres without flow alterations. The locally preferred plan, the 48-ft alternative, would result in even greater net losses of SNS habitat overall. DNR considers the magnitude of these impacts to the habitat of shortnose sturgeon to be unacceptable, with or without mitigation.

Other unintended consequences of flow alterations also are likely. Recent and ongoing tagging studies suggest that SNS may move freely between the Front, Middle and Back rivers via Steamboat Cut and Rifle Cut.[4] If this proves to be the case, closing Rifle Cut could impede this movement, and limit SNS access to suitable foraging and nursery habitat. In addition, DNR field biologists recently have reported that the upper end of the sediment basin immediately below the Tidegate has already filled in to a large extent, particularly along the sides of the basin, and that any further deposition of sediments in this area could present another impediment to SNS migration throughout the system.[5] Furthermore, DNR is concerned about the potential impact of open-water disposal of dredged material on water quality in the Back River. This could exacerbate recurring episodes of hypoxia in this area, and worsen shoaling in upstream portions of Back River by increasing the deposition of fine-grained sediments there.

As noted above, USACE also proposes to construct a sill near the mouth of the Middle River to protect important nursery habitat for juvenile SNS from adverse impacts. The intended purpose of this sill is to minimize the predicted increase in salinity in the lower portion of Middle River as a result of deepening. USACE proposes to provide compensatory mitigation for unavoidable

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[2] Collins, M.R., W. C. Post, and D. Russ. 2001. Distribution of shortnose sturgeon in the lower Savannah River: Results of research from 1999-2000. Final Report to Georgia Ports Authority. 21 pp plus appendices.

[3] Collins, M. R., W. C. Post, D. Russ, and T. I. J. Smith. 2002. Habitat use and movements of juvenile shortnose sturgeon in the Savannah River, Georgia/South Carolina. Trans. Am. Fish. Soc. 131:975-979.

[4] Meadows, A. W., W. C. Post, and J. Moak. *In prep.* Draft report on the movements of shortnose sturgeon in the Savannah River, GA/SC: 2006-2009.

[5] W. C. Post, Personal communication.

impacts to SNS foraging and nursery habitat by constructing a fish passage structure around the New Savannah Bluff Lock and Dam (NSBLD) near Augusta, GA, at a projected cost of $6.3 million. The structure described in section 5.3.2 as "a rock ramp fishway" would be located on the SC side of the river, and would theoretically provide SNS access to approximately 20 miles of upstream spawning habitat. DNR believes the likelihood that this approach would be successful in passing SNS is highly doubtful. While such a fish passage structure might benefit other migratory fish, its success in passing SNS has never been demonstrated. Because of its unproven success, DNR is opposed to implementing active fish passage as mitigation for unavoidable impacts to SNS habitat, and believes that the best approach to protecting SNS habitat would be to minimize those impacts by selecting either the "no action" alternative or the 44-ft deepening alternative with flow-altering mitigation.

Striped Bass Impacts:

While impacts to SNS would be minimized by selecting either the "no action" alternative or the 44-ft alternative, modeling results presented in the DEIS Table 5-36 suggest that the overall net loss of striped bass habitat including suitable habitat for spawning, eggs and larvae would be less with the 45-ft alternative (net loss of 0 acres for all life stages combined) than with the 44-ft alternative (net loss of 219 acres for all life stages combined). This seeming anomaly is a result of the proposal to increase freshwater flow down the Middle and Back rivers by dredging McCoy Cut and the upper reaches of the Middle and Little Back rivers as part of the flow-altering mitigation plan for the 45-ft alternative (Plan 6A), but not for the 44-ft alternative (Plan 6B). Striped bass is an important recreational species whose population in the lower Savannah River has been drastically reduced by earlier dredging operations and flow-altering modifications to the system. Because of the predicted increase in suitable habitat for the survival of striped bass eggs and larvae, DNR would consider the 45-ft alternative, with the proposed flow-alterations, to be environmentally acceptable, as well – provided USACE contributes supplemental funding to GA Department of Natural Resources (GADNR) ongoing striped bass stocking program in order to adequately compensate for all unavoidable impacts to striped bass habitat as described in Appendix C.

Public Use Issues:

As noted in the DEIS, closing Rifle Cut would lengthen the transit time and distance travelled by recreational boaters currently using Rifle Cut to reach the Back River from the only public boat ramp in this area at Houlihan Bridge on the Front River. USACE proposes to mitigate for this impact on recreational boating by constructing a new boat ramp on the north side of Hutchinson Island on the Back River. USACE then would turn over the site to Chatham County, which would operate the facility in perpetuity. If the deepening project is approved in some form and Rifle Cut is, in fact, closed as one of the flow-altering modifications, DNR would support the boat ramp proposal; however, our greater concern is that the indirect impacts to natural resources be minimized by limiting any deepening to no more than -44 or -45 ft. However, DNR is concerned about the proposal to turn the boat ramp over to the local county without providing continuing funding for maintenance, especially during a period when local governments are struggling financially. A funding mechanism to support the local government's operation of the boat ramp in perpetuity should be identified.

Potential for Invasive Species:

The DEIS acknowledges ballast water is:

> . . . *a major source for introducing non-native species into aquatic ecosystems where they would not otherwise be present.*

It is also acknowledged that invasive, non-native species can adversely impact the environment, the economy and, in some cases, human health. Nevertheless, the DEIS concludes that there would be no additional risk from the introduction of invasive species through ballast water since there is no projected increase in the number of vessels expected to call on the port of Savannah as a result of the proposed deepening. This conclusion is apparently based on the unsubstantiated assumption that the volume of ballast water is related only to the number of vessels calling on the port. Absent a comparison of the volume of ballast water currently carried and discharged into the port by the smaller vessels (in aggregate) vs. the volume of ballast water projected to be carried and discharged into the port by the fewer larger vessels (in aggregate) that are expected, the conclusion of "no additional risk" is without any rational basis. The possibility that larger vessels might actually carry and discharge more ballast water than smaller vessels would seem to further weaken that conclusion. In addition to any change in the volume of ballast water expected, other factors that should be considered are any projected changes in vessel speed and origin of ballast water. Any increase in vessel speed would presumably result in decreased transit time, thus increasing the probability of survival and delivery of invasive species propagules. Any projected change in the origin of ballast water also could affect propagule survival, as well as determine which species might be introduced. In summary, DNR believes the conclusion of "no additional risk" is not substantiated by evidence presented in the DEIS, and recommends that further analysis and discussion of the ballast water issue be included in the Final Environmental Impact Statement.

The DEIS states that, currently:

> . . . *ballast water exchange is the only effective management tool to reduce the risk of ballast-mediated invasion.*

However, it is widely acknowledged that ballast water exchange is not completely effective in eliminating the risk of introducing non-native species.[6] Other treatment technologies, such as filtration, heating, ultraviolet light and certain biocides (used either alone or in combination with ballast water exchange) have the potential to be more effective in reducing this risk. These technologies and the feasibility of implementing them should be discussed in greater detail in the DEIS.

It is stated in the DEIS that the University of Georgia, Marine Extension Service (MES) has completed a study designed to monitor for aquatic invasive species in the Port of Savannah, and that the MES was:

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[6] National Research Council. 1996. Stemming the tide: Controlling introductions of nonindigenous Species by ships' ballast water. 141 pp.

> . . . *expected to release an Invasive Species Management Plan for the State of Georgia later in 2008.*

No further mention is made of this plan in the DEIS, however. This plan should be discussed with respect to its implications for SHEP.

Impacts on Essential Fish Habitat:

It is acknowledged in Section 5.04, that:

> . . . *the proposed action would adversely impact habitat of Striped Bass and the endangered Shortnose sturgeon.*

In section 5.15, however, USACE concludes that, with mitigation and monitoring:

> . . . *the proposed action is not expected to cause significant adverse impacts to Essential Fish Habitat or EFH species.*

This conclusion is repeated in Appendix S (Essential Fish Habitat). Similarly, it is stated in Appendix B (Threatened and Endangered Species) that with the implementation of certain conservation measures and the proposed mitigation plan for SNS, specifically the sill in Middle River and fish passage at New Savannah Bluff Lock and Dam:

> . . . *the proposed project may affect, but is not likely to adversely affect Shortnose or Atlantic sturgeon or their critical habitat.*

DNR believes that all of these statements are misleading and should be qualified. Specifically, it should be noted that the proposed mitigation for SNS (providing fish passage at New Savannah Bluff Lock and Dam), even if successful in providing access to upstream spawning habitat, would not replace the critical nursery and foraging habitat that would be lost as a result of harbor deepening. Similarly, while the proposed funding of the GADNR striped bass stocking program would help offset losses to striped bass habitat, it would not replace that lost habitat.

Monitoring and Adaptive Management Plan (Appendix D)

As stated in the first paragraph of Appendix D:

> *The Savannah Harbor Expansion Project . . . has the potential to adversely affect nationally important resources. In addition, since predictions are made about future effects to biological resources, there is a degree of uncertainty about the impacts which the recommended action would actually produce. Those uncertainties include both the accuracy of the predictive impact tools and the biological responses that will occur as a result of changes in the environment.*

DNR concurs with this assessment of the uncertainty regarding the accuracy of the hydrodynamic and water quality models used to predict the physical, chemical and biological

impacts of the proposed project and constructed mitigation features. DNR also agrees there is considerable uncertainty regarding the biological responses to these impacts. Because of this uncertainty, it is imperative that a comprehensive monitoring and adaptive management strategy be developed, implemented, and adequately funded, if the deepening project goes forward.

USACE defines "adaptive management" as:

> . . . *evaluating the accuracy of the predicted environmental impacts, assessing the effectiveness of the mitigation features, and modifying the project as needed to ensure the levels of environmental effects predicted in the Environmental Impact Statement (EIS) are not exceeded.*

As part of the EIS process, field investigations were conducted to identify important resources in the project area and obtain data from which the hydrodynamic and water quality models were developed. In order to determine the accuracy of these models in predicting the environmental impacts of the project, as well as the effectiveness of the constructed mitigation features, USACE proposes to conduct additional field studies before, during, and after construction (for a period of 5 years following construction). In addition, USACE proposes to conduct long-term post-construction monitoring "over the life of the project."

DNR generally concurs with the proposed pre-construction monitoring of physical characteristics and biological resources, in order to update existing information and provide a baseline for comparison with post-construction monitoring results; however, we question whether the intensive monitoring of hydrologic parameters within the lower estuary over one lunar cycle, will be sufficient to evaluate hourly, daily and, especially, monthly variations in the aquatic environment. DNR suggests that intensive hydrologic monitoring be conducted over a period of at least 2, and preferably 3, lunar cycles. The estimated cost of any such additional monitoring should be factored into the total pre-construction monitoring cost.

The proposed monitoring of biological resources would focus on impacts to tidal wetlands and shortnose sturgeon (SNS), which are described as:

> . . . *the two most critical resources that could be or are expected to be impacted by the project.*

DNR recommends that Atlantic sturgeon (*Acipenser oxyrinchus*), recently proposed to be listed as an endangered species, and striped bass be added to the list of biological resources to be monitored. If monitoring of striped bass is already included as a component of the GADNR striped bass stocking program, which USACE proposes to partially fund as compensatory mitigation for impacts to this species, this monitoring plan and its relevance to the deepening project should be described in Appendix D of the DEIS. Development of a monitoring protocol for Atlantic sturgeon should be closely coordinated with federal and state natural resource agencies. The estimated cost of adding these monitoring components should be factored into the total monitoring cost of the project.

No mention is made in Appendix D of a specific monitoring plan, or any associated costs, to evaluate vegetative species composition and percent cover at the brackish marsh creation site that is proposed as compensatory mitigation for direct impacts to fringing saltmarsh. This is one of the few proposed mitigation measures that actually has well-defined success criteria, based on percent cover, and an identified adaptive management strategy if the success criteria are not met (e.g., planting *Spartina alterniflora*). A monitoring plan designed to evaluate the progress and ultimate success of this project should be included in the "Post-Construction Monitoring" section of this appendix. The estimated cost of this monitoring component, conducted over a 5-yr period, should be added to the total monitoring costs.

As stated in Appendix D, current estimates for the project construction period range from 3 to 6 years, and that USACE would perform monitoring during construction "for whatever length of time it takes to construct the project." The cost estimates, however, assume only a 3-year construction period. DNR is concerned that the project may take considerably longer than 3 years to construct, and that the cost estimates for this phase of the monitoring plan may be too low. DNR recommends that the cost estimates for this monitoring phase be based on the maximum estimated duration of construction (6 years).

It is stated on p. 18 of Appendix D:

> *The Sediment Basin would be allowed to fill naturally after construction of the submerged sill at its lower end.*

Earlier in the main body of the DEIS, however, it is stated that the sediment basin would be actively filled in with dredged material. This discrepancy should be rectified and explained. In addition, it should be noted that DNR already has expressed its opposition to using the sediment basin for dredge spoil disposal because of its potential to further degrade water quality in the Back River.

DNR recommends that post-construction monitoring of: (1) nearshore benthic communities, (2) fish utilization of oceanward sediment placement sites, and (3) fish distribution and abundance along the marsh edges be extended from 3 years to 5 years. Cost estimates should be adjusted accordingly.

Depending on the results of the proposed monitoring studies, USACE in consultation with the federal and state natural resources agencies, may undertake appropriate adaptive management measures to ensure that the environmental impacts remain within the range predicted by the models, and that the constructed mitigation features perform as expected and adequately compensate for any unanticipated impacts. Appendix D lists several adaptive management measures that could be undertaken, depending on which environmental impact or mitigation feature might require corrective action. For most of the potential adaptive management measures listed, USACE proposes to allocate funds equal to 10% (or in some cases, only 5%) of the initial construction cost to the implementation of these corrective measures.

DNR is concerned that the amount of money proposed to be allocated for these, or other, adaptive management measures may be insufficient, particularly for those mitigation measures

that have a high degree of uncertainty associated with their success such as the oxygen injection system, the flow-altering modifications to the system and the fish passage structure at NSBLD. DNR recommends that funding for these adaptive management measures be increased to at least 15% of the initial cost of construction, and that funding for this purpose be secured prior to starting the project.

If corrective action is required, USACE proposes to conduct post-construction monitoring for only 1 year after implementing the adaptive management feature. DNR believes monitoring for only 1 year may be insufficient to determine the effectiveness of the corrective action, and recommends that dedicated funding be provided for monitoring the effects of any adaptive management feature for a minimum of 3 years.

The proposed long-term monitoring plan which is the plan to monitor certain aspects of the project on an annual basis beyond the initial 5-year post-construction monitoring period seems inadequate in that the cost of this monitoring component is only projected for one year, with funding in subsequent years presumably dependent on annual appropriations. DNR recommends that the total cost of long-term monitoring, as well as the cost of continued operation and maintenance for each mitigation component, be projected over the entire life of the project, and that this funding be secured prior to starting the deepening project.