Comments from the Savannah River Maritime Commission on the Savannah River Expansion Project DEIS and GRR

Costs and Economic Benefits

January 21, 2011



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Review comments are contained herein on Draft General Re-Evaluation Report (GRR), Economics Appendix and portions of the DEIS. The review was undertaken with guidance from the USACE ER 1105-2-100 as well as the IWR NED Deep Draft Navigation Manual 10-R-4. The primary focus of the review was analyzing elements comprising the asserted NED benefits of the project.

In addition to the above, the review benchmarked other port operations, both within the USA and globally, to evaluate whether the forecasts and procedures used in the GRR and DEIS gave a realistic depiction of current and expected future conditions at Savannah Harbor.

The major areas addressed in the comments were the container cargo forecasts for Savannah Harbor during the project's 50 year life span; the without project capacity at Savannah for such cargo; vessel utilization rates expected as a result of the forecasts; and the forecasted vessel fleet during the project life.

Several elements that were essential to the study were not made available as part of the review process. In particular, the specifications used in the HarborSym model to generate overall vessel flows within Savannah Harbor were not available. This makes it difficult to evaluate potential capacity limitations to shipping lanes within the project boundaries used to project tidal delay and meeting area benefits. The vessel capacity utilization analysis offered in the Economics Appendix appears incomplete, and does not look at utilization over time to account for the large percentages of empty containers expected in the future at Savannah, especially for the export transits within the Harbor.

The main findings of the review were the following:

- Garden City Container Terminal under current and proposed configurations does not have the capacity to handle 6.5 million TEUs as claimed under the without project condition.
- There is no multi-port analysis offered in the report. It is a given that 6.5 million TEUs will come to Savannah by 2032. There is minimal consideration of competing ports.
- Transportation cost savings includes all costs per entire trade route. There is no consideration as to whether cargo to/from Savannah may have origins or



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destinations at interim ports along the trade route, or be transshipped along the way.

 There is the without project condition, and a series of incremental deepening alternatives offered. There is no non-structural or channel segment alternatives offered. There is no consideration for future facilities at other than Garden City Terminal.



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2. Draft General Re-evaluation Report Comments

2.1. Inventorying and Forecasting Conditions

Commodity forecasts have increased significantly between the Corps 2004, 2007 and 2010 SHEP studies. While the Panama Canal improvements being undertaken may allow larger vessels to be deployed on certain services calling on Savannah, this should not affect the volumes of cargo handled at Savannah. To assume this is the case would mean an inducement to transfer cargo allocations from other ports, such as LA/LB. Cargo forecasts should be measured against broader forecasts of economic activity, such as population growth, income levels and GDP growth for reasonableness. China is unlikely to be the lowest cost provider of goods 20 to 30 years hence. Their K/L ratio will be too high (forcing wages to rise) and their consumption will rise from less than 40% of their GDP toward the US rate of 70%. So, there is uncertainty about the importer of tomorrow. A general assumption that Garden City Terminal can handle 6.5 million TEUs as the baseline for without project condition is not substantiated. A specific analysis of this terminal's capacity needs to be completed to determine appropriate volumes of cargo that can be handled without project.

The assumption that Garden City will be expanded seems appropriate, however that without condition can change if another major facility opens downstream. Then, the expansion could be scaled back and those savings would be benefits to the new downstream facility. As the Garden City Terminal may not be able handle the forecasted future cargo, the report misses an opportunity to evaluate additional terminal locations. A terminal located well downstream of the Garden City might optimize at a depth deeper than Garden City which would reduce the need for environmental impacts and expensive mitigation.

2.2. Formulating Alternative Plans

The multi-port analysis does not account for competing Gulf ports of Houston, New Orleans and Mobile in defining the Savannah hinterland market area.

There is an acknowledgement of S. Atlantic ports planning for 12 million TEUs additional capacity in coming years. There is no comparison of impacts by utilizing other ports over Savannah to meet the plan objectives.

There is minimal effort to identify a non-structural solution. The Corps should consider the non-structural alternative of reducing the LNG radius given the current. Vessels moving downstream may approach an LNG vessel faster than those moving upstream. So it may be more efficient to shrink the downstream no-sail zone. The ready acceptance



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of the need for a 4 ft underkeel clearance is inconsistent with the required analysis described in ER 1105-2-100 E-5.e(3).

2.3. Evaluating Alternative Plans

HarborSym is referenced as a basis in determining not only project design, but channel capacity estimates to allow for realization of the project objectives. This model and calculations derived from its use should be part of the report, and presented at a level of detail for review.

Page	Section/Para.	Comment
14	Main Report	1200 acres of terminal space includes ICTF/rail facilities. CY facilities limited to about 650 acres.
14		6.5 million TEU capacity is a given without any justification in the GRR. This capacity needs to be justified to insure the without project condition can accommodate future cargo forecasts.
17	1.1	Is the AIWW an impediment to navigation?
20		82% of container ships have design drafts restricting access. Container weights vary considerably. <i>Ref: Table 105 P. 141 Econ App.</i> This shows the vast majority of vessel calls are at or below -38' draft.
		In 2008, Waterborne Commerce Statistics show that of 4,320 inbound self propelled dry cargo vessel calls. 23 were at 42 ft, 32 at 41 ft. and 124 were between 39 and 40 ft. On the export side, 55 were at 42 ft, 73 at 41 ft. and 169 were between 39 and 40 ft.
		Table 29 of the Econ appendix shows that only 66 (4%) of the total container ships calling at Savannah are post-Panamax.
22	Figure 1-3	What does "Required depth (for 6' project)" mean?
24	Table 1-2	Currently dredge to 46 to 50 ft up to Station 102. Advance maintenance is major, up to 8 feet. Yet, it is not accounted for in the HarborSym analysis and calculation of transportation cost savings and vessel fleet allocation over time.
25-28	1.2.1	Sediment and fresh water controls didn't work or not maintained. This does not bode well for any mitigation maintenance measures in the future.
43	4.1	A shipper is trucking export containers to Charleston because they can't find room on outgoing vessels. Why does MSC see Charleston with 8500 TEU ships as beneficial over Savannah under current conditions? Light loads imply not enough volume for both CHS and SAV calls.
45	Table 4-1	"Planned Depth is meaningless. P&G says use authorized depth
45	Footnote	The correct web address is www.ci-online.co.uk
47	Table 4-2	The definition of Panamax is a vessel that can transit the Canal. The Greater than Panamax Draft are defined in the footnote as including Panamax vessel, which seem incorrect.
47	Table 4-2	Total Panamax or larger ships is 2075, not 2805. The 43% seems to be correct.

Table 2-1: Specific Comments



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50	4.4	How does econ analysis account for arrival of LNG vessels delaying other vessels? Is LNG traffic and one mile safety zone figured into the HarborSym analysis? There is also a 90,000' or 1.5 hour restriction for loaded LNG vessels (Econ appendix P. 23, Sec. 2.6) On page 56, the report states that the clear radius is only 1 mile.
51		Surprising that only 20% moves by rail. GPA forecast accounts for rail movements at 25%. Bottom of page, at some point \$1 billion capital improvement plan should be defined, what does it entail?
52	4.5	Wastepaper weighs more than consumer goods so outgoing drafts sometime exceed incoming drafts. (When?) But the value of the cargo is extremely low. What is the ratio of empty/total in & out? Imports and exports should be treated separately throughout the study.
53	Table 4-7	Export TEU's always > import TEU's
53	Figure 4-2	Loaded Export TEU's < Import TEU's since about 2000. So, more and more room to put wastepaper and export drafts should not be controlling in the future.
53	4.5.1	Should discuss distribution centers in this section. Hinterland definition from Norfolk south; what about CHS as well? Prior reports had addressed CHS vs. Savannah.
54	4.6	Export boxes heavier, make sure forecasts keep balance between imports/exports, or some adjustment should be made in cost savings for both legs. Again, exports and imports should be treated separately. Claim that because < 12% of container transits greater than -38 ft proves carriers averse to tidal access. This does not mean that less than 12% was in fact constrained, because of over dredging, and vessels arriving above MLLW
55	Table 4-8	In 2007, some vessels transits draft deeper than the supposed 42 ft limit. Forty-two inbound vessels drafted between 42 and 43 ft. Based on the maximum practicable drafts in Table 35 of the Economics Analysis, all of these transits must be PPX vessels. The discussion on p. 56 implies that relatively few PPX vessels called on the port during part of that year. So, it seems possible that most PPX inbound transits are slightly greater than 42 ft. Does the model allow frequent drafts this deep w/o project?
56	1st para	Savannah Maritime Association has published Port of Savannah Industry Guidelines for Minimum Under-Keel Clearances, dated Feb 2009. These guidelines read as follows: (a) Four (4) feet for transits in the navigation channel between the sea buoy, across the Savannah Bar, through Jones Island range, USACE Station – 14, where the project depth of the channel decreases from 44 feet to 42 feet. (b) Two (2) feet for transits between Jones Island range and the point in the navigation channel which is adjacent to the facility of destination. Given these guidelines, underkeel assumptions used in the economic analysis seem to be incorrect.
58	4.8	Here, tidal range average is 6.8 ft with upper limit of 7.9 ft. On p. 56, it's 6.9 feet. Are economists and environmental scientists using different values?
69	5.2	Jasper County terminal was relevant in previous reports using much lower cargo forecasts. If uncertainty around Jasper County Terminal precludes it from the without-project condition, then GRR needs to demonstrate that Garder City plan can in fact accommodate all future growth assumed in the study.
70	Table 5-2	Unclear which ports assumed in the w/o project. Given that Jasper County does not meet the criteria for inclusion in the w/o project condition, how do these plans satisfy the criteria for inclusion in the without project, especially ten years into the future.



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70	5.3	Garden City capacity increases to 6.5 million TEU annually. Assumes berth productivity increase from 280 to 700 TEU's per berth foot.
71	5.4	Trade projections based on 2005-07 condition, pre-recession. These are the bubble years in world trade. Overall, world trade seems to be stabilized at about 20% of World GDP. There should be an evaluation of growth forecasts using such general indices as regional population growth, real income and GDF growth forecasts as a check for reasonableness.
71	5.4	"For example, major products destined for the Mediterranean are heavier pulp and kaolin clay whereas imports from the Far East involve lighter Manufactured goods and textiles. For each service, the historical average weight per TEU was calculated and used for this conversion." But as imports grow faster than exports, the average weight of export TEUs, including empties should decline.
74	Table 5-4 & 5-5	The weighted average from 2005-07 condition, is too short a time and weighing more heavily on 2007 uses this particular year to a large extent to establish the baseline forecast for the next 50 years. Use broader incises as mentioned in the comment above (p. 71).
76	Table 5-8	There should be total weighted growth rate given on this table of import metric tons and growth rates. NE Asia is the lions share; overall growth rates of 5-6% seem really high long tern with GDP growth in US nowhere near that. All tables showing growth rates on a yearly basis should also show the total growth rate for the period.
77 & 79	Table 5-10 & 5-14	This seems more reasonable than the projections in Table 5-8. Imports should follow a similar trend. We can only import so much. It is not reasonable to assume that imports can grow at a significantly higher rate than long-term GDP given the size of the US trade deficit.
78 & 80	Table 5-12 & 5-16	Total import tonnage area projected to increase by 80% in the 12 yrs from 2020 to 2032. This is preceded by a 73% growth rate in 10 years, which is somewhat explained by the enlargement of the Panama Canal and the change in destination from the west coast ports (LA/LB) to the east coast that is associated with this development.
		It seems that this rate of growth is assumed to continue without any competitive response by the west coast ports. What happens if they lower their terminal and inland transport rates? If west coast TEU throughput is impacted by the deepening project, NED benefits need to be adjusted downward to reflect that less to the west coast region.
		Continuing to assume dramatic compound rates of increased cargo flow well after the Panama Canal is enlarged seems more than suspect. The rate of growth should significantly decline after 2020.
80	Table 5-15	Are the values in this table short or metric tons? Either way, 5.67 tons per TEL is very light. Also, vessels departing thru the Panama Canal will be very light loaded with 67% empty containers.
		Avg. weights by imports and export routes. Do these change over time with the forecast? Loaded imports double while loaded exports triple by 2032.
81	Table 5-16	High export empties TEU volume, huge growth of imports 2020-2032.
84	Figure 5-4	The figure seems to be mislabeled as Panamax vessel calls. It should be labeled Post-Panamax vessel calls based on the text in the previous page.



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85		"The combination of assumptions and calculations used in the LFA are the determining factors for vessel deployment and vessel drafts used in the Transportation Cost Savings Model." These important assumptions and calculations should be done separately for imports and exports. This becomes more important the later in the study period as imports increase relative to exports and the near balance of today is lost.
87	Table 5-20	Unit costs are never defined. What is a unit? How were these calculated, and what are they based on. Whatever the units are, the costs need to be evaluated by direction so that they vary for exports and imports. This is not understandable. PPX1 most economical at 42 ft. PPX2 becomes more economical at 44 ft for only FE (Panama) ECUS. PPM2 most economical for all at 46 ft. This needs to be evaluated
88	Table 5-21	Why is Panama vessel mix constant for 44 to 48 ft? Seems like it would change at 45 ft based on Table 5-20.
90		Would like to see socio-economic profile of any neighborhoods near the Port. Use to consider social justice and potential health impacts.
91	Table 5-26	Does not take into account competing ports (HOU, NOL, MOB, CHS, and ORF) in determining true competitive market area.
92		Sea level rise projection seems to be based on political ideology instead of science. Using the historical rate as the most likely rates does not seem to meet the letter or spirit of EC 1165-2-211because they exclude global sea rise. May be overspending on wetland mitigation because salt intrusion will occur with or without a project. Decisions are made at the margin, and the optimal depth may well be sensitive to the incremental mitigation costs. Sea level rise would also reduce bridge clearances, and this issue does not
95	5.8	Seem to be addressed. CSS Georgia is removed in w/o project. This is inconsistent with including the cost of removal as a SHEP project cost and any harbor delays w/o project that are associated with the CSS Georgia.
97	6.2	There is only one study objective which is to reduce navigation transportation costs to and from the harbor. This hardly seems to be a balanced approach to problem solving given the environmental, social, and NED aspects of planning.
97	6.4	If the forecasted tonnage cannot be accommodated by the future landside developments described in the report, then the study is incomplete.
98	last line	Plans do not need to be consistent with state & local laws. ER 1105-2-100 2-3 c(1) states that plans "should be in compliance or include proposals for changes as appropriate."
100	6.5	Reducing under keel clearance requirement is a specific non-structural measure.
104	6.6.1	Underkeel clearance has been 2ft, not 4 ft, since at least 1996.
104		How are Savannah Harbor underkeel guidelines consistent with all the other harbors mentioned that have 3 ft clearances?
105		Revising the underkeel clearance established 14 yrs ago is made all too readily given the improvements in technology available since then.
106		By dismissing non-structural alternatives so readily, the study effectively does not give "equal consideration" of non-structural options as required by ER 1105-2-100 2-3 c(5).



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106		Industry standard 50% berth utilization is max capacity. Expectation is 58% at garden city in 2020 buildout. In addition, LNG vessel calls restrict berth access under any condition, so the industry standard may be too high to apply to Savannah.
106		Focusing on berth capacities, given the 9700' of berth at Garden City, annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per foot for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth. 700 TEU's per berth foot per year in 2020 not realistic and there is no basis for asserting that such capacity can be realized.
111	Table 6-1	Unit costs per mile for trail/truck should be included. There is no indication how these figures were developed.
	6.8.2	Alternative sites all dismissed.
115	Table 6-3	Many alternatives terminals seem competitive cost-wise with Garden City, if you include mitigation costs for Garden City that have increased over \$100 million since these costs were developed in 2005 as displayed in App. O of the EIS. Most, if not all, of that increase does not apply to downstream alternatives. Also, the dredging costs to Garden City have increased about another \$100,000 million and it is reasonable to assume that the cost increase for dredging to the downstream locations has increased less than that. We question the likelihood of GPA expanding the Garden City Terminal without additional channel depth. Terminal capacity analysis indicates berthing space is constrained and GPA improvements do not address this shortage of berthing space.
116	Table 6-4	Hurricanes and other weather events will affect all of these alternatives, not just the offshore terminal. It is reflective of the lack of risk assessment in the report that the potential for these events is ignored.
124	6.12.2	Why 464 ft for bottom channel width? 50+140+150+140+50 ft would be required. The 530' width should be reflected in costs. Does Harbor Sym assume a Panamax and Post-Panamax vessel can meet in the channel?
125		Turning basin at 1600' x 1600', why not have at least one step with interim design vessel at say 45' to measure channel/turning basin width requirements and costs?
128	Table 7-1	There should be a weighted average of SAV proportion of cargo for all trade routes. Looks like it should compute to low-mid 20% range.
128	7.1	There should be a table in this section showing total costs per voyage per route and vessel class
129	Table 7-2	What does '140\$ rr for PPX2' mean?
130	7.2	Are meeting area benefits calculated relative to no channel improvements? Should be incremental, after each channel deepening. Does HarborSym account for LNG vessel safety impacts, AlWW impacts, hurricane/weather impacts, etc.?
131		LNG transits increase to 80% of capacity by 2030. Don't they continue to increase beyond that? If so, then traffic delays should increase beyond 2032.
132	Table 7-6	Meeting area benefits go up, then down as depths increase. Benefits seem to decrease with increasing channel depth over 45'. But over 46 ft, there is no change in the number of PPX vessel transits and those are the only vessels that require the meeting areas. Why do benefits decrease? Should consider Long Island only early and Oglethorpe later in time.



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133		Tidal delay reductions should address the air draft constraint of 185' at the Tallmadge Memorial Bridge.	
134	Table 7-7	Tide Delay benefits increase by a factor of eleven over time. There will eventually be about one LNG transit per day. With all of these delays, is vessel transit capacity of the channel ever exceeded?	
135	Table 7-9	Is it appropriate to simply sum meeting area and tide delay benefits? Meeting areas decrease transit time, thus effectively increasing tidal windows.	
143	8.2.4	Monitoring of chloride in water, but what if it happens? Again, this is a missed opportunity to incorporate risk into the analysis.	
145	8.2.6	Without project assumes all cargo traffic will happen anyway. This assumption seems to reflect an inherent bias in the analysis.	
146	para 2	GPA claims there should not be a significant change in port operations. However, larger vessels will berth longer. The larger vessels will require more than "slightly longer time at the dock". There will be a substantial increase in berthside times. 8600 TEU vessels will take over 24 operating hours to complete a single berth call.	
146	para 4	Reference to multi port analysis and findings of increased overland costs would not overcome decreased waterborne transit costs to induce traffic to SAV. So, the least cost alternative is to always unload at the nearest port. By the same token, how can SAV compete with any closer port within their defined hinterland if this is the case?	
149	Fishery	Reallocate water from Corps lakes – what is the opportunity cost? Hasn't the SE had significant droughts recently?	
174	10.3.1	Cost include removal of CSS Georgia, but that is a w/o project condition. (p.95 Section 5.8)	
179	Table 10-4	Why do DO costs decrease from 44 to 45 ft, then increase at 47 ft?	
179	Table 10-4	Spend \$191 million to mitigate the first foot, then \$30 million to mitigate the nex 4 feet. Suspect mitigating for w/o project condition. Incremental costs are suspect.	
180	10.3.6	What are w/o project dredging costs? The without project condition is not fully defined.	
181	10.3.6	How is it that the bottom width narrows?	
181		Risk that O&M costs may be greater than estimated, which should increase the deeper they dredge into the sideslopes. This should all be reflected in a risk analysis.	
181		CSS Georgia O&M part of w/o project even though it is removed?	
181	Table 10-7	Why would outer harbor dredging increase every two feet, but not every foot depth increases? Doesn't that channel widen with depth?	
181	Table 10-7	DO O&M costs do not have the same trend as DO construction costs in Table 10-4. If construction costs the same at 44 & 47 ft, expect O&M costs to then be the same. According to Table 9-6, the capacity of the DO system at 47 ft is larger than at 44 ft.	
		Need to display current, without project O&M for comparison. It seems that the cost of inner harbor dredging increases by \$2.7 million annually if the channel is deepened by 2 ft to 44 ft.	
		Acknowledgement of potential for increased costs due to using existing channel slopes for deeper channel is not accounted for in the table.	



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182	Table 10-8	Most of the O&M in this table is \$1,000 more than the O&M in Table 10-7.			
186	Table 11-2	Meeting areas optimize at 45 ft. No study of the effectiveness of 45 ft meeting areas with 47 ft channel. Simply assumed 47 ft meeting areas needed with 47 ft channel.			
192	Table 11-3	Air quality has become the defining problem at LA/LB. Basic question: doe the project induce vessel calls?			
195	Table 11-3	If no change in shipping volume, where do increased sales volumes, income and employment come from? What is sales volume? Are these figures annual?			
208	Table 11-3	Investment risk ignores the dependence of the b/c ratio on forecasts. How much will shipments need to increase to justify the project? In general, this table should present more quantification.			
		substantial transportation cost savings?			
	Table 11-3	This table is too long at about 20 pages. Should be separate tables for each letter, A thru F.			
214	Table 11-5	How is it legal to dredge 8 ft deeper than authorized project depth for advanced maintenance and allowable over depth?			
221	12.1.1	We are providing an analysis of the Garden City Terminal which determines that the capacity is constrained at about 3 million TEU's annually. This affects any without project design and NED benefit computation.			
222		Referred to map on page 1. What? Refers to DMCA 12 A&B, but no DMCA 12 B on the maps.			
	12.1.2	Sensitivity Analyses are difficult to follow with limited narrative. Better to display fewer scenarios more in depth, especially for meeting area and tide delays.			
223	Econ Analysis	There is an implied assumption that at some point there will be a need for additional terminal capacity during the lifetime of the project. Why aren't costs and benefits considered in the overall analysis using this assumption? The study period is 50 years, until 2065.			
226	12.4	There may be bridge clearance issues associated with sea level rise.			
240		Question no change in project purpose, as removal of CSS Georgia is mitigation of an existing project.			
241		Mentions continuing the existing advance maintenance features. Was there a cost analysis in the DMMP? Also mentions deepening container berths 4-7 at GPA. Is this a non-Federal, non-cost shared, but NED cost needed to realize the benefits?			
242	13.2	IDC is not a cost authorized by Congress. It is an opportunity cost of capital.			
245	Trans Cost	If 'increased reliability is expected to encourage carriers to assign more of thei large vessels to Savannah route services' ,would this have an impact on competing ports and the NED costs associated with their vessel costs?			
264	15	First cost is listed as Fed after cost-sharing. O&M is before cost-sharing.			
264	15	GPA responsible for 50% of excess O&M costs above those estimated for a 44 ft channel. This may relate to claim that O&M essentially will not increase. This should apply to DO O&M, also.			



2.4. Competition

There is nothing in the document that addresses the competition among Southeastern U.S. ports to provide docking facilities and services to the upcoming generation of very large ships that will be coming through the enlarged Panama Canal in approximately five years. This is a very important consideration for the Region's economic future. If one of the other key competitors (namely Norfolk, Miami or Jacksonville) beats an enlarged Savannah and/or new Jasper County port to the "punch," it will have an adverse effect not just on future economic growth but also on existing economic conditions.

2.5. Land Transportation as a Growth Limitation

There is no mention of the fact that at the current time one of the major inhibitors on expansion of the Port of Savannah is the road network (it is definitely NOT a system) that serves the port's operations. Trucks pulling the larger containers directly off the ships to the import distribution centers located within five miles of the port's gates have no choice but to travel on an old street and road network built to handle the residential and commercial traffic of at least 30 years ago. As a result, it is both inconvenient and unsafe for the trucks and also for the people who still live in the small homes along the streets. Passenger vs. freight conflicts are a problem.

As well, there are freight train grade crossings that hold up other both cars and commercial truck traffic near the port. The Savannah MPO reports that they are working on plans to alleviate some of the problems, but the investment that will be required is extremely large, and no commitments for funding have been made at any level of government. In addition to the financial costs, adding new highways will result in residential and small commercial dislocation and relocation, which will likely be considered environmental justice issues.

The economic "Uncertainty" analysis is in report was more of a summary. Is there additional information on this? There was no economic and marketing justification material in the report, nor were sources of data or assumptions used in their sensitivity analyses identified.



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3. DEIS Economic Appendix Comments

3.1. Introduction

The following comments are structured on the Evaluation Procedures for Deep Draft Navigation contained in the Corps' Planning Guidance Notebook (PGN) (ER 1105-2-100). The nine steps described in the PGN are evaluated below:

Step 1 - Determine the Economic Study Area.

- Step 2 Identify Types and Volumes of Commodity Flow.
- Step 3 Project Waterborne Commerce.

Step 4 - Determine Vessel Fleet Composition and Cost.

Step 5 - Determine Current Cost of Commodity Movements.

Step 6 - Determine Current Cost of Alternative Movement.

Step 7 - Determine Future Cost of Commodity Movements.

Step 8 - Determine Use of Harbor and Channel With- and Without-Project.

Step 9 - Compute NED Benefits.

3.2. Determining the Economic Study Area

This is Step 1. The hinterland definition does not account for Gulf ports. A competitive analysis for areas claimed, such as Jackson, MS, Birmingham, AL, New Orleans, LA, and Charleston, SC should be done. "The final delineation of the economic study are for a given improvement, should adequately discuss the trade area relative to adjacent ports" (ER 1105-2-100)

There is a focus in the DEIS on discussing the growth of local warehousing that serves as distribution centers in the immediate counties adjacent to Savannah Harbor. Given the identification of the study hinterland covering the Southeast US, distribution centers sited close to major retail destinations should result in major population centers in the Southeast US being the DC hubs within the study area. The focus on warehouse availability adjacent to Savannah appears to be a bias in assessing the economic impacts of SHEP. Centering DC clusters further away from Savannah will open the potential for competing ports in the Gulf/and Southeast US for these markets.

3.3. Identify Types and Volumes of Commodity Flow

This is Step 2. Some portion of the existing foreign waterborne commerce generated to and from the Savannah hinterland is currently moving via West Coast US ports. A significant rational for harbor expansion projects based on currently ongoing expansion work at the Panama Canal is anticipated to result in a shift from movements via US West Coast ports to all water services between the Far East and the U.S. East Coast.



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This shift is potentially impacted by canal transit tariffs that could significantly rise after the completion of the canal improvements. There needs to be a sensitivity analysis performed to assess the relative routing advantages of all water versus ongoing use of US West Coast ports.

There is an ongoing competition between East Coast ports for additional through-put expected as a result of the Panama Canal expansion. The only way to effectively allocate throughput for a given port is to analyze the region as a whole. Then, and only then, can "a study should be made of various alternatives for the existing traffic and of new traffic susceptible to diversion from alternative harbors or other modes of transportation" be made. "In determining the likelihood of prospective commerce, particular attention should be given to alternative competitive harbors in the case of new movements and to hinterland traffic." (ER 1105-2-100)

The NED analysis is based on no change in tonnage, origin, or destination of existing cargo trends. Thus the transportation cost savings benefits are based on the distances from origins to destinations. If there were only changes in destination, the transportation benefits would be much smaller. Accepting that cargo will divert via the Panama Canal to the East Coast regardless of a Corps project, the assumption that cost savings begin when a vessel sets sail from China is not valid. Given cargo is moving on these trade lanes defined in the commodity projections, a competitive port analysis should be the basis for transportation cost savings.

3.4. Project Waterborne Commerce

This is Step 3. The Corps' 2004 study projected a TEU volume of 3.5 million loaded TEUs for Savannah in 2030. The Corps 2007 Regional Port Analysis forecasts 2.5 million loaded TEUs for Savannah in 2030. The current forecast for Savannah for 2030 is 4.9 million loaded TEUs. There is no basis for such a huge increase in 3 years, unless there is consideration for impacts of the Panama Canal improvements. If this is the case, the overall impacts should account for any offsets in U S West Coast TEU traffic, and transportation costs to their ultimate destination need to be estimated for later calculating benefits.

There is no sensitivity analysis to account for any canal transit fees levied by Panama, and affects such fees may have on relative costs between US West Coast transits and U S East Coast transits for USEC FE cargoes.

Initially, Global Insight projected that imports would increase 80 percent from 2015 to 2028 (Table 16). These forecasts were adjusted downward based on a one-year "trend" from 2007 to 2008 (as shown in Table 21), before the global financial crisis. Then, the GI forecasts were extended just four more years to 2032, and imports are now expected to



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increase by 127 percent from 2015 to 2032 (Table 22). Why and how is higher growth rates factored into the revised forecasts?

Import containerized tonnage is expected to more than double from 2015 to 2032 (Table 22). Export containerized tonnage is expected to increase only about 50 percent during the same period (Table 24). Yet, the ratio of total loaded export TEUs to total loaded import TEUs is assumed to be about constant (Table 26) at 70 percent for the same period. Therefore, the average weight of an outbound TEU should decrease.

3.5. Determine Vessel Fleet Composition and Cost

This is Step 4. The analysis assumes that the equivalent of 25 percent of the PPX2 world fleet will be devoted to trade routes stopping at Savannah (Table 50). This seems to assume that Savannah will be one of the dominant world trade centers globally. There should be some kind of comparison to demonstrate that the largest container ships operating in 2030 will be most efficiently allocated to those trade routes as opposed to others, especially those not involving the USA, such as European trade with the Far East.

3.6. Determine Current Cost of Commodity Movements

This is Step 5. There is no effective analysis of commodity movements between one port to another within the hinterland market area for determining the potential for cargo diversions within US East Coast ports. Given assumptions in the study, each port that is closest in highway miles to a given hinterland destination should have all cargo allocated to that destination. International cargo traffic is based on a variety of factors, including adjacent markets to ports for immediate market access, comparative cost advantages to inland destinations, including both rail and truck. There is no comparative cost analysis for rail in the report, even though GPA claims the ICTF facilities at Garden City are expected to handle up to 25 percent of traffic in the future.

Also, ER 1105-2-100 seems to require analysis of observed vs. apparent deviations from underkeel clearance standards to address this problem in application of the guidance. The use of 4 ft, even though the local guidance is 2 ft, must be demonstrated with empirical data, not based on an a priori assumption. This is especially true because the prevailing clearance at other ports is repeated cited as 3 ft.

3.7. Determine Current Cost of Alternative Movement

This is Step 6. There was no attempt to "determine transportation costs prevailing at the time of the study for all tonnage identified in Step 2 for alternative movements" (ER 1105-2-100). These alternative movements include shifts from movements via U.S. West Coast ports to U.S. East Coast destinations via land bridge, to all water services between the Far East and the U.S. East Coast.



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3.8. Determine Future Cost of Commodity Movements

This is Step 7. We did not have access to, nor could we review the detailed calculations used. We believe that the average draft of an outgoing vessel will be less than incoming vessels in the future and this trend will become more pronounced over time. However, it appears that problems related to Table 26 affect the analysis and overstate the benefits associated with outgoing vessels because the analysis seems to carry forward existing average weights per TEU. This does not account for the increasing percentage of empty export containers that are missing from Table 26.

NED benefits for harbor deepening are based on design drafts. The load factor analysis in the report (sec. 3.4.4.1) does not account for the large proportion of empties that grow over time, due to increasing deficits in TEU export containers versus import containers. An attempt to utilize current weight and empty proportions given in Table 25 was used to show expected vessel utilization weights as a percentage of vessel weight capacity. The table below shows vessels will be significantly light loaded at Savannah, and resulting operating drafts are expected to be significantly shallower than design drafts. Table 25 shows a percent factor for empties by trade route and direction, which does not relate at all to empty percent, indicated in Table 33 of the load factor analysis. Any load factor analysis should be direction specific, as the variables vary substantially for export and import directions at most all US container ports.

The PDT had problems calibrating their model because vessels too often drafted more than design draft. They addressed this problem by reducing the amount of empties. It would seem that the proportion of empties should increase over time, decreasing the predicted drafts.

3.9. Use of Harbor and Channel With and Without Project

This is Step 8. There is an assumption under without project that commodity forecasts can be handled throughout the project period. There is no capacity analysis of existing and future facilities at Savannah to demonstrate forecasted cargo can be accommodated. This comment in more fully documented in the Terminal Capacity Analysis.

There is no detail provided regarding the HarborSym model used to assist in determining overall capacity and utilization factors in the analysis for Savannah Harbor.



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Route	TEU Weight (Table 25)	Empty (Table 25)	Avg. Cargo Weight Per Loaded TEU	Total TEU Cargo Weight	Total TEU Weight w/ Container (P. 41)	DWT (P. 51)	Gross Tonnage (P. 51)	TEU weight / Gross Tonnage = Load factor for vessel by weight
Panama export	10.72	67%	3.53	28,956	45,356	104,700	91,560	49.5%
Panama import	5.67	2%	5.53	45,355	61,755	104,700	91,560	67.4%
Suez export	10.02	21%	7.88	64,622	81,022	104,700	91,560	88.5%
Suez import	7.52	15%	6.40	52,470	68,870	104,700	91,560	75.2%
FE ECUS MED PEN export	10.52	41%	6.18	50,671	67,071	104,700	91,560	73.3%
FE ECUS MED PEN import	6.15	11%	5.45	44,691	61,091	104,700	91,560	66.7%
FE ECUS EU PEN export	9.8	16%	8.22	67,366	83,766	104,700	91,560	91.5%
FE ECUS EU PEN import	7.45	47%	3.96	32,445	48,845	104,700	91,560	53.3%

Table 3-1: Vessel Load Factor for 8200 TEU Design Vessel

3.10. Compute NED Benefits

This is Step 9. Over the life of the project, the volume of empty containers involved in vessel calls at Savannah is anticipated to increase significantly. From 2032-2065 the estimated volume of empty TEUs is over 1.5 million annually (loaded import TEUs – loaded export TEUs 3032, table 26), owing to much larger compounded growth rates of import volumes versus export volumes on most trade routes.



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Moving empty containers back to origins for loading is called repositioning. Global carriers factor these costs and lost revenue opportunities into their pricing structure to maintain sustainable revenues and profitability. Thus shippers pay indirectly for these costs. As the percentage of empty containers and the associated cost to return those increases, the only way to recoup that cost is to increase the rate charged for imports to that destination. Another way to look at this is that the cost to ship to Savannah will increase as the imbalance of trade increases. This trend, via the resultant price increases that can be reasonably expected, should retard the growth of trade.

The computation of NED benefits should account for the proportion of TEUs, which are part of the overall volume forecasts at Savannah. Empty container movements should not be counted in NED benefit computations.

Transportation cost savings are computed based on containers transiting the entire length of a given trade lane. There is no consideration that containers may be on or off loaded at an interim port, either due to an origin or destination along the route, or due to being transshipped at an interim port to a feeder vessel for final destination. These factors should be considered in applying the total vessel cost savings as NED benefits.

3.11. Regional Economic Development

The most widely accepted model for estimating regional development is IMPLAN. Instead, the report includes a regression analysis relating harbor tonnage vs. personal income. Why tonnage instead of TEUs? Regardless, the chosen model should then be applied to project construction related employment. Of the two models, only IMPLAN fits that purpose.

The NED analysis would lead to little or no local (RED) impact on income because shipping volume supposedly remains unchanged. The GRR seems to claim no RED impacts, but it also seems to imply there are significant RED benefits at the same time. The real issue of benefit incidence would be how are the cost saving distributed between foreign producers, foreign shippers, American merchants, and American consumers.

3.12. Risk Analysis

Lastly, the Appendix repeatedly refers to the Federal discount rate as the OMB mandated discount rate. There is no such OMB mandate. It's the law, specifically Section 80 of PL 93-251. Also, the Treasury Department calculates it, not OMB.



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Table 3-2:
Specific Comments

Page Section/Para.		ge Section/Para. Comment			
3		Intro paints a grim picture. Why wouldn't some of the cargo move to deeper ports without project if that would be cheaper?			
6		Who owns/uses these large distribution centers? It is more efficient to locate them near major population centers. Define 40 mile "trade radius", and what is the significance?			
7	2.2.1	A berth is a berth. Regardless of the number of operators, there is still a physical constraint to port facilities.			
12	footnote 7	The Corps should use a holistic approach to expanding/deepening port facilities in response to the deepening of the Panama Canal, not port-by-port analysis.			
13	last sentence	Attributing SAV cargo growth to GPA success in attracting DCs to greater SAV has limits, given slow population growth of greater SAV.			
20		The text seems to confuse vessel calls with the loading and unloading of cargo. It is typical for vessels to call seven days a week. However, it is not the practice to work weekends, especially Sundays. The Regional Port Analysis alludes to this			
22	Figure 17	There were 32 separate classes in Table 5. It is difficult to track the analysis when it moves to only these 5 classes.			
23	2.6	Clarify the loaded LNG clearance requirement, if 90,000 ft then pretty much the entire channel and entrance must be cleared until berthing or departure from the entry bar of LNG vessel. Is this accounted for in HarborSym?			
24	Table 7	What is the basis for the values, especially for PPX class, underkeel clearance? See main report page 104, 6.1.1(b), 2 ft underkeel?			
24	Figure 18	42 ft channel provides 42 ft of depth 94% of the time, not 100%. What's this about, especially with overdredging and advanced maintenance?			
25	last sentence	Panama Canal max draft currently 39.5 ft, not 38.5 ft. (ACP Notice N-1-2007)			
27	last para	Statement that transport of empties causes problems with channel limitations doesn't hold water. Empties are lighter, only if exports nearly match imports is this true. The "problems" caused by empties as they relate to channel depth constraints does not seem to make sense.			
29		"The carriers emphasized repeatedly that East Coast ports would need to be able to receive loaded Post Panamax vessels upon Panama Canal expansion or risk losing services to ports which can accommodate this traffic." How does this compare the without project assumption that Garden City will not lose traffic?			
30	3.3.1.1	Using 2005-07 for the baseline, weighted toward 07, is not representative. At the top of the bubble. The data should be independently validated, GPA as sole data source has a vested interest in the project. What about waterborne commerce stats?			
30	last para	Why is furniture the leading import commodity? If so, these particle board pieces are heavy. Why are import TEU's far east so light (5.67 tons)?			
32	Table 12	Metric tons exported thru (Panama) greatly exceed imports, yet empties compose 67% in Table 25.			
32	3.3.2	Trade forecasts for what? How were they allocating total imports and exports between various harbors?			



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34	Table 14	Does putting Canada, Caribbean, Central America into NE Asia region skew the analysis in favor of Panama crossings? There is plenty of Canadian shipping thru the St Lawrence Seaway that has nothing to do with Panama.
34	Table 14	Egypt would make more sense in Mediterranean than SE Asia.
35	Table 15	Half of the Imported TEUs from China. How long is this trend expected to continue? What if currency imbalances are corrected? This may sound like the macroeconomic question for the ages, but it must someday be addressed. As the K/L ratio increases in China and India, the trade advantage from lower wages will diminish.
36		"The fastest growth will take place in developing countries." Fastest growth in NE Asia and slowest is with Africa. However, it seems likely that Africa may well host the next generation of low cost factories.
36-38	Tables 16 & 19	Table 16 shows imports increasing by 80 % from 2015 to 2028. Table 19 shows exports increasing 38% during the same period. On page 38 is says "the rate of change in exports is slightly lower than that of imports." Less than half the rate is not "slightly lower". All of these figures are by weight, which brings to question the claim that trade is balanced in the future.
	Tables 17 & 20	Should show overall total annual rate of change rather than just by trade lane
42	Table 26	50% increase in loaded TEU exports 2015-2032, 130% increase in loaded import TEUs 2015-2032. 87% total TEU increase including empties. MTs increase 63.2%. Since empties increase as a percentage of export totals, this should lighten export transit vessels and decrease draft requirements. This table is misleading. In order to balance TEU cargo flows including empties, for each year total inbound and outbound container counts should match. This table needs to be completely redone because the imbalance eventually reaches about 1.5 million TEUs annually for 2032 - 2064, or over 28% of all container movements at Savannah. Basic shipping 101; unless storing or off leasing containers locally, total loaded and empty TEUs import and export should equate.
41	Tables 22, 24, 25, 26	An analysis was done to substantiate the conversion from tonnage in the commodity forecasts to TEUs. The conversion appears correct. A further analysis was done to evaluate the weights of containers loaded, their average weights by service route and direction, and the percent of empties to determine how heavy vessels will be. Findings indicate vessels will be loaded from under 50% of weight capacity to under 92% of weight capacity of the design vessel. This means vessels will be utilizing far less than vessel design drafts in transits within Savannah Harbor. This should be accounted for in NED benefit calculations.
41		Empty to loaded TEUs by route should change over time.
	Table 25	refer back to Table 12
45	2nd para	How long can the US continue to grow imports that exceed exports? This relates to commodity projections and the assumption that imports continue to grow unabated.
46	Table 27	Have mercy on the reader and list the actual drafts. Why not use a numeric code instead of an alpha code?
53	Figure 26	Regression equations using natural logs almost always have an extremely high R2, so the correlation may be relatively meaningless.
54	Figures 26 & 27	These Figures prove nothing more than the intuitively obvious that you need more boats to move more containers. However, this study is based on using bigger boats. How are these figures incorporated into the study?



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57	Figure 28	The forecast estimates about 900 PPX2 vessel calls in 2025, with most (600+) going to SE Asia thru the Panama Canal or the Far East thru the Suez. A round trip on either route takes about 8 weeks. That represents equivalent of the full-time use of about 90 PPX2 vessels on these two routes alone, or over 15 %. Overall, it seems that more than 20% of the PPX2 world fleet is expected to be devoted to trade routes that include Savannah. For this to be a reasonable assumption, the GRR should demonstrate that carriers will deploy so many such vessels in these services based on cost efficiency relative to other routes throughout the world.
55		The correct presentation of the equation should be: y = 0.3621 x + 105,718 TEU's Units are often omitted from equations/calculations (eg. box on p. 56) which makes following the long equations (eg. box on p. 56) which
58	Table 31	This is almost completely static. Hard to believe no sourcing shifts over the next 50 years. The sensitivity analysis is focused on absolute growth rates, but never addresses sourcing shifts.
62	Table 33	FE (Panama) route has 8.74% empties, while table 25 shows 67% empties for export to FE (Panama). The entire study should be consistent in applying directional analysis. TEU weights, vessel load factors are very different import/export. Panama route has lowest Tons/TEU. Trade with S. America has minimum % empty of 30.24%, which is highest by far and yet the Tons/TEU is the highest.
62-63	3.4.4.2	The PDT assumes that vessels would load to their Max Practical Load Draft. Given the volume of empties and average tons per container previously provided, this is not the case. Vessels cube out before reaching MPLD.
67	Table 35	The sailing draft columns seem to be channel depths, but why would they vary by route? Why is max sailing draft 42.8 for ppx1 and 42.7 for ppx2 at 42 and both increase at 44 ft? What is the rational for different Max Practicable Sailing Drafts for the PPX1 and PPX2 well before the channel depths at which the maximum MPSD? An example in the text might be helpful to validate the calculation.
68	Table 37	Is it appropriate to look at costs per ton instead of cost per container? Step 5 - Determine Current Cost of Commodity Movements of ER 1105-2- 100 seems to also require that costs include transit fees at the Panama Canal. Are these fees, which are \$72 per TEU transit, included in the unit costs?
69		It would seem that PPX2 vessels would be assigned to the most efficient routes in the world. Where are those? Analysis starts the PPX2 at 44 ft channel. The PPX2 becomes most efficient on the Panama Route at a channel depth less than any other route. Why? Need to explain.
70		"Upon further discussions with the PDT and reviewers, the PDT changed their assumptions slightly by applying a 140 percent replacement ratio of PPX1 vessels.' 140 % does not seem to be a slight change. What is this adjustment, as opposed to say 120%, based on? It seems odd that the adjustment is only from PPX2 to PPX1 vessels at 42 ft. This narrative seems unclear and leaves the adjustment seemingly arbitrary.
71	Table 39	What does the 140% replacement ratio mean? In the w/o project condition, (42 ft), w/ no PPX1 vessels, the PPX2 vessels are increased by 5% in 2015 to 24% in 2032. Also, the only difference between the adjustment and no adjustment at 48 ft is 1 fewer PPX1 in 2020 and one fewer PPX2 in 2025.
70	Table 38	Why are there 279 PPX2 vessels at 44 ft in 2020 and only 276 at 45 and 276 in Table 39? Looks like a typo.



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72		At certain depths it becomes economically advantageous to switch from a PPX1 vessel to a PPX2 vessel. The number of PPX calls that was predicted by MSI for its unconstrained channel could then be applied. (For the FE (Panama)-ECUS example, once the channel depth reached 44 feet, PPX2 vessels were deployed at Savannah.
72	Table 41	Comparing table 41 with table 25 P. 42, FE trade looks like about 1300 import TEUs per PPX1 Call and 1800 TEUs per PPX2 call at -48'. Import only. Why no such analysis of exports? Why show Gulf when benefits primarily to Panama and Suez services?
72		The residual forecasted tonnages left after allocation to the Sub-Panamax and PPX vessel classes were then allocated to the Panamax fleet. The number of vessel calls required by this class was based on historical averages of Savannah's share of vessel capacity for the Panamax vessel class." These statements seem to contradict themselves. How does the residual tonnage magically match the historic share?
73	Table 42	Sums are often off by one. Net savings between 46 ft and 47 ft is 0 PX voyage in 2015 (after correcting math), 5 PX in 2020, 9 PX in 2025 (after correcting math), and 11 PX voyages in 2032.
74 - 75	Assumptions	 Not an assumption, but a fact. Question the need for 4+ ft of underkeel clearance. Avg. weight per container should include empties and differentiate between imports and exports. Vessels exceed MPD 85% of time? This should be substantiated by specific examples, as this assumption is critical to determining appropriate drafts for vessels in transit. Does final comment mean that rerouting cost savings exist and benefit model somewhat overstates benefits by not allowing rerouting w/o a project? Under the without project cargo is likely to be rerouted to Charleston and Jacksonville. Likely in the with project condition, cargo would be routed to Savannah from Charleston and Jacksonville. This should be considered when computing benefits. Also, historic growth rates at SAV have been affected by labor lockout on W Coast in 2003, which has already given impetus for shift to SE US ports. Hinterlands are not unique to a given port, especially in SE where CHS is less than 100 miles away and has rail/hiokway access as well.
80	Table 49	This table seems to be a duplicate of Table 42.
81	Table 50	The % World Fleet looks very high (sometimes 25%) for PPX2 vessels in the out years. At 42 ft, 32% share of PPX1 also looks very significant.
85	Box	"a certain share of each vessel's cargo was exclusive to Savannah." Yes, but how much of the cargo to Savannah is "exclusive to Savannah"? Some could have just as easily gone to Charleston.
85	Equation 3	The equation is used to calculate Savannah fraction of cargo, but it is not done separately for imports and exports as is appropriate.
86	Table 56	All of the cargo does not go the entire length of the voyage because of interim port calls en route. There should be a factor applied to account for cargo with origins or destinations other than the terminus nodes of the vessels' routes.
108	Table 76	Just a 1% reduction in the commodity growth reduces vessel cost savings benefits by \$30 million (almost 30%). Also, a 1% increase adds fewer benefits than a 1% decrease. So, the economic analysis does not seem to be symmetrically sensitive to the commodity forecast.
114	Table 82	A 25% reduction in PPX calls reduces benefits even more than a 1% decline in commodity growth.
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115	5,4.2.	Actually, the most successful greening initiative to date seems to be the slowing of vessel cruising speeds to save fuel and reduce emissions.
124	5.4.6	No growth scenario. Vessels transportation cost savings benefits decline by more than half. While the b/c ratio is over 4 for the project as a whole and justification of a project is not sensitive to the forecast, the size of the optimal plan certainly is. The NED plan is sensitive to the assumption that the forecasted commodities will move through SAV, regardless of the actual Garden City capacity.
130		"overall results of the sensitivity analyses confirm that there is a strong likelihood that improvements to Savannah Harbor are well justified economically and that the NED plan for Savannah Harbor is 47 feet." Disagree. There is no discussion of the relative likelihood of these sensitivity scenarios. The discuss focuses on the overall B/C ratio and the relevant discussion should be on the optimal channel depth.
		The sensitivity analysis does not conform to the requirements of ER 1105-2- 100 E-10.e. (4)(b) to consider alternative user fees. Total TEUs in the future rely on cargo moving from west coast to east coast destinations after the Panama Canal is enlarged. However, as stated in the NYT (12 Dec 2010), "Officials in Panama are also expected to charge higher tolls for the canal to pay off the national loan that is financing the expansion. Those costs to shippers could offset potential savings in improved logistics."
134	Figure 34	What units correspond to the Y-axis? They appear to be seconds, which seems an unimaginable level of detail. This model estimates the number of seconds? If so, then most iterations are within a minute of each other. The discussion of the Harbor Sym model does not list all specific variables or their distributions. If indeed the output variable is seconds, the average vessel is in the system just under 35 hours. This computes, based upon 2032 vessel calls to just Garden City (over 3000) This would put 12 vessels in the system every moment of every day on average trying to use only 9 berths at Garden City. If the outputs are measured in hours, hours of vessel time in harbor? Transiting channel? For what year? With or without which meeting areas?
135	6.2.1	"The Pilots indicated that they currently "can meet all vessel classes using the harbor now including two post Panamax vessels". Does the model ever allow vessels to meet w/o project? If not, it overestimates benefits.
136	Para, 4	Do LNG vessel restraints account for 90,000' clearance as required? What about advance shutdown of channel in advance of LNG arrivals/departures to insure safety range of vessels? Berthing duration assumptions are crucial for terminal capacity analysis.
137	6.2.1.2 & 6.2.1.3	Why does one meeting area need to be 4,000 ft long and the other 8,000 ft long?
138		The bigger the ship, the longer time it spends at the dock. Container fleet averages may be 16 hours currently, but they will increase significantly with larger vessels. The 16 hours claimed needs to be substantiated.
139	Table 103	Calls to the LNG terminal forecasted to increase from 1 every 3 days to 1 every other day. Each vessel stop involves two 4 hr periods of an essentially closed the harbor. In the future, that's 4 hrs a day that the harbor will be closed to other traffic. Text notes that the number of LNG vessel calls may reach 200 annually.



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140	General Cargo	Why end the growth in 2030 and not 2065? Harbor Sym should have growth beyond 2030 inputted. This anticipates about 10 vessel calls daily over and above the containers going to Garden City. In total, there will be about two transits an hour for each hour the channel is not closed due to LNG movements. One would expect more of the unexpected and more variability in the system time than illustrated in Figure 34, and therefore we also question whether only 50 iterations is sufficient. Given 3000 container calls to Garden City in 2030, 3000 general cargo calls in 2030, and 200 LNG calls in 2030, a total of 6200 vessel calls equates to about 35 vessel transits daily at Savannah Harbor, not including traffic on the Intercoastal Waterway.
140	6.2.3	What is the purpose of analyzing observed sailing drafts limited to tide delay and meeting areas? Assume it also relates to the vessel cost savings.
141	Table 105	By definition, a Panamax vessel can only draft 39.5 feet. Panamax vessels are designed to transit the canal under loaded conditions at this draft. To claim that Panamax drafts significantly greater that this depth limitation does not make sense.
141	Data Set	Why would this be sensitive data?
143	Table 108	There is no obvious reason why the Panamax sailing drafts below 38 ft would change as channel depths increase. These are unaffected by the channel constraint. Those are 86% of traffic at Savannah and 67% elsewhere. The historical data in Table 105 indicates about 2100 Panamax Vessel transits annually in or out of Garden City. Then, Table 106 relies on a subset of data covering only two carriers responsible for only about 300 transits (?) annually. The smaller subset represents a significantly lower percentage of Panamax vessels sailing at or below 38 ft. This equation makes little sense. Other Harbors Panamax /Some Savannah Panamax * All Savannah Panamax = Other Harbors Panamax * All Savannah Panamax = Future Savannah Panamax It would make more sense to hold the percentage of Panamax vessels drafting at or below 38 ft constant as channel depth increases. Then, that percentage may decrease as more Panamax vessels are expected to arrive over the time. This would have been an ideal assumption for sensitivity testing.
145	Equation	This equation could not be understood. However, the net effect seems to be directly using the percentages from Table 111 for all drafts greater than 40 ft for a 45 ft channel. This makes sense and no-one should care about shallower drafts for that depth of channel. So, is this methodology, applying world-wide sailing draft distributions, used throughout the spectrum of alternative channel depths considered?
148	Underkeel	Says from IWR with Pilots assistance. Main report says used assertions from the Pilots. What input did IWR have to this assumption?
151	Transit Costs	This model, unlike the vessel cost model, is run for 2030.
136	Meeting Area Alts	There seem to be 7 existing turning basins. Can these ever be used as meeting areas?
152	Tables	These tables need more descriptive titles. For 135 LNG & Panamax, why do avg. transit costs go down from 2015 to 2020 and up for other vessels? The costs are transit costs and they are multiplied by the number of calls. Is there a misnomer, or should these values be doubled to reflect transits instead of calls?

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154	Annual Benefits	Meeting area benefits are at FY2010 costs. Report does not seem to mention the price level that Transportation costs savings were estimated at. All tables displaying benefits should always display price levels and, if applicable, the discount rate.		
155		Meeting area costs are at Oct 09 price levels. So, FY 10 means Oct 09?		
155	Table 124	Why do the meeting area benefits go down after 2030? Why does the ratio of benefits for two areas to the sum of benefits for individual areas steadily decline from 2016 to 2030? See Meeting Area Benefits table below.		
156	Table 126	The incremental costs do not seem intuitive because they have no consistent trend. The same can be said about O&M in Table 127.		
		Incremental Cost Of Meeting Areas		
		45 ft \$278,253		
		46 ft \$159,339		
		47 ft \$413,956		
	the second s	48 ft \$389,723		
157	6.3	In modern times, ships should know well in advance when they can take		
	Tide Delay	advantage of the tide. Then they can slow to economic speed from service speed (Table 115) while in transit to minimize the cost of tide delays. This seems especially important for the PPXs which represent well over half the benefits in every decade.		
159 - 163	Tables	Why are benefits so often negative for the LNG vessels?		
165	Cumulative Benefits	Do meeting area benefits assume tide delay? Do tide delay benefits assume cannot meet? If the answer to both is yes, you can't sum them. The must be done incrementally.		
172	Multiport Analysis	This should include a discussion of distribution centers		
174	8.1	RED is limited to the entire State of Georgia while South Carolina is on the other side of the river.		
174	8.2	"This relationship should not be considered as the impact of traffic on income because the model does not explicitly reveal the causal relation." I the same amount of tonnage moves with or without project, then there see to be no RED benefit. If delays are reduced, then local pilot hours will		



Yr	Long Island	Oglethorpe	Long Island/ Oglethorpe	LI&O (LI +0)
2015	7,699	20,861	24,792	87%
2016	57,150	63,305	105,597	88%
2017	106,601	105,748	186,403	88%
2018	156,051	148,192	267,209	88%
2019	205,502	190,636	348,015	88%
2020	254,953	233,079	428,821	88%
2021	306,608	274,069	501,972	86%
2022	358,263	315,058	575,123	85%
2023	409,918	356,047	648,274	85%
2024	461,573	397,037	721,426	84%
2025	513,228	438,026	794,577	84%
2026	604,649	515,518	917,184	82%
2027	696,070	593,010	1,039,791	81%
2028	787,491	670,502	1,162,398	80%
2029	878,912	747,995	1,285,005	79%
2030	970,333	825,487	1,407,612	78%
2031	916,739	730,351	1,336,737	81%
2032	863,144	635,215	1,265,863	84%

Table 3-3: Meeting Area Benefits (\$) (RE: Comment on p. 155, Table 124)

3.13. Other Comments on the DEIS Economics Appendix

The Corps Study explores the impact of port operations in Savannah, however the methodology is weak and the region of study is improperly defined. Although the report does include a brief discussion of planned port improvements, it does not provide insights or analyses with respect to the stimulative economic impact of construction and equipping of new port facilities that have been planned by the Georgia Ports Authority (GPA) in connection with the Savannah dredging project.

An impact report addressing Savannah Port operations should include the impact upon Chatham County (GA) and its surrounding communities, including those in South Carolina. Further, and as an extension to the work done by Wilber Smith, a separate and distinct report should be generated to understand the regional impact of a large capital investment like the proposed Savannah dredging project.



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On the cover of the report by the US Army Corps of Engineers it is explicitly stated that the expansion project is in Chatham County, Georgia and Jasper County, South Carolina. However, the report ignores any economic impact that would occur in South Carolina, thereby telling me that the economic analysis is seriously flawed.

The content is primarily centered on shipping and the arguments for expanding the port to capture additional cargo demand. The exception is Chapter 8, Regional Economic Impact Analysis. Here, the authors make an attempt to model the impact of operations solely within Georgia and some of its counties. The omission of South Carolina and its counties (particularly Jasper) from the analysis makes no sense if part of the capital improvements associated with the dredging project will be located in Jasper County, South Carolina. Moreover, the inadequate regional definition is not the only problem with the Corp's assessment.

The Corp's methodology uses a multivariate least-squares regression analysis to forecast impacts. It argues that additional tonnage at the port should generate additional income. While there is correlation with the activity, it is difficult to reach a reasonable conclusion about impacts in this manner due to the oversimplification that is inherent in the authors' approach. Realistically, the growth of income (or Domestic Product) should be highly correlated with additional tonnage but with variations that reflect local conditions, such as workforce make-up, availability of transportation and the presence or lack thereof of certain industries. Thus, an increase in tonnage may or may not have an impact upon the state or substate areas. The economic impacts of a project will be determined by the mix of activity within a study area – which is the reason most economists use an input-output model such as IMPLAN to measure operational impacts.

The regional impact in the Corps study is defined for Chatham and its surrounding counties in Georgia. There is an inner ring of Chatham's Contiguous neighbors (Effingham, Bryan, and Liberty) and an outer ring of the seven counties contiguous to the inner ring (Bulloch, Evans, MacIntosh, Long, Tattnall, Candler, and Screven). It is interesting that the Corps would omit the South Carolina County that is contiguous to Chatham to the north, Jasper. Even though there is a river between the land masses, there are bridges that provide good access for transportation of people and goods between Savannah and Chatham County, Georgia, on one side of the Savannah River and Jasper County and other South Carolina points of origin and destinations, on the other. Moreover, from a statistical point of view, it has been shown that Beaufort County (Jasper County's northern neighbor) experiences a greater employment impact from the Port of Savannah home (Chatham County) than six of the Georgia counties in Savannah's "outer ring," so there is no methodologically-sound argument for omitting Beaufort from the Corp's analysis either. In fact, given the commuting pattern data mentioned earlier, one could easily argue to include two other South Carolina counties, Hampton and Colleton, in the Corp's report. It is noteworthy that Standard & Poor's cites the



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importance of the Savannah economy to the credit of Jasper County in its rationale for the ratings of Jasper's bonds (Standard & Poor's).

Summary and Conclusion

From this economist's point of view, the inherent weaknesses of data, scope and analytical focus contained in the report make it impossible to obtain a reasonable understanding of the economic impact of port operations at Savannah on the affected communities from a reading of either document. The Corps Study has not done an adequate job of assessing the operational economic impacts of the Savannah Port or the construction and installation-related economic impacts of the planned dredging-dependent port facilities improvements at Savannah.

The Corps Study makes an attempt to look at the regional impact of the dredging project. However, the methodology is weak and that the regional definition is inappropriate – especially given the fact that the Savannah Port expansion will physically affect Jasper County. Additionally, any impact model should include the impacts of capital investment. Although Section 3 of the Corps Study contains a description of planned improvements that go hand-in hand with the proposed dredging project, there is no discussion of the stimulative economic impact of such investments in that document or the impact on the tax bases of the impacted South Carolina communities.

With respect to South Carolina and Jasper County, the Savannah Port operations currently have an important economic impact upon these areas. While the report does not address these impacts, guidance as to what could be achieved in one or more thorough studies of the economic impact of the Savannah Port dredging project and port expansion can be seen in a number regional economic impact studies that are readily available in the public domain. A common feature of these reports is that they credibly demonstrate that the affect of expansion by a large employer upon a contiguous region would be substantial. Additionally, many of the data reviewed indicate that a major construction project should have a substantial stimulative impact upon the construction industry in both Jasper and Chatham Counties - even though these neighbors are in two different states. And, given the current depressed state of the construction industry, the dredging project should be a godsend for the unemployed/underemployed construction workers, whose services can be expected to be required in connection with the construction and installation of the improvements listed in Chapter 8 of the Corps Study. The extent of the impacts discussed here can only be measured within the framework of a properly defined economic impact study. This has not been under taken.



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This analysis evaluates the assumed capacity of Garden City Terminal to determine baseline conditions under the Without Project condition. The Without Project condition at Savannah Harbor relies on several assumptions to define the baseline case, under which NED impacts as a result of improvements to the navigation features of the Savannah River up to Garden City Container Terminal and the Kings Island Turning Basin are determined.

These assumptions include:

- A cargo/container movement forecast for Savannah of 6.5 million TEUs in 2032.
- A terminal capacity at Garden City Container Terminal of 6.5 million TEUs.
- · Flat lining of NED benefits past 2032 after reaching capacity at the terminal.
- No other container terminals will be developed at Savannah.

The IWR NED Deep Draft Navigation Manual (p. 49) states "Terminal capacity is, at best, an estimate. Individual estimates may be biased for competitive reasons. Therefore, it is advisable to supplement terminal operator interviews with comparative estimates based on the criteria of an independent authority. The approximate annual throughput of cargo at any or all facilities may be obtained by inquiry. For relevant commodities, it will be necessary to account for actual quantities through specific terminals in order to have an accurate basis for computing benefits."

The physical limits of Garden City Terminal, after the anticipated capital improvement plan being implemented by the Georgia Port Authority (GPA), include the following. (p. 70 General Reevaluation Report)

•	1200 acres	 RTG operating mode
•	9700' berth	33 container cranes
•	560 CY (container yard) acres	 169 rubber tire gantry cranes
•	Mason ITCF (NS rail yards)	 Chatham Yard ITCF (CSX rail yard)

To perform a capacity analysis of the Garden City Terminal facility, we apply the methodology from Improving Marine Container Terminal Productivity: Development Of Productivity Measures, Proposed Sources Of Data, And Initial Collection Of Data From



Proposed Sources prepared by The Tioga Group, Inc. for the Cargo Handling Cooperative Program, U. S. Maritime Administration, U. S. Department of Transportation, July 8, 2010 (hereafter referred to as the MARAD report).

The MARAD report analyses the performance of major US container ports for the year 2008. It then applies a series of measurements of performance to come up with an overall capacity assessment for each port. Using these measurements and updating the baseline calculation to account for the GPA capital improvement plan, an assessment of capacity at Garden City was performed to determine the ability of that facility to handle the 6.5 million TEUs.

In summary, Garden City appears to have:

- Land and landside operations to accommodate 6.5 million TEUs.
- Container crane capacity to accommodate 6.5 million TEUs.
- Berthing space to accommodate about 3 million TEUs

Focusing on berth capacities, the design vessel (PPX2) is 1,138 feet long. At that length, it would require a minimum berth length of about 1,300 feet. PPX1 vessels are also over 1,000 ft and require berths at least 1,100 long. By the year 2032, the economic analysis assumes that 700 PPX1 and 1,100 PPX2 vessels will call annually. On average, we assume these vessels will require 14 and 19 hrs at berth, respectively. One vessel has to move out of the way before another can use the berth. Our analysis assumes that time is only 3 hrs for turnaround, birth positioning, and the like between berthings. So each PPX1 berthing requires 17 hrs and each PPX2 berthing requires 22 hrs.

The MARAD report compares annual vessel calls per berth for 18 US harbors. Savannah has the highest rate in the nation at 184 per year. This is not surprising because the length of calls at berths increases as the size of vessels increases and the current channel limitations lead to smaller vessels calling at Savannah on average. So, no other harbor in the country has vessels calling on the typical berth every other day. The national average is 80 calls per berth annually.

The MARAD report also provides berth call utilization rates (Exhibit 64). Savannah has a current utilization rate of 71%. This is only exceeded by Charleston at 79%. The SHEP General Reevaluation Report states an industry standard for berth utilization of 50% (p.106) which reasonably corresponds to the national average of just fewer than 40%. However, the GRR bases utilization on 24/7 operation 365 days a year. This assumption is unrealistic and differs from the assumption used in the MARAD report because the GRR assumes the current utilization is only approximately 42 percent at Savannah



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instead of the more accurate 71 percent. This is a critical oversight in the GRR forecast of future terminal capacity.

The MARAD report provides performance rates for US ports in TEUs per berth (Exhibit 63). NY/NJ, Savannah and LA/LB all have throughput rates slightly exceeding 290,000 TEUs per berth. The national average is about 185,000 TEUs per berth. In order to process 6.5 million TEUs, each berth at Garden City would have to handle over 720,000 TEUs.

Annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per foot for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth. In order to meet the capacity given of 6.5 million TEUs, given the 9700 ft of berth at Garden City, annual TEU per foot of berth at Garden City would have to be 670.

In summary, The General Reevaluation Report should develop a scenario with a baseline capacity at Garden City of 3 million TEUs annually. Each sensitivity analysis should be run against this scenario. There should also be a scenario developed where the proposed Jasper County container facility is assumed to come on line at some point within the study period, likely about when the commodity forecasts exceed 3 million TEUs. If Jasper County is assumed to exist under a Without Project scenario, there should be a reanalysis of NED benefits to allocated benefits between each facility. This may lead to significant changes in the project features.

The following table provides the findings using the analysis within the MARAD report. The information for LA/LB and South Atlantic Ports is directly from that report. Some of the information for Savannah has been modified from the MARAD report to reflect the planned modification of Garden City Terminal.



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Table 4-1: Terminal Capacity Comparison Based on MARAD Report

(Exhibit 67 and 69)

Container Yard	Savannah 2015	LA/LB Harbors	S. Atlantic Ports
TEU	2,616,126	14,337,801	6,676,245
Gross Acres	1,200	2,757	3,839
CY Acres	560	1370	1,715
CY / Gross Acres Ratio	47%	50%	45%
Annual CY Capacity- TEU (CY TEU slots x 70 turns/slot x .8 max utilization factor)	8,153,600	16,341,696	20,545,280
Annual TEU/Gross Acre	2,180	5,201	1,739
Annual TEU/CY Acre	4,653	10,466	3,893
Est. CY TEU Slots	145,600	243,180	366,880
Avg, CY Slots/Acre- Density	261	178	214
Avg. Annual TEU/CY Slot (Turns)	20	59	18
CY Utilization	32%	88%	32%

Container Cranes

Cranes	33	133	77
Cranes per berth	3.7	2.7	1.8
Annual Crane Capacity - TEU	8,289,015	33,130,563	19,177,987
Annual TEU/Crane (2008)	79,278	107,803	86,704
Annual Moves/Crane (2008)	44,186	60,587	48,739
Annual Vessel Calls/Crane (2008)	50	21	61
Crane Utilization	32%	43%	35%



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Table 4-1 (continued) : Terminal Capacity Comparison Based on MARAD Report (Exhibit 67 and 69)

Berths and Vessels			
Berths	9	22	44
Berth Feet	9,693	57,053	40,108
Annual Vessel Calls	1,659	2,795	4,732
Annual Vessel Calls per Berth	184	57	108
Berth Utilization-Vessel Call Basis	71%	27%	52%
Annual TEU per Berth	290,681	292,608	151,733
Annual TEU/Foot of Berth	270	251	166
Average Vessel Capacity-TEU	4,093	4,534	3,466
Est. Max. Vessel Capacity-TEU	4,067	13,000	N/A
Avg. vs. Max. Vessel Capacity	101%	35%	N/A
Average TEU per Vessel	1,577	5,130	1,411
Avg. Vessel Ute %Discharge/Load	39%	113%	41%
Berth Capacity- Avg. Vessel Basis	2,952,012	52,282,959	14,247,368
Berth Utilization-Avg. Vessel Basis	89%	27%	47%
Avg. Discharge/Load per Max. Vessel	1,567	14,708	N/A
Berth Capacity-Max. Vessel Basis	2,933,090	149,907,029	N/A
Berth Utilization-Max. Vessel Basis	89%	10%	N/A



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Another way to analyze terminal capacity is to work backwards and take the vessel calls forecast for 2032 (projected capacity maximization) and apply berthing factors based on operational considerations. The following depicts this analysis. Assumptions include:

- 25% vessel utilization factor to allocate transportation cost savings per vessel (Table 56);
- 1.8 TEUs per container (based on recent AAPA statistics for Savannah);
- 30 crane moves per hour;
- 3 hour duration between vessel calls;
- · 300 day operating year to account for Sundays, holidays, weather shutdowns;
- · 20 hour day to account for shift changes, breaks, and work stoppages.

This essentially depicts a 24/7 port operation. The utilization factor refers to the proportion of a ships capacity on or off loaded at Savannah. The 3 hour duration between vessel calls is to account for vessel navigation of the Kings Island turning basin, positioning to berth, setup to work the vessel, setup to depart the vessel, depart the berth, navigate the turning basin, and exit past the berths at Garden City.

The table below incorporates these assumptions to estimate the total berth hours per class needed to handle the forecasted volume in 2032.



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Vessel Class	SPX	PX	PPX1	PPX2	Total
Calls in 2032 w/ 48 ft	633	1040	716	1078	3,467
TEU	3,000	4,500	6,200	8,200	
% Utilization of vessel for SAV	0.25	0.25	0.25	0.25	
On and off loading	2	2	2	2	
TEUs moved	1,500	2,250	3,100	4,100	
TEUs to crane movements conversion	1.8	1.8	1.8	1.8	
Container moves per vessel call	833.3	1250.0	1,722.2	2,277.8	
cranes per berth	3	3	4	4	
Cranes movements per hour	30	30	30	30	
Hours at berth	9.26	13.89	14.35	18.98	
Additional hours per call for berthing, prep, turning basin transit past berth	3	3	3	3	
Total berthing hours	12.26	16.89	17.35	21.98	
Total hours at berth per class	7,760	17,564	12,424	23,696	61,444

Table 4-2: Berth Hours per Vessel Class in 2032

The hours needed under the given assumptions would total 61,444. The TEU Capacity table on the next page shows that the fully developed Garden City terminal would have to operate at 114% of berth capacity to meet the requirements. At a berth occupancy ratio of 100%, capacity would be 5.7 million TEUs annually. At the more realistic 75% occupancy ratio, capacity would be 4.28 million TEUs annually. At the IWR recommended 50% occupancy ratio, capacity would be 2.86 million TEUs annually. In order to process 6.5 million TEUs, each berth would need to accommodate 385 vessels a year annually. That is more than one vessel a day. There is not a berth in the world that services one container vessel a day, regardless of local labor agreements or safety and environmental regulations.



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Total Louis of Louis All Succession	C4 444
Total nours at berth - all vessels	61,444
# berths	9
hours per berth	6,827
Total annual hours worked (300 days x 20 hours/day)	6000
Berth utilization rate to achieve 6.5 million TEUs	114%
TEU Capacity at 50% Berth utilization (6.5 million TEU vs. computed berth utilization rate)	2,856,235
TEU Capacity at 75% utilization rate (6.5 million TEU vs. computed berth utilization rate)	4,284,353
TEU Capacity at 100% berth utilization rate (6.5 million TEU vs. computed berth utilization rate)	5,712,471

Table 4-3: TEU Capacity

A third approach is to assume that Garden City's efficiency ultimately match the most efficient in the world. PSA Singapore Terminals is widely seen as the most efficient port operation in the world. Much of the activities at Singapore constitute transshipment activities, which lends too much higher throughput per facility than a tradition origin/destination hub. Applying the PSA output per berth to Savannah would yield an annual capacity of 4.83 million TEUs for the nine berths. Applying PSA output per berth foot results in a capacity at Savannah of 5.76 million TEUs annually. Even with applying PSA output for an entirely different operation, a proposed capacity of 6.5 million TEUs for Garden City appears to be an over-estimate.

Lastly, Drewry Publishing has recently published 'Container Terminal Capacity and Performance Benchmarks'. Using the optimum berth capacity of 1700 TEU annually per meter of berth, or 557 TEU per berth foot for a large terminal with extensive transshipping operations, a theoretical capacity of 5 million TEUs is determined. Garden City with its traditional origin/destination operations could not be expected to approach this figure.

An analysis of terminal capacity that fully accounts for the berth limitations at Garden City concludes that it is significantly less than the 6.5 million TEUs.



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760V2-MM-231-EC01, 760V2-MM-231-EC02

Comment: Several elements that were essential to the study were not made available as part of the review process. In particular, the specifications used in the HarborSym model to generate overall vessel flows within Savannah Harbor were not available. This makes it difficult to evaluate potential capacity limitations to shipping lanes within the project boundaries used to project tidal delay and meeting area benefits. The vessel capacity utilization analysis offered in the Economics Appendix appears incomplete, and does not look at utilization over time to account for the large percentages of empty containers expected in the future at Savannah, especially for the export transits within the Harbor.

Response: The draft reports contained the information needed to review the proposed action. The specifications used in the HarborSym analysis are provided in the Economic Appendix, Section 6 – Meeting Area and Tide Delay Analysis. This section describes how the estimated future fleet mix for Savannah Harbor was developed for the model runs as well.

The vessel capacity use analysis includes factors to account for the empty containers transported by the vessels.

760-MM-231-EC03, 760-MM-231-EC04, 760-MM-231-EC05, 760-MM-231-EC06

Comment: *The main findings of the review were the following:*

- Garden City Container Terminal under current and proposed configurations does not have the capacity to handle 6.5 million TEUs as claimed under the without project condition.
- There is no multi-port analysis offered in the report. It is a given that 6.5 million TEUs will come to Savannah by 2032. There is minimal consideration of competing ports.
- Transportation cost savings includes all costs per entire trade route. There is no consideration as 10 whether cargo la/from Savannah may have origins or destinations at interim ports along the trade route, or be transshipped along the way.
- There is the without project condition, and a series of incremental deepening alternatives offered. There is no non-structural or channel segment alternatives offered. There is no consideration for future facilities at other than Garden City Terminal.

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville (see GRR-Appendix A, Multiport Analysis. The findings indicated that if Savannah Harbor is deepened, there would be no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given that study's findings, the SHEP economic analysis was based on the project producing no substantial change in hinterland service area and no change in overall cargo without and with channel improvements at Savannah harbor. This basic conclusion is further supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

Page 84 of the Economics Appendix describes how a portion of the total voyage costs was allocated to Savannah.

The SHEP NEPA alternatives analysis considered potential options [structural/nonstructural] to address the navigation problems at the port. The measures included consideration of actions within the port and other South Atlantic ports. Alternative locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel were also considered. The SHEP NEPA alternatives analysis is found in several documents that are part of the SHEP record, including EIS Section 2.0, Need and Objective for Action; EIS Section 3.0, Alternatives; EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives); EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; GRR Appendix A, Economics; GRR Appendix A, Attachment 3 (Regional Port Analysis); GRR Appendix A, Attachment 5 (Multi-Port Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment 4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O); (6) analysis of six different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.4 - 3.15).

Although NEPA requires that all reasonable alternatives be evaluated, it does not require detailed study of options eliminated early in the planning process. As described in detail in Appendix O and summarized below, the EIS considered numerous potential alternative locations and methods [structural/nonstructural] to address the harbor's navigation problems [chiefly draft constraints].

Among other things, the Regional Port Analysis specifically evaluated current and projected port capacity, demand, and growth, and environmental impacts and constraints for other South Atlantic ports (Norfolk, VA; Wilmington, NC; Charleston, SC; Savannah, GA; and Jacksonville, FL) and a proposed Jasper County Marine Terminal (GRR, Appendix A, Attachment 3, Final Report, pp. 1-20). In addition, the analysis of a Jasper County Marine Terminal was rolled into a study of the potential costs and environmental impacts of locating the project at one of eight different sites along the Savannah River (four on the South Carolina side, four on the Georgia side) as described in EIS Sec. 3.0 and Appendix O.

As explained in several places in the GRR/EIS, including EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives), among the conclusions reached as a result of the Regional Port Analysis, the Multi-Port Analysis, and the analysis of eight alternative sites for the project along the Savannah River were the following: (1) no one port could accommodate all the growth in container volume expected in the region, (2) the major South Atlantic ports will experience much cargo growth from 2005 to 2050 such that improvements may be justified at all major South Atlantic ports, and (3) the proposed deepening of Savannah Harbor would not take business from another port because the shipping cost efficiencies would not outweigh the additional landside transportation costs (largely due to the longer distances from each port to and from population centers that are outside its primary service area), and (4) a Jasper County Marine Terminal would not be cost effective when compared to deepening to the existing Garden City Terminal based on the high cost involved (now estimated at \$4 billion including the cost of constructing the new transportation infrastructure that would have to be built), and the timing (Jasper does not exist at present and cannot be constructed in time to meet the growth in demand occurring through Savannah Harbor).

Management measures that had the potential to address these limitations [present/future] were evaluated based on technical, economic, and environmental considerations. The evaluations were conducted in accordance with criteria established by the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 1983) and the policies and procedures established by ER 1105-2-100, Planning Guidance Notebook [April 22, 2000].

The analyses conducted in these early stages of project formulation resulted in several conceptual alternatives being eliminated from further consideration. The District prepared a document that described this work and its conclusions (Formulation of Alternatives, May 2005, Appendix O). It was circulated to interested state/federal agencies as well as the public for review/comment. Four terminal locations were judged as having either MEDIUM or HIGH potential and were compared on their economics (including mitigation costs). When the landside development costs are included, deepening to the Garden City Terminal proved to be the most cost effective. The next site option was 45 percent more expensive. Therefore, deepening to the Garden City Terminal and the no-action (without project) alternative received detailed evaluations.

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760V2-MM-231-EC07

Comment: Commodity forecasts have increased significantly between the Corps 2004, 2007 and 2010 SHEP studies. While the Panama Canal improvements being undertaken may allow larger vessels to be deployed on certain services calling on Savannah, this should not affect the volumes of cargo handled at Savannah. To assume this is the case would mean an inducement to transfer cargo allocations from other ports, such as LNLB. Cargo forecasts should be measured against broader forecasts of economic activity, such as population growth, income levels and GDP growth for reasonableness. China is unlikely to be the lowest cost provider of goods 20 to 30 years hence. Their K/L ratio will be too high (forcing wages to rise) and their consumption will rise from less than 40% of their GDP toward the US rate of 70%. So~ there is uncertainty about the importer of tomorrow. A general assumption that Garden City Terminal can handle 6.5 million TEUs as the baseline for without project condition is not substantiated. A specific analysis of this terminal's capacity needs to be completed to determine appropriate volumes of cargo that can be handled without project." **Response:** The Corps made its commodity projections independent of the size of container vessel that may carry the goods.

Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. As described in GRR Section 5.3, GPA already has a 10-year capital improvement plan which includes equipment purchases and upgrades, transportation infrastructure improvements, and container area expansion to increase the Garden City Terminal's container throughput capacity to 6.5 million TEUs annually by 2020, regardless of whether the harbor is deepened. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC08

Comment: The assumption that Garden City will be expanded seems appropriate, however that without condition can change if another major facility opens downstream. Then, the expansion could be scaled back and those savings would be benefits to the new downstream facility. As the Garden City Terminal may not be able handle the forecasted future cargo, the report misses an opportunity to evaluate additional terminal locations. A terminal located well downstream of the Garden City might optimize at a depth deeper than Garden City which would reduce the need for environmental impacts and expensive mitigation.

Response: EISSection 3.0 and Appendix O contain the analysis the District performed of potential alternate terminal locations. The analysis concluded that the combined site development and dredging (and mitigation) costs for all other sites considered would exceed the dredging (and mitigation) costs for the Garden City Terminal location. No downriver site would have lower total site development, dredging and mitigation costs and environmental impacts than would deepening to the existing Garden City Terminal. This determination is supported by the Regional Port Analysis, which included evaluation of the costs and environmental impacts of deepening or constructing various South Atlantic ports, including a proposed Jasper County Marine Terminal. As noted in various responses, according to the Jasper Ocean Terminal Joint Project Office, developing a Jasper County Marine Terminal at its currently proposed site would cost more than \$4 billion, a large cost which must be taken into account.

760V2-MM-231-EC09

Comment: The multi-port analysis docs not account for competing Gulf ports of Houston, New Orleans and Mobile in defining the Savannah hinterland market area.

Response: While there could be very minor overlaps, the Ports of Houston, Mobile and New Orleans were found to be located too far from the hinterland serving (and products moved through) Savannah. The Ports of Jacksonville and Charleston were more appropriate for the Regional Port Analysis and the Multiport Analysis and were included in those analyses.

760V2-MM-231-EC10

Comment: There is an acknowledgement of S. Atlantic ports planning for 12 million TEUs additional capacity in coming years. There is no comparison of impacts by utilizing other ports over Savannah to meet the plan objectives.

Response: The 2007 GEC Regional Port Analysis examined ports from Norfolk to Jacksonville (see GRR-Appendix A, Attachment 6). The findings indicate that no single port could handle the growth in container volume expected in the Southeast. Every existing port and planned new terminal has environmental, cost, and other limitations that restrict its ability to address the container traffic needs of the region.

760V2-MM-231-EV01, 760V2-MM-231-EV02

Comment: There is minimal effort to identify a non-structural solution. The Corps should consider the non-structural alternative of reducing the LNG radius given the current. Vessels moving downstream may approach an LNG vessel faster than those moving upstream. So it may be more efficient to shrink the downstream no-sail zone. The ready acceptance of the need for a 4 ft underkeel clearance is inconsistent with the required analysis described in ER 1105-2- 100 E-S.e(3).

Response: The Corps coordinated with the US Coast Guard, who did not believe it was appropriate at this time to reduce the safety zone around moving LNG vessels.

As stated in Appendix E-5 of ER 1105-2-100, "The purpose of Corps of Engineers' underkeel design standards is to provide clearance between a ship's bottom and a channel's bottom, which minimizes the risk of grounding by a design vessel under design conditions in the design channel. That is, underkeel clearances are engineering judgment on the minimum amount of clearance to assure safety and do not necessarily reflect actual behavior." As described in Section 6 of the GRR, the need for a 4-foot underkeel clearance was based on empirical data from SPA, GPA, shippers, terminal operators, towing companies and other maritime industry professionals and is consistent with other deep-water ports in the United States. Additionally, as stated in Section 6.11 of the GRR, the underkeel guidelines used by the Pilots comply with channel design and safety criteria.

Page 2-2

760V2-MM-231-EC11

Comment: HarborSym is referenced as a basis in determining not only project design, but channel capacity estimates to allow for realization of the project objectives. This model and calculations derived from its use should be pan of the report, and presented at a level of detail for review.

Response: The HarborSym model is used in two separate analyses to estimate the potential benefits of the project. First, it is used to calculate benefits generated by including the meeting areas. Second, it is used to calculate the reduction in tide delays due to the additional depth. HarborSym does not calculate the bulk of the benefits associated with the transportation cost savings model. Also, HarborSym is not

used to calculate the channel capacity of the harbor. However, meeting areas and reducing tide delays would decrease the overall congestion in the harbor. The final Economic Appendix includes additional information on the HarborSym model and the analyses for which it was used.

760V2-MM-231-EC12

Comment: 1200 acres of terminal space includes ICTF/rail facilities. CY facilities limited to about 650 acres.

Response: The Garden City Terminal has more than 1,200 acres of terminal space, 9,000 feet of berth, 33 Post-Panamax size cranes, and two on-site intermodal transfer facilities served by two major rail lines. All the facilities within the Garden City Terminal were included in the Corps' assessment of the site's long-term build-out capacity of 6.5 M TEUs.

760V2-MM-231-EC13

Comment: 6.5 million TEU capacity is a given without any justification in the GRR. This capacity needs to be justified to insure the without project condition can accommodate future cargo forecasts.

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC14

Comment: Is the A1WW an impediment to navigation?

Response: No. The AIWW which crosses the deep-draft channel at Fields Cut (roughly Station 24+000, RM 4) does not result in currents or traffic levels that constitute an impediment to deep-draft navigation.

760V2-MM-231-EC15

Comment: 82% of container ships have design drafts restricting access. Container weights vary considerably. Ref: Tab/e 105 P. 141 Econ App, This shows the vast majority of vessel calls are at or below -38' draft. In 2008, Waterborne Commerce Statistics show that of 4,320 inbound self propelled dry cargo vessel calls. 23 were at 42 ft, 32 at 41 ft. and 124 were between 39 and 40 ft. On the export side, 55 were at 42 ft. 73 at 41 ft. and 169 were between 39 and 40 ft. Table 29 of the Econ appendix shows that only 66 (4%) of the total container ships calling at Savannah are post-Panamax.

Response: With inclusion of the 4-foot underkeel clearance, the -38 foot depth represents a constraint to much deep-draft navigation. Historically, Post-Panamax vessels have been a small share of vessels calling at Savannah, but that share has been growing substantially and would expand further following the completion of the Panama Canal's expansion.

760V2-MM-231-EC16

Comment: What does "Required depth (for 6' project)" mean?

Response: Figure 1-3 presents an engineering cross-section of the dredging project, assuming a 6-foot deepening. There is an additional allowance for overdepth (to ensure the navigation depth is obtained).

760V2-MM-231-EC17

Comment: Currently dredge to 46 to SO ft up to Station 102. Advance maintenance is major, up to 8 feet. Yet, it is not accounted for in the HarborSym analysis and calculation of transportation cost savings and vessel fleet allocation over time.

Response: Over-dredging and advanced maintenance are included in the environmental modeling. They are not included in the economic analyses because the Pilots cannot count on those areas being clear of sediment. The Corps allows those areas to fill with sediment before performing maintenance dredging.

760V2-MM-231-EC18

Comment: Sediment and fresh water controls didn't work or not maintained. This does not bode well for any mitigation maintenance measures in the future.

Response: The sediment control works [which became operational in 1977] was highly effective in keeping the City Front reach of the navigation channel clear of sediments and lowering the cost of removing O&M sediments from the harbor. The Tidegate was removed from service in 1991 as a result of its adverse environmental impacts. The Sediment Basin continues to provide some off-channel storage of O&M sediments.

Although the USFWS had maintained the Freshwater Control System on a regular basis, after 20+ years of service the system needed major rehabilitation. Savannah District prepared a Letter Report in 2009 recommending the major components of the system be renovated. The report was approved and construction on the Federal-lands portion of the Freshwater Control System was completed in 2011.

760V2-MM-231-EC19

Comment: A shipper is trucking export containers to Charleston because they can't find room on outgoing vessels. Why does MSC see Charleston with 8500 TEU ships as beneficial over Savannah under current conditions? Light loads imply not enough volume for both CHS and SAY cans.

Response: The recent building of distribution centers, availability of affordable land, port rotations, the hinterland market and the types of commodities all play a role in why cargo moved to Savannah. Many of these factors have nothing to do with the water depths.

Light loads also result from insufficient channel depth which precludes a vessel from loading to its design draft.

Comment: Planned Depth is meaningless. P&G says use authorized depth

Response: The "Planned Depths" are those identified by the listed ports as their desired depth in the future.

760V2-MM-231-EC21

Comment: The correct web address is www".ci-online.co.uk

Response: Noted, it will be changed in the General Reevaluation Report (GRR).

760V2-MM-231-EC22

Comment: The definition of Panamax is a vessel that can transit the Canal. The Greater than Panamax Draft are defined in the footnote as including Panamax vessel, which seem incorrect.

Response: We have revised this in the final report.

760V2-MM-231-EC23

Comment: Total Panamax or larger ships Is 2075, not 2805. The 43% seems to be correct.

Response: We corrected that in the final report.

Page 2-3

760V2-MM-231-EC24

Comment: How does econ analysis account for arrival of LNG vessels delaying other vessels? Is LNG traffic and one mile safety zone figured into the HarborSym analysis? There is also a 90,000' or 1.5 hour restriction for loaded LNG vessels (Econ appendix P. 23, Sec, 2.6). On page 56, the report states that the clear radius is only 1 mile.

Response: The LNG safety zone requirement is included in the HarborSym analysis. The Georgia Ports Authority has stated that when a loaded LNG vessel is transiting the system, all other traffic is delayed until the vessel reaches the Elba Island terminal. However, due to limitations in the model, vessel traffic cannot be delayed by a specific class. Therefore, the 90,000-foot safety zone for the LNG class was input into the model as a way to cause all other vessel classes from transiting when an LNG vessel was calling on Savannah Harbor.

760V2-MM-231-EC25

Comment: Surprising that only 20% moves by rail. GPA forecast accounts for rail movements at 25%. Bottom of page, at some point \$1 billion capital Improvement plan should be defined, what does it entail?

Response: A summary of the GPA's capital improvement plan is provided in Section 5.3 of the GRR. The 10-year capital improvement plan includes equipment purchases and upgrades, transportation infrastructure improvements, and container area expansion to increase the Garden City Terminal's container throughput capacity to 6.5 million TEUs annually by 2020, regardless of whether the harbor is deepened.

Comment: Wastepaper weighs more than consumer goods so outgoing drafts sometime exceed incoming drafts. (When?) But the value of the cargo is extremely low. What is the ratio of empty/total in & out? Imports and exports should be treated separately throughout the study.

Response: Imports and exports were evaluated separately in the Economic Appendix.

760V2-MM-231-EC27

Comment: *Export TEU's always > import TEU's*

Response: The fact that there are far more imported containers than exported containers reflects the larger imbalance of trade. While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not worth as much as a loaded one and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers.

760V2-MM-231-EC28

Comment: Loaded Export TEU's < Import TEU's since about 2000. So, more and more room to put wastepaper and export drafts should not be controlling in the future.

Response: To say that only wastepaper is exported is far too simplistic. Heavy cargo such as kaolin clay, frozen poultry and many others will continue to be exported and result in vessels loading heavily. Also, the amount carried on an outgoing vessel can depend largely on whether shippers have room to make "opportunistic additions" to the vessel. They may decide to carry more or less containers, depending on the availability and the needs at the next port of call.

760V2-MM-231-EC29

Comment: Should discuss distribution centers in this section, Hinterland definition from Norfolk south; what about CHS as well? Prior reports had addressed CHS vs. Savannah.

Response: The final GRR contains additional information on the distribution centers along with the comparison of Savannah with Charleston, as addressed in previous reports.

760V2-MM-231-EC30

Comment: Export boxes heavier, make sure forecasts keep balance between imports/exports, or some adjustment should be made in cost savings for both legs. Again, exports and imports should be treated separately. Claim that because < 12% of container transits greater than -38 ft proves carriers averse to tidal access. This does not mean that less than 12% was in fact constrained, because of over dredging, and vessels arriving above MLLW

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As

aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information is included in the final report.

760V2-MM-231-EC31

Comment: In 2007, some vessels transits draft deeper than the supposed 42 ft limit. Forty-two inbound vessels drafted between 42 and 43 ft. Based on the maximum practicable drafts in Table 35 of the Economics Analysis, all of these transits must be PPX vessels. The discussion on p. 56 implies that relatively few PPX vessels called on the port during part of that year. So, it seems possible that most PPX inbound transits are slightly greater than 42 ft. Does the model allow frequent drafts this deep w/o project?

Response: Yes, for two of the trade routes, the cargo is so heavy that their respective MPDs are high (for PX vessels). Recall that the MPDs were determined first as a means of calculating the unit costs used in the deployment analysis.

760V2-MM-231-EC32

Comment: Savannah Maritime Association has published Port of Savannah Industry Guidelines for Minimum Under-Keel Clearances, dated Feb 2009. These guidelines read as follows: (a) Four (4) feet for transits in the navigation channel between the sea buoy, across the Savannah Bar, through Jones Island range, USAGE Station - 14, where the project depth of the channel decreases from 44 feet to 42 feet. (b) Two (2) feet for transits between Jones Island range and the point in the navigation channel which is adjacent to the facility of destination. Given these guidelines, underkeel assumptions used in the economic analysis seem to be Incorrect.

Response: The underkeel clearances stated in the Appendix also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC33

Comment: Here, tidal range average is 6.8 ft with upper limit of 7.9 ft. On p. 56, it's 6.9 feel. Are economists and environmental scientists using different values?

Response: The Economics considered the MLLW value of 6.9 feet. There are variations of tide, with an average of 6.8 feet as well as extreme tidal ranges. The tide range also varies with the location in the estuary, with the tide range decreasing as one progresses upriver.

760V2-MM-231-EC34

Comment: Jasper County terminal was relevant in previous reports using much lower cargo forecasts. If uncertainty around Jasper County Terminal precludes It from the without project condition, then GRR needs to demonstrate that Garden City plan can in fact accommodate all future growth assumed in the study.

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC35

Comment: Unclear which ports assumed in the w/o project. Given that Jasper County does not meet the criteria for inclusion in the w/o project condition, how do these plans satisfy the criteria for inclusion in the without project, especially ten years into the future.

Response: The ports shown in the table are included in the Without Project condition.

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760V2-MM-231-EC36

Comment: Garden City capacity Increases to 6.5 million TEU annually. Assumes berth productivity increase from 280 to 700 TEU's per berth foot.

Response: The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required did not differ substantially from that occurring in other ports and would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC37

Comment: Trade projections based on 2005-07 condition, pre-recession. These are the bubble years in world trade. Overall, world trade seems to be stabilized at about 20% of World GOP. There should be an evaluation of growth forecasts using such general indices as regional population growth, real income and GOP growth forecasts as a check; for reasonableness.

Response: The study team reevaluated the project economics to include the recent economic downturn. The updated results are included in the final report.

760V2-MM-231-EC38

Comment: For example, major products destined for the Mediterranean are heavier pulp and kaolin clay whereas imports from the Far East involve lighter manufactured goods and textiles. For each service, the historical average weight per TEU was calculated and used for this conversion. But as imports grow faster than exports, the average weight of export TEUs, including empties, should decline.

Response: The commenter is assuming more empties will be loaded on outbound vessels over time. While it may appear that there is an imbalanced loading for exports and imports, there are unique cargo distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah from overseas, taken to a distribution center in central Georgia, then reloaded and exported at Jacksonville. Also, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. In some areas such as Anchorage, Alaska, there is a glut of empty containers.

760V2-MM-231-EC39

Comment: The weighted average from 2005-07 condition. Is too short a time and weighing more heavily on 2007 uses this particular year to a large extent to establish the baseline forecast for the next 50 years. Use broader incises as mentioned in the comment above (p. 71).

Response: The study team reevaluated the project economics to include the recent economic downturn. The updated results are included in the final report.

760V2-MM-231-EC40

Comment: There should be total weighted growth rate given on this table of import metric tons and growth rates. NE Asia is the lions share: overall growth rates of 5-6% seem really high long tern with GOP growth In US nowhere near that. All tables showing growth rates on a yearly basis should also show the total growth rate for the period.

Response: The District will consider revising tables as suggested.

760V2-MM-231-EC41

Comment: This seems more reasonable than the projections in Table 5-8. Imports should follow a similar trend. We can only import so much. It is not reasonable to assume that imports can grow at a significantly higher rate than tong-term GOP given the size of the US trade deficit.

Response: GDP growth in Asia has well exceeded 5-6% in recent years and the rates determined by Global Insight were reviewed for reasonableness. Also recall that world voyages are comprised of many port calls. While the trade deficit is a concern, we do not expect global trade to contract. Finally, the study team truncated the volume of cargo at the year 2032, given the landside terminal capacity; this means the benefit stream levels off at that point.

760V2-MM-231-EC42

Comment: Total Import tonnage area projected to increase by 80% in the 12 yrs from 2020 to 2032. This is preceded by a 73% growth rate in 10 years, which is somewhat explained by the enlargement of the Panama Canal and the change in destination from the west coast ports (LA/LB) to the east coast that is associated with this development.

It seems that this rate of growth is assumed 10 continue without any competitive response by the west coast ports. What happens if they lower their terminal and inland transport rates? If west coast TEU throughput is impacted by the deepening project. NED benefits need to be adjusted downward to reflect that less to the west coast region.

Continuing to assume dramatic compound rates of increased cargo now well after the Panama Canal is enlarged seems more than suspect. The rate of growth should significantly decline after 2020.

Response: Based on the findings of the Multiport Analysis as well as dialogues with HQUSACE and reviewers, the conclusions regarding Savannah's cargo with and without a deepening project were found to be reasonable and that most, if not all, of the benefitting cargo claimed in Savannah was due to increased waterborne efficiencies. The West Coast lockout reverberated strongly in the shipping world and may have led to further shifts to the Southeast (we can add that statement on history). The Corps agrees that hinterlands are not unique to Savannah. Global Insight's commodity forecast contains an implicit hinterland analysis.

760V2-MM-231-EC43

Comment: Are the values in this table short or metric lons? Either way, 5.67 lons per TEU Is very light. Also, vessels departing thru the Panama Canal will be very light loaded with 67% empty containers. Avg. weights by imports and export routes. Do these change over time with the forecast? Loaded imports double while loaded exports triple by 2032.

Response: The values are measured in metric tons (or a tonne as it's commonly spelled). It is not unreasonable to find such light cargo for that particular trade route. No, these were modified slightly as part of the Load Factor Analysis calibration.

760V2-MM-231-EC44

Comment: *High export empties TEU volume, huge growth of imports 2020-2032.*

Response: While it may appear that there is an imbalanced loading for exports and imports, there are unique cargo distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah from overseas, taken to a distribution center in central Georgia, then reloaded and exported at Jacksonville. Also, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. In some areas such as Anchorage, Alaska, there is a glut of empty containers.

760V2-MM-231-EC45

Comment: The figure seems to be mislabeled as Panamax vessel calls. It should be labeled Post-Panamax vessel calls based on the text in the previous page.

Response: Concur. We re-labeled Figure 5-4, as recommended.

Page 2-5

760V2-MM-231-EC46

Comment: The combination of assumptions and calculations used in the LFA are the determining factors for vessel deployment and vessel drafts used in the Transportation Cost Savings Model. - These important assumptions and calculations should be done separately for imports and exports. This becomes more important the later in the study period as imports increase relative to exports and the near balance of today is lost.

Response: The information used in the LFA was derived separately for imports and exports.

760V2-MM-231-EC47

Comment: Unit costs are never defined. What is a unit? How were these calculated, and what are they based on. Whatever the units are, the costs need to be evaluated by direction so that they vary for exports and imports.

This is not understandable. PPX1 most economical at 42 ft. PPX2 becomes more economical at 44 ft for only FE (Panama) ECUS, PPM2 most economical for all at 46 ft. This needs to be explained.

Response: The unit cost is defined as the waterborne transportation cost per metric tonne. The final report clarifies this point. The purpose of the deployment analysis (using unit costs) was to identify the breakpoints where it made economic sense for a shipper to switch to a larger class of vessel. Also, recall that the Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. The only way of performing a true directional deployment analysis would be to know the "vessel manifests" for an entire journey. This information is proprietary.

760V2-MM-231-EC48

Comment: Why is Panama vessel mix constant for 44 to 48 ft? Seems like it would change at 45 ft based on Table 5-20.

Response: No, the unit costs are minimized at 44' and thus comprise the breakpoint. It makes economic sense for a shipper to deploy a larger vessel from that depth forward.

760V2-MM-231-EC49

Comment: Would like to see socio-economic profile of any neighborhoods near the Port. Use to consider social justice and potential health impacts.

Response: The final EIS contains an expanded discussion of parameters such as income and employment for the communities that surround the Garden City Terminal and the port.

760V2-MM-231-EC50

Comment: Does not take into account competing ports (HOU, NOL, MOB, CHS. and ORF) in determining true competitive market area.

Response: The Multiport Analysis (GRR-Appendix A, Attachment 4) discusses potential transfers to/from competing ports.

Comment: Sea level rise projection seems to be based on political ideology instead of science. Using the historical rate as the most likely rates does not seem to meet the letter or spirit of EC 1165-2-211 because they exclude global sea rise. May be overspending on wetland mitigation because salt intrusion will occur with or without a project. Decisions are made at the margin, and the optimal depth may well be sensitive to the incremental mitigation costs.

Sea level rise would also reduce bridge clearances, and this issue does not seem to be addressed.

Response: The change in sea-level rise does not impact specifications for waterway depth but does impact influence or needs for structures with fixed elevations in relation to changes in absolute elevation of water levels for the waterway. Accordingly the jetty system may be reduced in elevation above the water and other structures such as the Talmadge Bridge will undergo a reduction in the air draft that it affords for navigation. The issue as to whether sea-level rise is a significant consideration is relative to the degree or amount that it is projected to rise over time. Depending on the modeling procedures and assumptions for analysis applied, currently available information indicates sea level rise over the 50-year horizon of the project analysis (i.e., 2015 to 2065) will range from a minimum of approximately 0.7 feet to as much as approximately 2.3 feet by year 2065. Given uncertainty in the range of sea-level rise and margins as described for clearance, depth and typical draft requirements for the fleet projected to serve Savannah Harbor, sea level rise could impose some restriction on movement relative to air draft of the bridge but it is not expected to be significant given the range of variability available for vessel operating parameters.

760V2-MM-231-EC52

Comment: CSS Georgia is removed in w/o project. This is inconsistent with including the cost of removal as a SHEP project cost and any harbor delays w/o project that are associated with the CSS Georgia.

Response: The condition of the *CSS Georgia* is precarious and it needs to be conserved before it no longer exists. The site would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it are included as costs of harbor deepening. References to the removal being part of the without project condition have been deleted from the documents.

760V2-MM-231-EC53

Comment: There is only one study objective which is to reduce navigation transportation costs to and from the harbor. This hardly seems to be a balanced approach to problem solving given the environmental, social, and NED aspects of planning.

Response: As discussed in other responses, the SHEP NEPA alternatives analysis considered potential options [structural/nonstructural] to address the navigation problems at the port. The measures included consideration of actions within the port and other South Atlantic ports. Alternative locations for disposal of dredged or fill material along Savannah Harbor and in the Atlantic Ocean along the entrance channel were also considered. The SHEP NEPA alternatives analysis is found in several documents that are part of the SHEP record, including EIS Section 2.0, Need and Objective for Action; EIS Section 3.0, Alternatives; EIS Appendix H, Section 404(b)(1) Evaluation (Practicable Alternatives); EIS Appendix O, Formulation of Alternatives; GRR Section 6, Formulation of Alternatives; GRR Appendix A, Economics; GRR Appendix A, Attachment 6 (Regional Port Analysis); GRR Appendix A, Attachment 4 (Multiport Analysis); and GRR Appendix D, Plan Formulation Appendix.

The SHEP NEPA alternatives analysis includes the following key elements: (1) the statement of project purpose and need (EIS Section 2.0); (2) a Regional Port Analysis (GRR, Appendix A, Attachment 6); (3) a Multiport Analysis (GRR, Appendix A, Attachment4); (4) analysis of various structural and non-structural alternatives (EIS, Section 3.0; GRR, Appendix D); (5) analysis of eight alternative locations or sites for a port/terminal along the Savannah River (EIS, Section 3.0 and Appendix O); (6) analysis of different depths of harbor deepening along the Savannah River (EIS, Section 3.0 and Appendix O); (7) analysis of alternative disposal sites, methods, or beneficial use of dredged sediments (EIS, Section 3.01.1 and 3.07); (8) analysis of related maintenance dredging requirements (EIS, Section 3.08-3.10); and (9) analysis of the no-action alternative (EIS, Section 3.4 - 3.15).

760V2-MM-231-EC54

Comment: *If the forecasted tonnage cannot be accommodated by the future landside developments described in the report, then the study is incomplete.*

Response: Under both the without and with project conditions, the Corps expects the Garden City Terminal to reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC55

Comment: Plans do not need to be consistent with slate & local laws. ER 1105-2-100 2-3 c(1) states that plans ·should be in compliance ... or include proposals for changes as appropriate,"

Response: According to the ER, "Plans should be in compliance with existing statutes, administrative regulations, and common law or include proposals for changes as appropriate. Alternative plans shall not be limited to those the Corps of Engineers could implement directly under current authorities. Plans that could be implemented under the authorities of other Federal agencies, State and local entities and non-government interest should also be considered." The selected plan is consistent with this guidance.

760V2-MM-231-EC56

Comment: Reducing under keel clearance requirement is a specific non-structural measure.

Response: Concur. That was one of the management measures considered early in the Tier II studies, as described in EIS-Appendix O. The current underkeel guidelines were developed by the Port Users Group (1996) which consisted of representatives of SPA, GPA, shippers, terminal operators, towing companies, other maritime industry professionals, the Corps, USCG, and other Federal agencies responsible for safe and efficient navigation on these waterways. This Group established the minimum underkeel clearance at 4-feet. However, according to the Savannah Pilots Association, it is the Pilot's

decision as to whether conditions are adequate for a vessel to transit the river at a given time. The Savannah underkeel guidelines (4-feet) are minimum standards and are not intended to be limiting for Pilots, operators, or owners that choose to require a higher degree of safety for their operations.

760V2-MM-231-EC57

Comment: "Underkeel clearance has been 2ft, not 4 ft, since at least 1996."

Response: The underkeel clearances stated in the Appendix account for the static condition but also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC58

Comment: *"How are Savannah Harbor underkeel guidelines consistent with all the other harbors mentioned that have 3 ft clearances?"*

Response: The underkeel clearance for the Savannah Harbor Expansion Project is comparable to those in similar harbors. The additional requirements may be explained by the large swath of freshwater and its consequences on sinkage.

760V2-MM-231-EC59

Comment: *"Revising the underkeel clearance established 14 yrs ago is made all too readily given the improvements in technology available since then."*

Response: The underkeel clearances stated in the Appendix also account for the dynamic condition, and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice. The Harbor Pilots could not identify any measures that would provide them with more information on real-time conditions or other modifications to the channel that could allow them to conclude that a smaller underkeel clearance would provide the same measure of safety as the present underkeel clearance guideline.

760V2-MM-231-EC60

Comment: "By dismissing non-structural alternatives so readily, the study effectively does not give ~equal consideration" of non-structural options as required by ER 1105-2-1002-3 c(5)."

Response: Numerous non-structural measures were considered [GRR- Section 6.5 "Management Measures"]. Appendix O of the EIS contains the document that describes the early plan formulation that the District conducted on this project. All management measures were given equal consideration at that point in the study process. The District screened the measures to identify the ones that appeared to best meet the project needs at the lowest economic and environmental cost. The evaluations concluded that the alternatives that should be considered in detail were deepening to the existing Garden City Terminal and the no-action alternative.

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760V2-MM-231-EC61

Comment: "Industry standard 50% berth utilization is max capacity. Expectation is 58% at garden city in 2020 buildout. In addition, LNG vessel calls restrict berth access under any condition, so the industry standard may be too high to apply to Savannah."

Response: Moffatt & Nichol examined the capacity of the Garden City Terminal. They point out the dangers of over-reliance on historical averages, present ship-to-shore crane capacity, and make comparisons with a transshipment terminal. Moffatt & Nichol then listed components which influence berth capacity and demonstrated the wide disparity in productivity rates for container ports throughout the world. They provide an example with the Port at Long Beach (a proxy port for Savannah), and show how actual throughput versus *potential* throughput can result in quite different answers. Finally, Moffatt & Nichol provide rationale for how 6.5 million TEU's could be achieved at the Garden City Terminal by adding cranes, labor hours, etc. In the end, they state that it is reasonable for the Garden City Terminal berth to achieve 6.5 million TEU's of throughput given the demand in the forecasted time frame. The resultant berth productivity would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC62

Comment: "Focusing on berth capacities, given the 9700' of berth at Garden City, annual TEU per foot of berth is estimated at 270 TEU. This compares with an estimated 251 TEUs per fool for LA/LB Harbors, and 166 TEUs per foot for S. Atlantic ports. Table 5-1 of IWR report 10-R-4 (NED Manual for Deep Draft Navigation) gives an estimate of 212 TEUs annually per foot of berth_ 700 TEU's per berth foot per year in 2020 not realistic and there is no basis for asserting that such capacity can be realized."

Response: See response to previous comment.

760V2-MM-231-EC63

Comment: "Unit costs per mile tor trail/truck should be included. There is no indication how these figures were developed."

Response: Rail and truck costs (per mile) were developed by the Intermodal Association of America, based on the Savannah to Atlanta route. The cost difference may be significantly greater than expressed by these estimates, since per mile truck and rail costs for the Atlanta route (approximately 250 miles by Interstate) are significantly less than costs of relatively slow movements to/from an alternative terminal in the vicinity of the port.

760V2-MM-231-EC64

Comment: "Alternative sites all dismissed..."

Response: The March 2004 report "Formulation of Alternatives has been added (in entirety) to the Plan Formulation Appendix of the GRR. All management measures were given equal consideration at that point in the study process. The District screened the measures to identify the ones that appeared to best meet the project needs at the lowest economic and environmental cost. The combined landside site development costs and dredging costs rendered new terminal sites less cost-effective than deepening to the existing Garden City Terminal. The evaluations concluded that the alternatives that

should be considered in detail were deepening to the existing Garden City Terminal and the no-action alternative.

760V2-MM-231-EC65

Comment: "Many alternatives terminals seem competitive cost-wise with Garden City, if you include mitigation costs for Garden City that have Increased over \$100 million since these costs were developed in 2005 as displayed in App. 0 of the EIS. Most, if not all, of that increase does not apply to downstream alternatives. Also, the dredging costs to Garden City have increased about another \$100,000 million and it is reasonable to assume that the cost increase for dredging to the downstream locations has increased less than that. We question the likelihood of GPA expanding the Garden City Terminal without additional channel depth. Terminal capacity analysis indicates berthing space Is constrained and GPA improvements do not address this shortage of berthing space."

Response: While the cost increase in dredging may not have increased as fast as the costs for mitigation, the cost to develop the infrastructure at new terminal sites has also increased substantially. Appendix O of the EIS describes other factors that were also considered.

760V2-MM-231-EC66

Comment: "Hurricanes and other weather events will affect all of these alternatives, not just the offshore terminal. It is reflective of the lack of risk assessment in the report that the potential for these events is ignored."

Response: Hurricanes and other weather events will affect all of these alternatives, but the extent of those effects could differ substantially between locations. Terminal sites located on land would not be encumbered by the costs of double handling of the containers. The additional handling costs alone would exceed the costs of deepening to the Garden City Terminal.

760V2-MM-231-EC67

Comment: Why 464 ft for bottom channel width? 50+140+150+140+50 ft would be required. The 530' width should be reflected in costs. Does Harbor Sym assume a Panamax and Post-Panamax vessel can meet in the channel?

Response: The channel would be deepened by following the slide slopes down to a greater depth. This would result in a narrowing of the channel bottom. The 464-foot bottom would result from a 18-foot narrowing on each side (6-foot deepening of a 1V:3H slope). HarborSym does include meeting of Panamax and Post-Panamax vessels throughout the harbor. Meeting areas have been included to allow for meeting of two Post-Panamax vessels in the inner harbor.

760V2-MM-231-EC68

Comment: Turning basin a 1600' x 1600', why not have at least one step with interim design vessel at say 45' to measure channel/turning basin width requirements and costs?

Response: Channel design manuals indicate that a 1,600- by 1,600-foot turning basin would be needed to safely turn the design vessel (length of 1,138 feet).

Comment: There should be a weighted average of SAV proportion of cargo for all trade routes. Looks like it should compute to low-mid 20% range.

Response: Concur. The average for all trade routes can be included in Table 7-1 [as suggested]; however, recall that each trade route was examined separately in the project's economic analysis.

760V2-MM-231-EC70

Comment: There should be a table in this section showing total costs per voyage per route and vessel class.

Response: The District will consider the suggested revision and include it if it judged to be helpful in this table.

760V2-MM-231-EC71

Comment: What does '140\$ rr for PPX2' mean?

Response: That error was corrected in the Final report.

760V2-MM-231-EC72

Comment: Ate meeting area benefits calculated relative to no channel Improvements? Should be incremental, after each channel deepening, Does HarborSym account for LNG vessel safely impacts, AlWW impacts, hurricane/weather impacts, etc.?

Response: The HarborSym model calculates the meeting area benefits at each depth relative to current channel dimensions. An existing channel width condition was conducted for each proposed channel depth and then compared to a model run completed with each of the three proposed meeting area alternatives. The model evaluates the impacts of all vessel classes calling on the harbor as well. A general cargo class was developed to ensure that both the Container and LNG vessel classes must interact, presenting the most realistic scenario possible. The HarborSym model does not have the capability to include weather delays. However, it is assumed that Hurricanes/Storm Events would occur at the same frequency with and without the project.

760V2-MM-231-EC73

Comment: LNG transits increase to 80% of capacity by 2030. Don't they continue to increase beyond that? If so, then traffic delays should increase beyond 2032.

Response: LNG transits increase from 60% of capacity in the base year of the period of analysis to 80% capacity by 2030. As of 2008, no domestic LNG facility operated at 50% of capacity. Therefore, although growth in the industry is expected to occur, a restraint was placed on the overall growth for the analysis to remain conservative. As stated in the Economic Appendix, Section 6.2.2.2 it is possible that LNG transit could reach approximately 200 if 100% capacity was reached.

Comment: "Meeting area benefits go up, then down as depths increase. Benefits seem to decrease with increasing channel depth over 45'. But over 46 ft, there is no change in the number of PPX vessel transits and those are the only vessels that require the meeting areas. Why do benefits decrease? Should consider Long Island only early and Oglethorpe later in time."

Response: The Post-Panamax vessel class is the main benefactor from including meeting areas at Savannah Harbor. There is also the same number of anticipated calls with the same sailing draft distribution in the period of analysis regardless of the project depth. However, benefits of the meeting area decrease due to the availability of the channel depth. A vessel that must wait for tide to enter the harbor at one depth has an extended period of time in which to transit with additional depth. The deeper the channel depth the longer the period of time these vessel have to transit the harbor.

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760V2-MM-231-EC75

Comment: Tidal delay reductions should address the air draft constraint of 185' at the Tallmadge Memorial Bridge.

Response: The present container fleet is not restricted by the 185-foot clearance of the Talmadge Bridge. General evaluation of vessels with nominal TEU ratings up to approximately 9,100 to 9,200 TEUs with design for single accommodations revealed specifications for summer loadline fixed air drafts of 164 to nearly 173 feet depending on placement of accommodations for line-of-sight and other requirements. Given that no segment of the world fleet projected to serve Savannah has air drafts exceeding 164 to 173 feet, even at extreme high tides and immersed to near or at full summer loadline draft (SLLD) the bridge does not pose an impediment to navigation.

760V2-MM-231-EC76

Comment: Tide Delay benefits Increase by a factor' of eleven over time. There will eventually be about one LNG transit per day. With all of these delays, is the vessel transit capacity of the channel ever exceeded?

Response: The estimated number of LNG calls at 80% facility capacity is 167 calls or one every 2.2 days. At 100% facility capacity, the total calls are estimated to be around 200 or one every 1.8 days. It is not anticipated that the number of calls will reach 1 per day. The LNG vessels are included in the HarborSym simulation runs.

760V2-MM-231-EC77

Comment: *Is it appropriate to simply sum meeting area and tide delay benefits? Meeting areas decrease transit time, thus effectively increasing tidal windows.*

Response: The HarborSym model is used in two separate analyses to estimate the potential benefits of the project. First, calculating benefits generated by the inclusion of meeting areas at each proposed project depth. Secondly, the model calculates the reduction in tide delays due to the additional depth. The tide delay benefits at each proposed depth were calculated with the existing channel width dimensions to ensure that double counting did not occur.

Comment: Monitoring of chloride in water, but what if it happens? Again, this is a missed opportunity to incorporate risk into the analysis.

Response: Risk is included in the analysis in several locations, including GRR-Section 12 and EIS-Appendix Q

760V2-MM-231-EC79

Comment: Without project assumes all cargo traffic will happen anyway. This assumption seems to reflect an inherent bias in the analysis.

Response: The commodity projection includes consideration of several factors, including the expected growth in the demand for goods in the Southeast. GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah. The findings suggest that deepening the harbor would result in no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, no substantial changes in hinterland service area are expected, so no change is expected in the overall cargo volumes without and with channel improvements at Savannah harbor. This basic conclusion is further supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel is deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah. The savings per TEU for the ocean voyage costs range from about \$10 to \$60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. At these levels of savings, and with landside trucking costs within the local area of Savannah are estimated to range from \$100 to \$150 each round trip, and movements outside of the local area are estimated to average \$1.50 to \$2.00 per round trip mile, there is not a sufficient differential to divert large amounts of cargo from or to other ports. It is further believed that there are numerous other factors involved in port developments that would have a greater effect on cargo diversions, such as new container yard developments, location of distribution centers, and landside transportation improvements.

760V2-MM-231-EC80

Comment: GPA claims there should not be a significant change in port operations. However, larger vessels will berth longer. The larger vessels will require more than slightly longer time at the dock". There will be a substantial Increase in berthside times. 8600 TEU vessels will take over 24 operating hours to complete a single berth call.

Response: The Georgia Ports Authority has stated that as the total number of vessel calls and the size of those vessels grow, they will continue to add additional cranes at Garden City to minimize the overall impact to the berthing time of the larger vessels.

Comment: Reference to multi port analysis and findings of increased overland costs would not overcome decreased waterborne transit costs to induce traffic to SAV. So, the least cost alternative is to always unload at the nearest port. By the same token, how can SAY compete with any closer port within their defined hinterland if this is the case?

Response: Shippers are likely to deliver the same volume of cargo through Savannah and incur the inefficiencies in the absence of a project. The sentence was intended to state that shippers would rather deliver cargo to Savannah inefficiently than call at a nearby port and then truck or rail the cargo back to Savannah. It is more costly to do the latter.

760V2-MM-231-EC82

Comment: Reallocate water from Corps lakes - what is the opportunity cost? Hasn't the SE had significant droughts recently?

Response: Reallocation of water from Corps Lakes upstream of Augusta was considered. The large volumes of water required to make changes in the harbor for sustained periods of time would require a major change to the authorized purposes of the Corps reservoirs. The environmental and social effects of such large volumes has not been considered in detail, but are expected to be substantial. There are also river flow requirements for the Savannah River below Augusta to meet environmental commitments and point source discharge permitting.

760V2-MM-231-EC83

Comment: Cost include removal of CSS Georgia, but that is a w/o project condition, (p.95 Section 5.8)

Response: The condition of the *CSS Georgia* is precarious and it needs to be conserved before it no longer exists. The site would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it is included as costs of harbor deepening. References to the removal being part of then without project condition have been deleted from the documents.

760V2-MM-231-EC84

Comment: Why do DO costs decrease from 44 to 45 ft. then increase at 47 It?

Response: Oxygen injection requirements were considered for all project depths. One of the other mitigation features, McCoy's Cut modifications, would not be needed until the 45-foot depth. The increase in flow brought about by this feature required the use of 8 speece cones for the 45 and 46-foot depths, as opposed to the 9 required for the 44-foot depth. This is the reason for the difference in costs.

Comment: Spend \$191 million 10 mitigate the first foot, then \$30 million to mitigate the next 4 feet. Suspect mitigating for w/o project condition. Incremental costs are suspect.

Response: The mitigation plan was developed in an iterative manner. The types of project impacts do not vary by project depth, only the amount varies by depth. Most of the mitigation measures are required in all depths. The Corps developed a mitigation plan for the 44-foot depth then enlarged its features as possible to address the impacts of the greater depths. As a result, the bulk of the mitigation costs would occur with the 44-foot depth and only grow incrementally with the other depths.

760V2-MM-231-EC86

Comment: What are w/o project dredging costs? The without project condition is not fully defined.

Response: Project impacts to the O&M program are discussed in detail in the "Savannah Harbor Expansion Project Impacts to O&M" which is included in the Supplemental Materials of the Engineering Appendix to the GRR. Table 6 of this document titled "Current O&M Costs vs. Projected O&M Costs after Deepening" shows the current O&M dredging costs and the projected O&M dredging costs after project construction is completed. In addition, the without project dredging plan is detailed in Table 11.2-8 of the Engineering Appendix to the GRR titled "Inner Harbor Annual Maintenance Material Disposal Plan 2010 -2066 (Without Project Conditions)".

760V2-MM-231-EC87

Comment: How is it that the bottom width narrows?

Response: The District designed a narrower bottom width for the deeper channel depth alternatives as a way of reducing project impacts and costs. The deepening would be performed in the channel bottom and join an extension of the existing channel's side slopes. In general, this would result in no dredging of the existing side slopes and a slight narrowing of the channel's bottom width.

760V2-MM-231-EC88

Comment: Risk that O&M costs may be greater than estimated, which should Increase the deeper they dredge into the sideslopes. This should all be reflected in a risk analysis.

Response: The channel side slopes would not be moved laterally to accommodate a deeper channel possessing the same bottom width. Instead, the side slopes would generally remain untouched and dredging would only occur on the bottom of the channel. Deepening of the channel would occur in sediments with generally consisting of dense sands and sand clay materials that are well consolidated and exhibit high blow counts (n values). The dense materials in the lower elevations do not readily 'adjust' without substantial outside energy. Erosion of sediments in the upper/higher elevations is not expected because those areas would generally not be dredged.

760V2-MM-231-EC89

Comment: CSS Georgia O&M part of w/o project even though it is removed?

Response: The *CSS Georgia* would be adversely impacted by the proposed harbor deepening, so measures to document, remove, and conserve it are included as costs of harbor deepening. References to the removal being part of the without project condition have been deleted from the documents. Recurring annual O&M costs attributed to the CSS Georgia in With Project scenarios are for the curation of artifacts after they are removed from the wreck site.

760V2-MM-231-EC90

Comment: Why would outer harbor dredging increase every two feel, but not every fool depth increases? Doesn't that channel widen with depth?

Response: We will re-evaluate that table and revise it if corrections are needed. The channels do not widen with depth. The SHEP is designed with a narrower post-project bottom width to reduce dredging costs, real estate costs, and environmental impacts.

760V2-MM-231-EC91

Comment: DO 0&M costs do not have the same trend as DO construction costs In Table 10-4. If construction costs the same at 44 & 47 ft, expect 0&M costs to then be the same. According to Table g-6 the capacity of the DO system at 47 ft is larger than at 44 ft. Need to display current, without project Q&M for comparison. It seems that the cost of inner harbor dredging increases by \$2.7 million annually if the channel is deepened by 2 ft to 44 ft. Acknowledgement of potential for increased costs due to using existing channel slopes for deeper channel is not accounted for in the table.

Response: The Corps will review the numbers in the Table 12.4-1 and revise them if any are in error.

An evaluation of sedimentation in the inner harbor indicates that the amount of O&M material is not expected to change significantly whether you dredge to 44-feet or 48-feet. However, where the sediment is expected to shoal would change with removal of the Tidegate and filling of the Sediment Basin. The difference in where the material falls out in relation to the disposal area where it is to be placed is expected to result in the \$2.7M annual increase.

The District is confident that additional shoaling will not occur on a long term basis as a result of constructing the deeper channel as proposed with its narrower bottom width.

Page 2-8

760V2-MM-231-EC92

Comment: Most of the O&M in this table is \$1,000 more than the O&M in Table 10-7.

Response. The difference has to do with rounding errors that are corrected in the final report so that both tables match.

760V2-MM-231-EC93

Comment: Meeting areas optimize at 45 ft. No study of the effectiveness of 45 ft meeting areas with 47 ft channel. Simply assumed 47 ft meeting areas needed with 47 ft channel.

Response: The meeting areas were evaluated and would be constructed to the same depth as the navigation channel. Unless the meeting areas are constructed to the same depth as the proposed deeper channel, lighter-loaded vessels would be the only ones that could use the meeting areas.

760V2-MM-231-EC94

Comment: Air quality has become the defining problem at LA/LB. Basic question: does the project induce vessel calls?

Response: No. The Corps believes that a deeper channel would reduce the number of vessel calls – when compared to the without project condition. Fewer vessels would result in fewer air emissions.

760V2-MM-231-EC95

Comment: If no change in shipping volume, where do increased sales volumes, Income, and employment come from? What is sales volume? Are these figures annual?

Response: Increased income and employment would be an outcome of the cost of constructing the Savannah Harbor Expansion Project. These are Regional Economic Development benefits. These temporary economic benefits would be spread out over the period of construction.

760V2-MM-231-EC96

Comment: Investment risk ignores the dependence of the b/c ratio on forecasts. How much will shipments need to increase to justify the project? In general, this table should present more quantification.

How does a 'minor fleet shift for all deepening alternatives equate to such substantial transportation cost savings?

Response: The Panama Canal expansion is no longer a source of uncertainty as the construction is well under way and is expected to be completed on schedule. In response, the shipping industry has been evolving to use a greater share of Post-Panamax vessels. The Corps expects that trend to be relatively more pronounced on the East Coast after the Canal construction is complete. The risks and vulnerabilities associated with these have been reduced significantly over the past several years. Moreover, the various sensitivity tests performed as part of the economic analysis show positive net benefits and high B/C ratios, meaning there is little risk of this deepening being a non-justified project.

760V2-MM-231-EC97

Comment: This table is too long at about 20 pages. Should be separate tables for each letter, A thru F.

Response: The structure of the table is an attempt to fulfill Corps guidance to compare all project features in the Planning System of accounts.

760V2-MM-231-EC98

Comment: How is it legal to dredge 8 ft deeper than authorized project depth for advanced maintenance and allowable over depth?

Response: Advance maintenance must be economically justified and receive the same environmental evaluations and approvals as other harbor improvements. Overdepth is a construction and contracting

technique where the Government pays the contractor for a certain additional dredging depth beyond that which he is required to remove, in recognition that the contractor will likely remove some of that material as he removes the required area above it. The Overdepth is included in all modeling, so its removal is also evaluated and approved environmentally.

760V2-MM-231-EC99

Comment: We are providing an analysis of the Garden City Terminal which determines that the capacity is constrained at about 3 million TEU's annually. This affects any without project design and NED benefit computation.

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based on factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC100

Comment: *Referred to map on page 1. What? Refers to DMCA 12A&B, but no DMCA 12B on the maps.*

Response: During 2010, the cross dike between DMCAs 12B and 13A was removed to make it a larger DMCA that could be paired more evenly with DMCA 12A. It was designated as DMCA 13A (so DMCA 12B no longer exists).

760V2-MM-231-EC101

Comment: Sensitivity Analyses are difficult to follow with limited narrative. Better to display fewer scenarios more in depth, especially for meeting area and tide delays.

Response: The detailed description and discussion of the sensitivity analyses are included in the Economic Appendix. The summary is included in Section 12 of the GRR only to provide an overview of the analyses and its conclusion – that the economic analysis shows harbor deepening is not sensitive to the economic assumptions, but is instead justified under a wide range of economic assumptions.

760V2-MM-231-EC102

Comment: There is an implied assumption that at some point there will be a need for additional terminal capacity during the lifetime of the project, Why aren't costs and benefits considered in the overall analysis using this assumption? The study period Is 50 years, until 2065.

Response: The period of analysis was from 2017 to 2067. Given the expected commodity growth and the expectation that the Garden City Terminal's capacity will be reached by 2032, the benefit stream remains constant from that period forward. The harbor deepening is justified without assuming additional landside capacity is provided in year 2032.

760V2-MM-231-EC103

Comment: There may be bridge clearance issues associated with sea level rise.

Response: Careful consideration was given to the height constraint imposed by the Talmadge Bridge. The present container fleet is not restricted by the 185-foot clearance of the Talmadge Bridge. General evaluation of vessels with nominal TEU ratings up to approximately 9,100 to 9,200 TEUs with design for single accommodations revealed specifications for summer loadline fixed air drafts of 164 to nearly 173 feet depending on placement of accommodations for line-of-sight and other requirements. Given that no segment of the world fleet projected to serve Savannah has air drafts exceeding 164 to 173 feet, even at extreme high tides and immersed to near or at full summer loadline draft (SLLD) the bridge does not pose an impediment to navigation. Currently available information indicates sea level rise over the 50-year horizon of the project analysis will range from a minimum of approximately 0.7 feet to as much as approximately 2.3 feet. Those amounts are not sufficient to render the bridge a hazard to navigation.

760V2-MM-231-EC104

Comment: *Question no change in project purpose, as removal of CSS Georgia is mitigation of an existing project.*

Response: Savannah District determined that the CSS Georgia has been damaged over time and would be further impacted by additional harbor deepening. Plans for the CSS Georgia (With Project Condition) are described in EIS-Appendix F, Cultural Resources and include artifact recovery, conservation, curation, and the development of an interpretive/display center. Action needs to be taken soon to protect the remaining cultural and historic information.

760V2-MM-231-EC105

Comment: *Mentions continuing the existing advance maintenance features. Was there a cost analysis in the DMMP?*

Also mentions deepening container berths 4-7 at GPA. Is this a non-Federal, non-cost shared, but NED cost needed to realize the benefits?

Response: Yes, a cost analysis was conducted. The justification for advance maintenance is in the Engineering Appendix on page 243. Yes, deepening berths is a project cost because the action is needed to obtain the economic benefits. It is a non-Federal expense, in compliance with cost sharing law (WRDA 1986).

760V2-MM-231-EC106

Comment: *IDC is not a cost authorized by Congress. It is an opportunity cost of capital.*

Response: Concur. We will footnote that cost, as it is an economic cost used in the analysis and not financial cost of the project.

Comment: If 'increased reliability is expected to encourage carriers to assign more of their large vessels to Savannah route services', would this have an impact on competing ports and the NED costs associated with their vessel costs?

Response: Without harbor deepening, the larger vessels in the fleet would continue to make multiple port calls and stop at Savannah albeit inefficiently. With a project, such vessels will be able to load more fully or even larger vessels could be incorporated into the string of calls on a route. The transportation costs are thereby reduced in the overall system.

760V2-MM-231-EC108

Comment: First cost is listed as Fed after cost-sharing. O&M is before cost-sharing.

Response: This section of the GRR is written formally. Cost sharing will follow the rules established by WRDA 1986. First costs are cost shared. O&M costs are shared, depending on the channel depth.

760V2-MM-231-EC109

Comment: GPA responsible for 50% of excess O&M costs above those estimated for a 45 ft channel. This may relate to claim that O&M essentially will not Increase. This should apply to DO O&M. also.

Response: The Corps' estimate of future O&M requirements is not developed in light of what party may be responsible for paying those costs. It is the organization's estimate of future costs that should be expected. The commenter is correct in stating that the non-Federal sponsor is responsible for 50% of O&M costs above those estimated for a 45 foot channel. That would include the additional costs to operate and maintain the D.O. systems beyond what is estimated for a 45-foot depth channel.

Page 2-9

760V2-MM-231-EC110

Comment: There is nothing in the document that addresses the competition among Southeastern U.S. ports to provide docking facilities and services to the upcoming generation of very large ships that will be coming through the enlarged Panama Canal in approximately five years. This is a very important consideration for the Region's economic future.

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening Savannah Harbor would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

Comment: The economic "Uncertainty" analysis is in report was more of a summary. Is there additional information on this? There was no economic and marketing justification material in the report, nor were sources of data or assumptions used in their sensitivity analyses identified.

Response: The study team and reviewers emphasized "plausible" future conditions when developing each sensitivity analysis. The conclusions were meant to inform the reader that under most of the "plausible" sensitivities, project improvements were economically justified and that the NED plan is -47 feet most of the time.

Page 3-1

760V2-MM-231-EC112

Comment: This is Step I. The hinterland definition does not account for Gulf ports. A competitive analysis for areas claimed, such as Jackson, MS, Birmingham, AL, New Orleans, LA, and Charleston, SC should be done. "The final delineation of the economic study arc for a given improvement should adequately discuss the trade area relative to adjacent ports (ER 1105.2. 100)

Response: While there could be minor overlaps, the Ports of Houston, Mobile and New Orleans were found to be located too far from the hinterland serving (and commodities moved through) Savannah. The ports of Jacksonville and Charleston are more appropriate for the multiport analysis.

760V2-MM-231-EC113

Comment: There is a focus in the DEIS on discussing the growth of loea1 warehousing that serves as distribution centers in the immediate counties adjacent to Savannah Harbor. Given the identification of the study hinterland covering the Southeast US, distribution centers sited close to major retail destinations should result in major population centers in the Southeast US being the DC hubs within the study area. The focus on warehouse availability adjacent to Savannah appears to be a bias in assessing the economic impacts of SHEP. Centering DC clusters further away from Savannah will open the potential for competing ports in the Gulf/and Southeast US for these markets.

Response: Population is not always the driving force behind where distribution centers are located, though the Atlanta metropolitan area, located 200 miles away is home to 5.3 million people. Savannah is the closest major container port to Atlanta. The recent availability of affordable land, congestion at West Coast ports, the hinterland market and the types of commodities all played a strong role in the port's growth and in the decisions of private companies to locate distribution centers near the Port of Savannah.

Page 3-2

760V2-MM-231-EC114

Comment: This shift is potentially impacted by canal transit tariffs that could significantly rise after the completion of the canal improvements. There needs to be a sensitivity analysis performed to assess the relative routing advantages of all water versus ongoing use of US West Coast ports.

Response: As aforementioned, the project assumes the same volumes of cargo with or without a project (in a given year). Recent indications show that some of the market share has already been shifting from the west coast to the east coast. There are many underlying reasons for this (West Coast congestion, availability of affordable land at Savannah, location of outgoing products such as kaolin clay and poultry, among others).

760V2-MM-231-EC115

Comment: There is an ongoing competition between East Coast ports for additional through-put expected as a result of the Panama Canal expansion. The only way to effectively allocate throughput for a given port is to analyze the region as a whole. Then, and only then, can "a study should be made of various alternatives for the existing traffic and of new traffic susceptible to diversion from alternative harbors or other modes of transportation" be made. "In determining the likelihood of prospective commerce, particular attention should be given to alternative competitive harbors in the case of new movements and to hinterland traffic." (ER 1105-2-100)

Response: The Corps performed a multiport analysis (through GEC) for this project. The analysis concluded that deepening Savannah Harbor is not expected to result in diversion of cargo from one port to another.

760V2-MM-231-EC116

Comment: The NED analysis is based on no change in tonnage, origin, or destination of existing cargo trends. Thus the transportation cost savings benefits are based on the distances from origins to destinations. If there were only changes in destination, the transportation benefits would be much smaller. Accepting that cargo will divert via the Panama Canal to the East Coast regardless of a Corps project, the assumption that cost savings begin when a vessel sets sail from China is not valid. Given cargo is moving on these trade lanes defined in the commodity projections, a competitive port analysis should be the basis for transportation cost savings.

Response: The major economic benefits would accrue as a result of increase efficiencies that would be gained through the use of larger vessels. Those cost savings result from the lower cost per TEU to move each container with the larger vessels. Page 84 of the Economics Appendix describes how a portion of the total voyage costs was allocated to Savannah.

760V2-MM-231-EC117

Comment: This is Step 3. The Corps' 2004 study projected a TEU volume of 3.5 million loaded TEUs for Savannah in 2030. The Corps 2007 Regional Port Analysis forecasts 2.5 million loaded TEUs for Savannah in 2030. The current forecast for Savannah for 2030 is 4.9 million loaded TEUs. There is no basis for such a huge increase in 3 years, unless there is consideration for impacts of the Panama Canal improvements. If this is the case, the overall impacts should account for any offsets in U S West Coast TEU traffic, and transportation costs to their ultimate destination need to be estimated for later calculating benefits.

Response: The Corps assumes the same volumes of cargo with or without a deepening project. Recent indications show that some of the market share has already been shifting from the west coast to the east coast. There are many underlying reasons for this (West Coast congestion, availability of affordable land at Savannah, location of outgoing products such as kaolin clay and poultry, among others).

Comment: There is no sensitivity analysis to account for any canal transit fees levied by Panama, and affects such fees may have on relative costs between US West Coast transits and US East Coast transits for USEC FE cargoes.

Response: The \$72/TEU fees are not included in the total costs, assuming that tonnage is constant. These costs would be incurred with and without a project. If there are indeed increases in the marginal costs per TEU, the change would probably not be significant enough to warrant further investigation.

760V2-MM-231-EC119

Comment: Initially, Global Insight projected that imports would increase 80 percent from 2015 to2028 (Table 16). These forecasts were adjusted downward based on a one-year "trend" from 2007 to 2008 (as shown in Table 21), before the global financial crisis. Then, the GI forecasts were extended just four more years to 2032, and imports are now expected to increase by 127 percent from 2015 to 2032 (Table 22). Why and how is higher growth rates factored into the revised forecasts?

Response: Forecasts for container volumes are less variable over a long term than over short durations. Over shorter periods, short term events can have a dramatic effect, such as the commenter observed. Those short term events (both positive and negative) are smoothed out when long term predictions are made. The commenter identified large percentage changes in the imported container volumes between the tables, but the number of tons predicted in the later years did not change nearly as much – 20.9M tons in Table 16 vs. 18.3M in Table 22 for 2028. The forecasted volumes were smaller for 2028 in Table 22 than the previous table. Both tables contained displayed continuous growth in tonnage over the years. The fact that the tonnage predicted for 2032 in Table 22 would be higher than that predicted for 2028 is not surprising.

Page 3-3

760V2-MM-231-EC120

Comment: Import containerized tonnage is expected to more than double from 1015 to 2032 (Table 22). Export containerized tonnage is expected to increase only about 50 percent during the same period (Table 24). Yet, the ratio of total loaded export TEUs to total loaded import TEUs is assumed to be about constant (Table 26) at 70 percent for the same period. Therefore, the average weight of an outbound TEU should decrease.

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC121

Comment: This is Step 4. The analysis assumes that the equivalent of 25 percent of the PPX2 world fleet will be devoted to trade routes stopping at Savannah (Table 50). This seems to assume that Savannah will be one of the dominant world trade centers globally. There should be some kind of comparison to demonstrate that the largest container ships operating in 2030 will be most efficiently allocated to those trade routes as opposed to others, especially those not involving the USA, such as European trade with the Far East.

Response: Right now, the most efficient routes for PPX2 vessels are for the Asia to Europe trade, but over time more routes would be added as the containerized trade continues to grow and PPX2 vessels comprise greater shares of the world fleet. The deployment component of the TCSM applied the reduction of unit costs as a basis for switching from one class of vessel to another. The FE (Panama) trade route contains so much light cargo and given the low percentage of empties and vacant slots, vessels "cube out" or "volume out" at a low project depth. The savings can be realized with just a 44-foot project and by switching to PPX2. This is not the case for many of the other routes.

760V2-MM-231-EC122, 760V2-MM-231-EC123

Comment: This is Step 5. There is no effective analysis of commodity movements between one port to another within the hinterland market area for determining the potential for cargo diversions within US East Coast ports. Given assumptions in the study, each port that is closest in highway miles to a given hinterland destination should have all cargo allocated to that destination. International cargo traffic is based on a variety of factors, including adjacent markets to ports for immediate market access, comparative cost advantages to inland destinations, including both rail and truck. There is no comparative cost analysis for rail in the report, even though GPA claims the ICTP facilities at Garden City are expected to handle up to 25 percent of traffic in the future.

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening in Savannah would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah. The savings per TEU for the ocean voyage costs range from about \$10 to \$60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. At these levels of savings, and with landside trucking costs within the local area of Savannah are estimated to range from \$100 to \$150 each round trip, and movements outside of the local area are estimated to average \$1.50 to \$2.00 per round trip mile, there is not a sufficient differential to attract large amounts of cargo from

other ports. It is further believed that there are numerous other factors involved in port developments that would have a greater affect on cargo diversions such as new container yard developments, location of distribution centers, and landside transportation improvements.

760V2-MM-231-EC124,

Comment: Also, ER 1105-2-100 seems to require analysis of observed vs. apparent deviations from underkeel clearance standards to address this problem in application of the guidance. The use of 4 ft, even though the local guidance is 2 ft, must be demonstrated with empirical data, not based on an a priori assumption. This is especially true because the prevailing clearance at other ports is repeated cited as 3 ft.

Response: The underkeel clearances stated in the Appendix account for the dynamic condition and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC125

Comment: This is Step 6. There was no attempt to "determine transportation costs prevailing at the time of the study for all tonnage identified in Step 2 for alternative movements" (ER 1105-2-100). These alternative movements include shifts from movements via U.S. West Coast ports to U.S. East Coast destinations via land bridge, to all water services between the Far East and the U.S. East Coast.

Response: In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings indicate that deepening in Savannah would not result in substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed there would be no substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This basic assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 feet. However, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

Page 3-4

760V2-MM-231-EC126

Comment: This is Step 7. We did not have access to, nor could we review the detailed calculations used. We believe that the average draft of an outgoing vessel will be less than incoming vessels in the future and this trend will become more pronounced over time. However, it appears that problems related to Table 26 affect the analysis and overstate the benefits associated with outgoing vessels because the analysis seems to carry forward existing average weights per TEU. This does not account for the increasing percentage of empty export containers that are missing from Table 26.

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As

aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC127, 760V2-MM-231-EC128

Comment: NED benefits for harbor deepening arc based on design drafts. The load factor analysis in the report (sec. 3.4.4.1) does not account for the large proportion of empties that grow over time, due to increasing deficits in TEU export containers versus import containers. An attempt to utilize current weight and empty proportions given in Table 25 was used to show expected vessel utilization weights as a percentage of vessel weight capacity. The table below shows vessels will be significantly light loaded at Savannah, and resulting operating drafts are expected to be significantly shallower than design drafts. Table 25 shows a percent factor for empties by trade route and direction which does not relate at all to empty percent indicated in Table 33 of the load factor analysis. Any load factor analysis should be direction specific, as the variables vary substantially for export and import directions at most all US container ports.

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

Recall that the Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. A detailed directional deployment analysis would require knowledge of the "vessel manifests" for an entire journey. This information is proprietary. The study team used what was loaded and unloaded at Savannah. By applying average empties, bunkerage, and other factors, the study team could estimate the aggregate tonnage on a vessel at a given time given the vessel's draft.
Comment: The PDT had problems calibrating their model because vessels too often drafted more than design draft. They addressed this problem by reducing the amount of empties. It would seem that the proportion of empties should increase over time, decreasing the predicted drafts.

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years. This information will be included in the final report.

Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC130

Comment: This is Step 8. There is an assumption under without project that commodity forecasts can be handled throughout the project period. There is no capacity analysis of existing and future facilities at Savannah to demonstrate forecasted cargo can be accommodated. This comment in more fully documented in the Terminal Capacity Analysis.

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

Page 3-6

760V2-MM-231-EC131

Comment: The computation of NED benefits should account for the proportion of TEUs, which are part of the overall volume forecasts at Savannah. Empty container movements should not be counted in NED benefit computations.

Response: Empty containers are part of containerized shipping and comprise a non-cargo related component of a vessel's operation. Operating drafts are key to any Corps deep-draft study, so the

District accounted for empty containers, bunkerage, and ballast in the transportation cost savings model.

760V2-MM-231-EC132

Comment: Transportation cost savings are computed based on containers transiting the entire length of a given trade lane. There is no consideration that containers may be on or off loaded at an interim port, either due to an origin or destination along the route, or due to being transshipped at an interim port to a feeder vessel for final destination. These factors should be considered in applying the total vessel cost savings as NED benefits.

Response: The savings per TEU for the ocean voyage costs range from about \$10 to \$60 depending on the trade route distance, percentage of Savannah cargo and other factors. This is derived by dividing the "benefiting tonnes" on each trade route, by the ocean voyage transportation costs for the respective routes. Benefits were only claimed for cargo that was loaded or unloaded in Savannah.

760V2-MM-231-EC133, 760V2-MM-231-EC134

Comment: The most widely accepted model for estimating regional development is IMPLAN. Instead, the report includes a regression analysis relating harbor tonnage vs. personal income. Why tonnage instead of TEUs? Regardless, the chosen model should then be applied to projcc.1 construction related employment. Of the two models, only IMPLAN fits that purpose.

Response: Tonnage is the most common metric used in Corps navigation projects and it is used in developing the unit costs for the transportation cost savings. The vessel operating costs tables are also "tonnage centric", but also provide the TEUs.

The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the gain in the national benefits to the US as a whole. The NED benefits are comprised primarily of the reduced transportation costs as a result of project improvements. The savings are presumably passed onto US consumers and businesses in the form of lower prices. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project would shift business from one port to another, since that would not be considered a gain to the nation but merely a transfer from one region to another.

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include temporary jobs and income.

760V2-MM-231-EC135

Comment: The NED analysis would lead to little or no local (RED) impact on income because shipping volume supposedly remains unchanged. The GRR seems to claim no RED impacts, but it also seems to imply there are significant RED benefits at the same time. The real issue of benefit incidence would be how are the cost saving distributed between foreign producers, foreign shippers, American merchants, and American consumers.

Response: The economic analysis identifies where cost savings would occur as a result of the proposed action. For this project, the cost to move containers through the Garden City Terminal would decrease if the harbor is deepened. Corps guidance does not require estimation of how those cost savings are translated (i.e., lower commodity prices which would lead to additional exports, additional profits, etc.).

760V2-MM-231-EC136

Comment: Lastly, the Appendix repeatedly refers to the Federal discount rate as the OMH mandated discount rate. There is no such OMB mandate. It's the law specifically Section 80 of PL 93-251. Also, the Treasury Department calculates it, not OMB.

Response: Concur. The Corps has revised the final report.

Page 3-7

760V2-MM-231-EC137

Comment: Intro paints a grim picture. Why wouldn't some of the cargo move to deeper ports without project if that would be cheaper?

Response: It is possible that some cargo could move to deeper and often competing ports without a project, as mentioned. However, the Corps analyses do not indicate that is likely. In 2006, GEC performed a multiport analysis on various hinterland origins and destinations for several South Atlantic and Gulf ports, including Savannah, Charleston and Jacksonville. The findings suggest that there would be no substantial changes in the origins and destinations of imports and exports to key US markets served by Savannah. Given this study's findings, the SHEP economic analysis assumed that harbor deepening would not result in substantial changes in hinterland service area and therefore no change in overall cargo without and with channel improvements at Savannah harbor. This assumption is supported by the fact that PPX 1 vessels are calling Savannah in increasing numbers and are anticipated to call in greater numbers once the Panama Canal is enlarged.

In the draft report, it was assumed that PPX 2 vessels would call only if the channel were deepened to at least 44 ft; however, recent developments and carrier announcements indicate that even in the without project condition, PPX 2 vessels have and will continue to call at Savannah.

There are many reasons why ports successfully capture business that have nothing to do with harbor depths. In one recent example, Hanjin Shipping decided to leave Savannah Harbor and relocate to Jacksonville Harbor because the Port of Jacksonville gave them more control over their own terminal.

760V2-MM-231-EC138

Comment: Who owns/uses these large distribution centers? It is more efficient to locate them near major population centers. Define 40 mile "trade radius", and what is the significance?

Response: According to the GPA website, Wal-Mart, Kmart/Sears, Dollar Tree, Lowes, Ikea, Pier One Imports, Home Depot and Dick's Sporting Goods are some of the larger distribution centers in the region.

With respect to trade networks, there are many trade radii. One of the more commonly-cited ones is

the 40-mile trade radius. Recent information shows 30% of all imports remain within a 30-mile radius of Savannah Harbor; 70% of exports are within 200 miles of the port. This would include the Atlanta metropolitan region, home to 5.3 million people. The distribution centers servicing Savannah are established in that area for a variety of regions.

760V2-MM-231-EC139

Comment: A berth is a berth. Regardless of the number of operators, there is still a physical constraint to port facilities,

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

760V2-MM-231-EC140

Comment: The Corps should use a holistic approach to expanding/deepening port facilities in response to the deepening of the Panama Canal, not port-by-port analysis.

Response: The Multiport Analysis dealt with alternate routing to Savannah and was found to be reasonable by reviewers, including independent entities. The Congressional authorization of this project did not include the authority to conduct the requested analysis.

760V2-MM-231-EC141

Comment: Attributing SAV cargo growth to GPA success in attracting Des to greater SAV has limits, given slow population growth of greater SAV.

Response: The Port of Savannah experienced rapid growth for a number of reasons. Distribution centers setting up shop in the area is just one of the factors.

760V2-MM-231-EC142

Comment: The text seems to confuse vessel calls with the loading and unloading of cargo. It is typical for vessels to call seven days a week. However, it is not the practice 10 work weekends, especially Sundays. The Regional Port Analysis alludes to this

Response: While ports may not prefer to employ workers (gangs) on Sundays, they are gradually adopting their practices to comply with the international standards of the shipping industry, most of which involve a minimum of 6-day workweek and 16-hour days. Some ports now operate 24 hours a

day, 7 days a week, with only a handful of holidays throughout the year. For Savannah to approach their expected capacity, they will more than likely need to operate continuously.

760V2-MM-231-EC143

Comment: There were 32 separate classes in Table 5. It is difficult to track the analysis when it moves to only these 5 classes.

Response: Recall that Table 5 was intended to describe the world fleet in general (which was analyzed by MSI). Later the information was filtered down and presented the deployment patterns found to be more representative to North America, to the US East Coast, then ultimately to Savannah. The District debated over whether to keep Table 5 in the appendix because of this potential confusion, but decided to keep it in to depict the world fleet.

760V2-MM-231-EC144

Comment: Clarify the loaded LNG clearance requirement, if 90,000 ft then pretty much the entire channel and entrance must be cleared until berthing or departure from the entry bar of LNG vessel. Is this accounted for in HarborSym?

Response: The LNG safety zone requirement is included in the HarborSym analysis. The Georgia Port Authority stated that when a loaded LNG vessel in transiting the system, all other traffic is delayed until the vessel reaches the Elba Island terminal. Vessel traffic in the HarborSym model cannot be delayed by a specific class. Therefore, the 90,000-foot safety zone for the LNG class was used in the model as a way to keep all other vessel classes from transiting when an LNG vessel calls on Savannah Harbor.

760V2-MM-231-EC145

Comment: What is the basis for the values, especially for PPX class underkeel clearance? See main report page 104. 6.1.1(b), 2 ft underkeel?

Response: The underkeel clearances stated in the Appendix account for the dynamic condition and include squat, trim, and freshwater sinkage. Once these factors are netted out, the underkeel clearance requirements are representative of the standard practice.

760V2-MM-231-EC146

Comment: 42 ft channel provides 42 ft of depth 94% of the time, not 100%. What's this about, especially with overdredging and advanced maintenance?

Response: Reference depths are tied to reference datums of Mean Lower Low Water (MLLW). There are times when the tides are below the average of the MLLW, and therefore represent what is known as the extreme tide. In the graph, 6% of the time the tides will be below -42 feet. Depths identified as over-dredging and advanced maintenance are areas related to dredging and sediment storage; they are not reliable for use by vessels.

760V2-MM-231-EC147

Comment: Panama Canal max draft currently 39.5 ft. not 38.5 ft. (ACP Notice N,-2007)

Response: Concur. We have revised the report.

Comment: Statement that transport of empties causes problems with channel limitations doesn't hold water. Empties are lighter, only if exports nearly match imports is this true. The "problems' caused by empties as they relate to channel depth constraints does not seem to make sense.

Response: While it may not appear to make sense at first, recall that some trade routes predominantly deal with heavy exports so that it is possible for vessels carrying a significant imbalance of empties yet still requiring deep drafts. Smaller to moderate size vessels often do not have the marginal capacity to make opportunistic adjustments (in the form of carrying additional empty boxes).

760V2-MM-231-EC149

Comment: "The carriers emphasized repeatedly that East Coast ports would need to be able to receive loaded Post Panamax vessels upon Panama Canal expansion or risk losing services to ports which can accommodate this traffic.' How does this compare the without project assumption that Garden City will not lose traffic?

Response: Just because the carriers state that they will risk losing services to ports that are able to accommodate the traffic (or threatened to leave), doesn't mean it will actually happen. Savannah Harbor experienced rapid growth in spite of its present channel restrictions. The analysis assumes the same volume of cargo with and without a project.

760V2-MM-231-EC150

Comment: Using 2005-07 for the baseline, weighted toward 07, is not representative. At the top of the bubble. The data should be independently validated, GPA as sole data source has a vested interest in the project. What about waterborne commerce stats?

Response: The year 2005 was not a bubble, at least as Savannah was concerned. The commodity forecast has been updated to include historical data for tonnages, TEUs and other data of actual containership vessel calls at Garden City Terminal from 2005 through 2010. A regression analysis (2005-2010) was performed for each world region route and will be used to establish the baseline forecast starting point with the following exceptions. The ECUS Africa service has limited data (i.e., 2005 and 2006). Trade on this route is intermittent at best. Accordingly, a straight average was used. The FE ECUS EU PEN and FE ECUS PEN services were capped at 2010 tonnage levels versus using the regression results. This capping was performed due to the trend, which developed over the last few years whereby there has been a shifting of services that were originally on routes that use the Panama Canal to those that use the Suez Canal.

Route specific Savannah Harbor growth rates were then developed from a 2010 Global Insight South Atlantic Trade forecast (as performed in the original analysis). These rates were applied to the new forecast baseline to establish the long-term trade forecast (metric tons).

The narrative describing the reason for departure from the GI forecast and the methodology for developing the growth rates has been updated. The GI forecast was used to derive rates of growth/change and apply those rates to actual Savannah cargo information.

As for why GPA data was used, it is widely accepted that there is a time lag with obtaining PIERS and WCSC statistics. The data had been derived from history, pilots, harbor masters and from WCSC was found to be reasonable for this study. PIERS and WCSC data were used to calibrate the LFA model and to make adjustments, so the data was not entirely GPA's.

760V2-MM-231-EC151

Comment: Why is furniture the leading import commodity? If so, these particle board pieces are heavy. Why are impor1 TEU's far east so light (5.67 tons)?

Response: Furniture is the leading import, but recall that container vessels often carry a variety of items (heavy and light) simultaneously. Furniture could include very light bamboo chairs and pre-assembled plastic tables (which comprise a lot of dead space), not only heavy rubber wood or particle board. They may also include light weight packaging, which may occupy more space.

760V2-MM-231-EC152

Comment: Metric tons exported thru (Panama) greatly exceed imports, yet empties compose 67% in Table 25.

Response: See response to prior comment. There are fewer filled containers, but they are heavier. In fact, their weights are among the heaviest used. Thus, it is quite possible to carry half as many loaded boxes with a lot of empties and still draw that depth of water.

760V2-MM-231-EC153

Comment: Trade forecasts for what? How were they allocating 10tallmpor1S and exports between various harbors?

Response: The subsequent sections (Section 3.3.2.1 through 3.3.2.2) elaborate on the GI commodity forecast. They describe commodities and regions, rather than on a port-by-port basis.

Page 3-8

760V2-MM-231-EC154

Comment: Does putting Canada, Caribbean, Central America into NE Asia region skew the analysis in favor of Panama crossings? There is plenty of Canadian shipping thru the St Lawrence Seaway that has nothing to do with Panama.

Response: No. Most, if not all stops in Canada would presumably call at other North American ports, primarily those in the United States. Halifax is another port that is naturally deep. Long voyages generally result in shippers calling at many ports.

760V2-MM-231-EC155

Comment: Egypt would make more sense in Mediterranean than SE Asia.

Response: See response to prior comment. Egypt may be located in the Mediterranean, but serves as a main stopping point of the SE Asian voyages (and so it is likely to experience the same vessel traffic as a result of the SE Asian growth).

Comment: Half of the Imported TEUs from China. How long is this trend expected to continue? What if currency imbalances are corrected? This may sound like the macroeconomic question for the ages, but it must someday be addressed. As the K/L ratio increases in China and India the trade advantage from lower wages will diminish.

Response: Shipping research suggests that as the Northeast China market matures, the manufacturing centroid may relocate to SE Asia then possibly to India. It is less certain for Africa given their lack of comparable infrastructure. There is great uncertainty surrounding this in the near term.

Corps guidance on deep-draft navigation projects emphasizes using empirical data whenever possible and making forecasts over a 50-year period of analysis. Data on the past and present problems help shape the future without project condition scenario, which serves as a baseline for project formulation and evaluation. As one would expect, a 50-year forecast contains uncertainty, so several sensitivity analyses were performed using lower growth rates, no growth, and increased packaging densities. The results generally show project improvements would be economically justified under the alternate scenario.

Sensitivity analyses were performed using alternate growth forecasts, some of which address the concern about import growth from China. The types of sensitivity analyses were carefully developed by the PDT and reviewers, and capture the main sources of uncertainty.

760V2-MM-231-EC157

Comment: "The fastest growth will take place in developing countries." Fastest growth in NE Asia and slowest is with Africa. However, it seems likely that Africa may well host the next generation of low cost factories.

Response: Shipping research suggests that as the Northeast China market matures, the manufacturing centroid may relocate to SE Asia then possibly to India. It is less certain for Africa given their lack of comparable infrastructure. There is great uncertainty surrounding this in the near term.

Corps guidance on deep-draft navigation projects emphasizes using empirical data whenever possible and making forecasts over a 50-year period of analysis. Data on the past and present problems help shape the future without project condition scenario, which serves as a baseline for project formulation and evaluation. As one would expect, a 50-year forecast contains so much uncertainty, so several sensitivity analyses were performed using lower growth rates, no growth, and increased packaging densities. The results generally show project improvements would be economically justified under the alternate scenario.

Sensitivity analyses were performed using alternate growth forecasts, some of which addresses your concern about import growth from China. The types of sensitivity analyses were carefully developed by the PDT and reviewers, and capture the main sources of uncertainty.

Comment: Table 16 shows imports increasing by 80 % from 2015 to 2028. Table 19 shows exports increasing 38% during the same period. On page 38 is says "the rate of change in exports is slightly lower than that of Imports." Less than half the rate is not 'slightly lower". All of these figures are by weight which brings to question the claim that trade is balanced in the future.

Response: Concur. The text has been revised.

760V2-MM-231-EC159

Comment: Should show overall total annual rate of change rather than just by trade lane

Response: The Corps will consider this suggestion and include it if it enhances the tables.

760V2-MM-231-EC160

Comment: 50% increase in loaded TEU exports 2015-2032, 130% Increase in loaded import TEUs 2015-2032. 87% total TEU increase including empties. MTs Increase 63.2%. Since empties Increase as a percentage of export totals, this should lighten export transit vessels and decrease draft requirements. This table is misleading, In order to balance TEU cargo flows including empties for each year total Inbound and outbound container counts should match. This table needs to be completely redone because the Imbalance eventually reaches about 1.5 million TEUs annually for 2032 - 2064, or over 28% of all container movements at Savannah. Basic shipping 101 ; unless storing or off leasing containers locally, total loaded and empty TEUs Import and export should equate.

Response: While it may appear that there is an imbalanced loading for exports and imports, recall the distribution patterns in the Southeast. It is quite likely that a particular container may enter Savannah, be brought to a distribution center in central Georgia, then reloaded and exported at Jacksonville. As aforementioned, just because you have more empty containers doesn't mean the draft requirements will change significantly, since weight, stowage factors, port rotations and a host of other factors influence the amount carried on a vessel at a given time. The value of an empty container is not as worth as much as a loaded one, and there could be a large level of container "leakage" from the region. Some areas such as Anchorage have a glut of empty containers. Finally, it should be noted that the most recent commodity forecast shows a less dramatic split of exports and imports. In fact, imports no longer exceed exports tonnage-wise in the out years.

760V2-MM-231-EC161

Comment: An analysis was done to substantiate the conversion from tonnage in the commodity forecasts to TEUs. The conversion appears correct. A further analysis was done to evaluate the weights of containers loaded their average weights by service route and direction, and the percent of empties to determine how heavy vessels will be. Findings Indicate vessels will be loaded from under 50% of weight capacity to under 92% of weight capacity of the design vessel.

This means vessels will be utilizing far less than vessel design drafts in transits within Savannah Harbor, This should be accounted for In NED benefit calculations.

Response: Yes. The TCS model accounted for cargo and no-cargo use patterns of each trade route. Vessels generally did not reach their design drafts. Also, the empty to loaded TEUs were the MINIMUM percentages, not the average.

Comment: *Empty to loaded TEUs by route should change over time.*

Response: The empty to loaded TEUs were the <u>minimum</u> percentages, not the average. The average may indeed change over time. The Corps believes that using the minimum percentages results in a conservative assessment.

760V2-MM-231-EC163

Comment: refer back to Table 12

Response: The Corps will consider the suggested revision.

760V2-MM-231-EC164

Comment: How long can the US continue to grow imports that exceed exports? This relates to commodity projections and the assumption that Imports continue to grow unabated.

Response: Global Insight recently provided an updated commodity forecast, which provides growth rates lower than the ones used in the draft report. The GI database contained over 180,000 rows of cargo related data and based on an <u>unconstrained</u> forecast. As you noted, the capacity at Savannah is far lower than the forecast. The District truncated the cargo volumes for the out years when the 6.5 million TEU capacity at Garden City Terminal is reached. On a broader level, the trade imbalance is quite real and has been the focus of the current Administration's initiative to double exports.

760V2-MM-231-EC165

Comment: Have mercy on the reader and list the actual drafts. Why not use a numeric code instead of an alpha code?

Response: MSI's database categorized the world fleet in this manner. They are presented in this way to allow the reader to follow how the Corps used the input data to produce its calculation of expected economic benefits.

760V2-MM-231-EC166

Comment: Regression equations using natural logs almost always have an extremely high R2, so the correlation may be relatively meaningless.

Response: The R² was not intended to prove that there is a correlation between the number of vessels and containers (that's a given). The formula in the equation is reused to calculate the capacity and ultimately, the number of vessel calls. At the same time, the Corps applied MSI's vessel forecast, which shows a gradual replacement of smaller vessels in the world fleet with larger ones (and once the Panama Canal is completed, an entirely new vessel, PPX2, appears for many of the trade routes). The transportation cost model meshes the two forecasts together by assigning cargo on a fleet of vessels which change over time.

Comment: These Figures prove nothing more than the intuitively obvious that you need more boats to move more containers. However, this study is based on using bigger boats. How are these figures incorporated into the study?

Response: The R² was not intended to prove that there is a correlation between the number of vessels and containers (that's a given). The formula in the equation is reused to calculate the capacity and ultimately, the number of vessel calls. At the same time, we applied MSI's vessel forecast, which shows a gradual replacement of smaller vessels in the world fleet with larger ones (and once the Panama Canal is completed, an entirely new vessel, PPX2, appears for many of the trade routes). The transportation cost model meshes the two forecasts together by assigning cargo on a fleet of vessels which change over time.

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760V2-MM-231-EC168

Comment: The forecast estimates about 900 PPX2 vessel calls in 2025, with most (600+) going to SE Asia thru the Panama Canal or the Far East thru the Suez. A round trip on either route takes about B weeks. That represents equivalent of the full-time use of about 90 PPX2 vessels on these two routes alone, or over 15 %. Overall, it seems that more than 20% of the PPX2 world fleet is expected to be devoted to trade routes that include Savannah. For this to be a reasonable assumption, the GRR should demonstrate that carriers will deploy so many such vessels in these services based on cost efficiency relative to other routes throughout the world.

Response: While there are periodic realignments of vessel strings from time to time, recall that the 20% of the Panamax vessels are calling at Savannah right now, so it is not unreasonable to expect the assumed percentages in the future.

760V2-MM-231-EC169

Comment: The correct presentation of the equation should be: y = 0.3621 x + 105.718 TEU's Units are often omitted from equations/calculations (eg. box on p. 56) which makes following the logic employed more difficult than necessary.

Response: Concur. The Corps has revised the report to increase traceability.

760V2-MM-231-EC170

Comment: This is almost completely static. Hard to believe no sourcing shifts over the next 50 years. The sensitivity analysis is focused on absolute growth rates, but never addresses sourcing shifts.

Response: The information provided in Table 31 provides the aggregate share of tonnage for the PX and PPX vessels, so it is likely to remain static from that standpoint. However, recall that there are major shifts *across vessel classes* for each of the trade routes. The Corps included Table 31 to allow the reader to identify trade routes benefitting from the project.

Comment: *FE* (*Panama*) *route has 8.74% empties, while table 25 shows 67% empties for export to FE* (*Panama*). *The entire study should be consistent in applying directional analysis. TEU weights, vessel toad factors are very different import/export.*

Panama route has lowest Tons/TEU. Trade with S. America has minimum % empty of 30.24%, which is highest by far and yet the Tons/TEU Is the highest.

Response: The FE (Suez) route has 8.74% empties, rather than the FE (Panama) route identified in the comment. The FE (Panama) shows 6.46% empties. The 8.74% represents the <u>minimum</u> percentage of empties for that particular trade route. The 67% figure refers to the historical average. The percentages shown in Table 33 were minimums, not averages. These minimum percentages are input into the load factor analysis to correctly calibrate the model and determine the vessels' maximum practicable capacities. Not including these minimums in the model could potentially show vessels requiring too much draft. Trade routes are significantly different and reflect the wide variation in trade (weights, % empties, vacant, etc). The data in Table 25 was derived by actual data (and applied averages), with wide disparities for imports and exports. With respect to the South American percentages, with such heavy cargo, you would need to provide a larger number of empty containers to stay within the draft requirements.

760V2-MM-231-EC172

Comment: The POT assumes that vessels would load to their Max Practical Load Draft Given the volume of empties and average tons per container previously provided, this is not the case. Vessels cube out before reaching MPLD.

Response: This all depends. Refer to the response to the prior comment. With 30% empties, vessels would certainly cube out early in the loading and never reach their MPLD. The Transportation Cost Savings Model accounts for this as well (which prevents us from over-claiming benefits for those vessels). Each trade route, vessel class, etc. was evaluated separately.

760V2-MM-231-EC173

Comment: The sailing draft columns seem to be channel depths, but why would they vary by route? Why is max sailing draft 42.8 for ppx1 and 42.7 for ppx2 at 42 and both increase at 44 ft? What is the rational for different Max Practicable Sailing Drafts for the PPX1 and PPX2 well before the channel depths at which the maximum MPSO? An example in the text might be helpful to validate the calculation.

Response: The Corps has revised the labels in Table 35. The titles now read "project depth alternatives" with the MPSD making up the entries within the table. The Corps considered tracing the savings from loading of vessel, through the MPSD and benefits, but it was unwieldy for this appendix. A more thorough explanation can be found in the TCSM documentation, flow charts and annotated spreadsheets.

Note that there are vessels in the world fleet (and of which were incorporated into the model) that fell under the "Panamax" category, yet have design drafts greater than the Panama Canal. Such vessels have maximum design drafts of 44.02 feet and were applied to routes that bypassed the Canal (ECUS

MED and ECUS EU GULF). Moreover, these vessels are dictated mainly by their dimensions of length and breadth, and less so by draft (which can be adjusted to fit through the Canal).

760V2-MM-231-EC174

Comment: Is it appropriate to look at costs per ton instead of cost per container? Step 5. Determine Current Cost of Commodity Movements of ER 1105-2-100 seems to also require that costs Include transit fees at the Panama Canal. Are these fees, which are \$72 per TEU transit, included in the unit costs?

Response: The \$72/TEU fees were not included in the total costs, assuming that tonnage is constant since they are believed to be incurred without and with a harbor deepening. Any increases in marginal costs per TEU that may occur would likely be too small to warrant further investigation.

760V2-MM-231-EC175

Comment: It would seem that PPX2 vessels would be assigned to the most efficient routes in the world, Where are those? Analysis starts the PPX2 at 44 ft channel. The PPX2 becomes most efficient on the Panama Route at a channel depth less than any other route. Why? Need to explain.

Response: Right now, the most efficient routes for PPX2 vessels are for the Asia to Europe trade, but over time more routes would be added as the containerized trade continues to grow and PPX2 vessels comprise greater shares of the world fleet. Historically, the newest vessels have been first assigned to the Trans-Med routes, followed by the Trans-Pacific, the Trans-Atlantic, then finally, the North-South American routes. The deployment component of the TCSM applied the reduction of unit costs as a basis for switching from one class of vessel to another. The FE (Panama) trade route contains so much light cargo (readily hung textiles, finished products) and given the low percentage of empties and vacant slots, vessels "cube out" or "volume out" at a low project depth. The savings can be realized with a 44-foot project by switching to PPX2. This is not the case for many of the other routes.

760V2-MM-231-EC176

Comment: Upon further discussions with the PDT and reviewers, the POT changed their assumptions slightly by applying a 140 percent replacement ratio of PPX1 vessels.' 140 % does not seem to be a slight change. What is this adjustment as opposed to say 120%, based on? It seems odd that the adjustment is only from PPX2 to PPX1 vessels at 42 ft. This narrative seems unclear and leaves the adjustment seemingly arbitrary.

Response: The 140% figure was derived by the gain in vessel capacity from a PPX Gen1 vessel to a PPX Gen 2 vessel. There is a range of capacities for each type of vessel, but we took an average TEU capacity (8700 TEUs/6200TEUs) to derive the 1.4 or 140% gain. The 42-foot project represents the without project condition.

760V2-MM-231-EC177

Comment: What does the 140% replacement ratio mean? In the w/o project condition, (42 ft), w/ no PPX1 vessels, the PPX2 vessels are increased by 5% in 2015 to 24% in 2032. Also, the only difference between the adjustment and no adjustment at 48 ft Is 1 fewer PPX1 in 2020 and one fewer PPX2 in 2025.

Response: We are unsure that the commenter is referring to the correct table. Table 39 shows no PPX2 vessels and numerous PPX1 vessels. The 140% replacement ratio accounts for the change in TEU

capacities between a PPX Gen1 and PPX Gen 2 vessel. For the FE (Panama) ECUS route, the unit cost savings begin at the 44-foot project alternative, so it makes economic sense for a shipper to begin using PPX2 vessels at that point. Subsequent deepenings have no impact on the number of vessel calls. For the ECUS MED route, one in which the cargo is heavier, the savings (and adjustment) does not begin until the 46-foot project alternative (Table 40).

760V2-MM-231-EC178

Comment: Why are there 279 PPX2 vessels at 44 ft in 2020 and only 276 at 45 and 276 in Table 39? Looks like a typo.

Response: Concur. The final report includes the correction.

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760V2-MM-231-EC179

Comment: At certain depths it becomes economically advantageous to switch from a PPX1 vessel to a PPX2 vessel. The number of PPX calls that was predicted by MSI for its unconstrained channel could then be applied. (For the FE (Panama)-ECUS example, once the channel depth reached 44 feel, PPX2 vessels were deployed at Savannah.

Response: Concur.

760V2-MM-231-EC180

Comment: Comparing table 41 with table 25 P. 42, FE trade looks like about 1300 import TEUs per PPX1 Call and 1800 TEUs per PPX2 call at -48'. Import only. Why no such analysis of exports? Why show Gulf when benefits primarily to Panama and Suez services?

Response: The numbers should not completely reconcile. MSI prepared their vessel fleet forecast using a different commodity forecast (which was a higher, unconstrained forecast). This was undertaken prior to the release of Global Insight data. The MSI forecast had assumed a constant capacity and a constant share of Savannah cargo. Nonetheless, the Corps was able to use MSI's vessel fleet forecast as a baseline and made adjustments to certain conditions when meshing the: (1) the Load Factor Analysis, (2) share of Savannah cargo allocated to the trade and (3) a different forecast. The District provided two examples Panama and Gulf as a means of allowing the reader to trace routes other than the primary benefits. It also performed an analysis of exports as well, but only displayed the calculations for the imports. The transportation benefits to the Gulf trade route was minor compared to some of the others (See Table 57).

760V2-MM-231-EC181

Comment: The residual forecasted tonnages left after allocation to the Sub-Panamax and PPX vessel classes were then allocated to the Panamax fleet. The number of vessel calls required by this class was based on historical averages of Savannah's share of vessel capacity for the Panamax vessel class: These statements seem to contradict themselves. How does the residual tonnage magically match the historic share?

Response: Instead of saying, "historical share" the Corps has revised the text to read, "historical utilization of Panamax vessels". The final report also provides an example for a particular route, e.g.,

Panamax vessel use for imports is 17% to derive the number of Panamax calls." The historical share is one of the assumptions for vessel loading.

760V2-MM-231-EC182

Comment: Sums are often off by one. Net savings between 46 ft and 47 ft is 0 PX voyage in 2015 (after correcting math), 5 PX In 2020, 9 PX in 2025 (after correcting math), and 11 PX voyages in 2032.

Response: Concur. The TCSM computed partial vessel calls. When the District removed the decimal places, there were some rounding errors. The final report includes a revised appendix.

760V2-MM-231-EC183

Comment: 1. Not an assumption, but a fact.

6. Question the need for 4+ ft of underkeel clearance.

8. Avg. weight per container should include empties and differentiate between imports and exports. Vessels exceed MPD 85% of time? This should be substantiated by specific examples, as this assumption is critical to determining appropriate drafts for vessels in transit.

15. Does final comment mean that rerouting cost savings exist and benefit model somewhat overstates benefits by not allowing rerouting w/o a project? Under the without project cargo is likely to be rerouted to Charleston and Jacksonville. Likely in the with project condition, cargo would be routed to Savannah from Charleston and Jacksonville. This should be considered when computing benefits. Also, historic growth rates at SAV have been affected by labor lockout on W Coast in 2003, which has already given impetus for shift to SE US ports. Hinterlands are not unique to a given port, especially in SE where CHS is less than 100 miles away and has rail/highway access as well.

Response: Assumption 1. The District believes it is worthwhile to remind the reader that Post-Panamax ships already call at Savannah. The text has been revised to state that they will continue to do so in the future.

Assumption 6. See prior response on underkeel clearance (and freshwater sinkage).

Assumption 8. The 85% figure represents the upper threshold used in the load factor model. This should read that vessels will be at or LESS than their MPDs 85 percent of the time. The District has revised this in the final report.

Assumption 15. Based on the findings of the multi-port analysis as well as dialogues with HQUSACE and reviewers, the assumptions of Savannah's cargo with and without project were found to be reasonable and that most, if not all, of the benefitting cargo claimed in Savannah was due to increased waterborne efficiencies. The West Coast lockout reverberated strongly in the shipping world and may have led to further shifts to the Southeast (we can add that statement on history). The District agrees that hinterlands are not unique to Savannah. Global Insight's commodity forecast contained an implicit hinterland analysis already. Finally, the District acknowledges that some minor cargo shifts are possible (and point it out in the report). However, the strength of the benefit-cost ratio of the overall project does not warrant further investigations of the potential minor shifts that would not change the justification or optimization of the project.

Comment: This table seems to be a duplicate of Table 42.

Response: Concur. Table 42 provides a snapshot of the number of calls, whereas Table 49 was displayed as part of the transportation cost savings analysis.

760V2-MM-231-EC185

Comment: The % World Fleet looks very high (sometimes 25%) for PPX2 vessels in the out years. At 42 ft, 32% share of PPX1 also looks very significant.

Response: See the response to prior comments on port rotations. Savannah is one of many stops on a voyage. Without a deepening project, many shippers would rely more on PPX1 vessels instead of switching over to PPX2 vessels, so 32% share is not unreasonable. Some of this share would shift with varying project depths.

760V2-MM-231-EC186

Comment: 'a certain share of each vessel's cargo was exclusive to Savannah." Yes, but how much of the cargo to Savannah is "exclusive to Savannah"? Some could have just as easily gone to Charleston.

Response: The box was intended to remind the reader that the District was careful not to claim benefits for the entire voyage, and tried to isolate cargo and voyage costs exclusive to Savannah.

760V2-MM-231-EC187

Comment: The equation is used to calculate Savannah fraction of cargo, but it is not done separately for imports and exports as is appropriate.

Response: Because the equation is ultimately used in allocating the voyage costs, the District only looked at the share of cargo in Savannah as a percentage of the total cargo for an entire itinerary.

760V2-MM-231-EC188

Comment: All of the cargo does not go the entire length of the voyage because of interim port calls en route. There should be a factor applied to account for cargo with origins or destinations other than the terminus nodes of the vessels' routes.

Response: The District applied a factor based on the proportion of share for total tonnage carried by itinerary to determine the percentage for Savannah. For example, Savannah may comprise 20% of tonnage on a vessel. How shippers decide to allocate costs is based on the cargo value and its perishability.

The Load Factor Analysis necessitated the use of averages to estimate the amount of cargo (and drafts) since containerships carry cargo destined for multiple ports loaded onto a vessel at a given time. Performing a true directional deployment analysis would require knowing the "vessel manifests" for an entire journey. This information is proprietary. The study team knew was what loaded and unloaded at Savannah. By applying average empties, bunkerage, and other factors, the study team could estimate the aggregate tonnage on a vessel at a given time given the vessel's draft.

Comment: Just a 1 % reduction in the commodity growth reduces vessel cost savings benefits by \$30 million (almost 30%). Also, a 1% increase adds fewer benefits than a 1% decrease. So, the economic analysis does not seem to be symmetrically sensitive 10 the commodity forecast.

Response: Concur. The benefits are not symmetrically sensitive to changes in the commodity forecast since the growth rates vary widely by region and corresponding impacts differ (Load Factor Analysis, baseline number of calls, savings, etc.. Some routes are more sensitive to growth rate changes).

760V2-MM-231-EC190

Comment: A 25% reduction in PPX calls reduces benefits even more than a 1% decline in commodity growth.

Response: Concur. The number of PPX calls is a bigger driver in the overall benefits calculations, as demonstrated by the sensitivity analysis.

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760V2-MM-231-EC191

Comment: Actually, the most successful greening initiative to dale seems to be the slowing of vessel cruising speeds 10 save fuel and reduce emissions.

Response: Concur. This particular sensitivity (loading containers more fully to maximize space) was suggested by one of the ATR reviewers. The District failed to find any literature surrounding this potential change in vessel packaging, but we still performed the sensitivity analysis to identify its potential effect. You are correct in saying that one way of reducing emissions is by running vessels at slower speeds. The Corps is in the process of developing vessel operating costs for a variety of vessel speeds, which will lead to greater precision in the future.

760V2-MM-231-EC192

Comment: No growth scenario. Vessels transportation cost savings benefits decline by more than half. While the b/c ratio is over 4 for the project as a whole and justification of a project is not sensitive to the forecast the size of the optimal plan certainly is. The NED plan is sensitive to the assumption that the forecasted commodities 'Hill move through SAV, regardless of the actual Garden City capacity.

Response: Concur. GPA has specific measures identified that would expand the capacity of its Garden City Terminal over time up to its 6.5 million TEU capacity to keep ahead of the expected demand. The Corps expects GPA to be able to expand the terminal's capacity as needed to meet demand.

760V2-MM-231-EC193

Comment: •overall results of the sensitivity analyses confirm that there is a strong likelihood that improvements 10 Savannah Harbor are well Justified economically and that the NED plan for Savannah Harbor is 47 feet." Disagree. There is no discussion of the relative likelihood of these sensitivity scenarios. The discuss focuses on the overall BIC ratio and the relevant discussion should be on the optimal channel depth. The sensitivity analysis does not conform to the requirements of ER 1105-2- 100 E-I0.e. (4)(b) to consider alternative user fees. Total TEUs in the future rely on cargo moving from west coast to east coast destinations after the Panama Canal is enlarged. However, as stated in the NYT (12 Dec 2010), •Officials in Panama are also expected to charge higher lolls for the canal to pay off the national loan that is financing the expansion, Those costs 10 shippers could offset potential savings in improved logistics.

Response: Reviewers requested "plausible" future conditions when developing each sensitivity analysis. The conclusions are meant to inform the reader that under most of the "plausible" sensitivities, project improvements would be economically justified and that the NED plan would be the -47 foot depth most of the time.

760V2-MM-231-EC194

Comment: What units correspond to the Y-axis? They appear to be seconds, which seems an unimaginable level of detail. This model estimates the number of seconds? If so, then most iterations are within a minute of each other. The discussion of the Harbor Sym model does not list all specific variables or their distributions. If indeed the output variable is seconds, the average vessel IS in the system just under 35 hours. This computes. based upon 2032 vessel calls to just Garden City (over 3000) This would put 12 vessels In the system every moment of every day on average trying to use only 9 berths at Garden City. If the outputs are measured in hours, hours of vessel time in harbor? Transiting channel? For what year? With or without which meeting areas?

Response: The Y-axis displayed on Figure 34 is in hours. The HarborSym model calculates the average time for the entire vessel fleet in the system as a whole for each iteration through the model. At the end of the iteration, an average time in the system is provided for the fleet. After running multiple iterations, an average time in the system can be calculated by evaluating the results for each model iteration. Figure 34 demonstrates the similarity for the average time in the system through model runs 30 through 100. Therefore, 50 iterations was chosen for the calculations provided in the Economic Appendix.

760V2-MM-231-EC195

Comment: "The Pilots indicated that they currently -can meet all vessel classes using the harbor now including two post Panamax vessels'. Does the model ever allow vessels to meet w/o project? If not, it overestimates benefits.

Response: The pilots have indicated that two light loaded Post-Panamax vessel could meet within the current channel configuration under pristine channel conditions. However, the proposed deepening would maintain the current side slopes of the existing channel, thereby reducing the channel width for each additional foot of depth. The harbor pilots indicated that with the channel deepening, the conditions required for two light loaded Post-Panamax vessels to meet would become extremely rare. The HarborSym model assumes that two Post-Panamax vessel would not be able to pass within the system without including a meeting area within the inner harbor.

760V2-MM-231-EC196

Comment: Do LNG vessel restraints account for 90,000' clearance as required? What about advance shutdown of channel in advance of LNG arrivals/departures to insure safety range of vessels? Berthing duration assumptions are crucial for terminal capacity analysis.

Response: The Georgia Ports Authority and the harbor pilots indicated when a loaded LNG vessel is in transit, the remaining transiting vessels are delayed until the LNG vessel has reached the Elba Island terminal. The HarborSym model is not capable of delaying other class vessels due to the transit of a particular vessel class. Therefore, the 90,000 foot safety zone was included so that when a transiting LNG vessel entered the system, all other traffic would be delayed until that vessel reaches the terminal.

760V2-MM-231-EC197

Comment: Why does one meeting area need to be 4.000 ft long and the other 8.000 ft long?

Response: As stated in the Engineering Appendix Section 6.3.3, there are two meeting areas included in the project designed for two SHEP design vessels (Susan Maersk) to meet. Meeting areas provide locations for the design vessels to be able to meet in transit to avoid delays that would otherwise be incurred if a vessel had to either wait in the entrance channel or at dock until a design vessel had exited the channel. For Savannah Harbor all "passing" lanes are defined as meeting areas. "Passing" is typically defined as ships overtaking each other. "Passing" in this sense is not practiced in Savannah Harbor, therefore any subsequent reference to "passing" shall be understood as "meeting". The two meeting areas are located at Long Island Range and Oglethorpe Range. At the Long Island Range, ERDC determined through model runs and pilot input that a 100-foot wide and 8,000 foot length meeting area would be required for vessels to meet safely with 1,000-foot transitions back to the navigation channel width. The final location (center of range) was determined by consultation with the pilots. The location 13+000 to 23+000 including transitions).

For the Oglethorpe Range, a width of 100 feet from Station 54+800 to 58+800 (Station 54+800 to 60+700 with transitions) was used in the ship simulation runs and determined to be adequate. Ship simulation track plots showed that pilots could operate within that 4,000-foot length (but required the full length), so no further restriction in length was evaluated. Details of ship simulation for these two meeting areas can be found in the March 2009 document titled "Memorandum Subject: Savannah Harbor Simulations Study 2009" which is included in the Supplemental Materials of the Engineering Appendix to the GRR..

760V2-MM-231-EC198

Comment: The bigger the ship, the longer time it spends at the dock. Container fleet averages may be 16 hours currently, but they will Increase significantly with larger vessels. The 16 hours claimed needs to be substantiated.

Response: Currently, the average Container vessel remains at the dock for approximately 16 hours. The Georgia Port Authority indicated that as container traffic increases, they would continue to add additional cranes at the Garden City Terminal to offset the added work that would be required to offload larger container vessels.

760V2-MM-231-EC199

Comment: Calls to the LNG terminal forecasted to increase from 1 every 3 days to 1 every other day. Each vessel stop involves two 4 hr periods of an essentially closed the harbor. In the future, that's 4 hrs a day that the harbor will be closed to other traffic. Text notes that the number of LNG vessel calls may reach 200 annually. **Response:** The report states that 200 calls might occur if the facility operates at 100% capacity. The estimated increase in calls used in the HarborSym analysis begins at 60% in 2015 to 80% in 2030, or 167 annual calls. The 167 annual calls equates to one call for every 2.2 days. As of 2008, no domestic LNG facility operates greater than 50% of its facility capacity.

Page 3-12

760V2-MM-231-EC200

Comment: Why end the growth in 2030 and not 20657 Harbor Sym should have growth beyond 2030 inputted. This anticipates about 10 vessel calls dally over and above the containers going to Garden City, In total, there win be about two transits an hour for each hour the channel Is not closed due to LNG movements. One would expect more of the unexpected and more variability in the system time than illustrated in Figure 34, and therefore we also question whether only 50 iterations is sufficient. Given 3000 container calls to Garden City in 2030, 3000 general cargo calls in 2030, and 200 LNG calls in 2030, a total of 6200 vessel calls equates to about 35 vessel transits daily at Savannah Harbor, not including traffic on the Intercoastal Waterway.

Response: The future fleet forecast ends when container volume at Garden City is estimated to reach the terminal's capacity. A total of 50 iterations was run in the HarborSym model after an initial 100 iterations was run demonstrating that the total costs for each vessel class remained consistent after about 40 iterations. The total number of calls in the general cargo class includes all traffic entering Savannah Harbor, including traffic associated with the AIWW.

760V2-MM-231-EC201

Comment: What is the purpose of analyzing observed sailing drafts limited to tide delay and meeting areas? Assume it also relates to the vessel cost savings.

Response: The TCSM estimates ocean voyage costs and savings. Sailing drafts of container ships vary considerable throughout their voyage. To measure ocean voyage costs, forecasts of sailing drafts are not necessary; however estimates of total cargo carried and Savannah import and export amounts are needed. Analysis of sailing drafts when vessels called Savannah was performed and used to make estimates of total cargo carried and Savannah's cargo share of vessel utilization. To reasonably estimate in-harbor costs of operations and delays, analysis of historical sailing drafts and predictions of future sailing drafts were performed, as they are necessary variables in the calculations.

760V2-MM-231-EC202

Comment: By definition, a Panamax vessel can only draft 39.5 feet. Panamax vessels are designed to transit the canal under loaded conditions at this draft. To claim that Panamax drafts significantly greater that this depth limitation does not make sense.

Response: Many vessels in the world fleet are classified as "Panamax vessels" but have design drafts beyond 39.5 feet. In fact, there was a sizable number of Panamax vessels used in the TCSM with design drafts up to 44 feet. The dimensions of a Panamax vessel are dictated mainly by length and breadth of the Canal, since those characteristics are fixed and not often adjustable (a vessel's draft can be adjusted to safely transit the canal). The 44-foot design draft vessels would need to sail light loaded through the Canal.

Comment: Why would this be sensitive data?

Response: It is considered proprietary information by the companies supplying the data.

760V2-MM-231-EC204

Comment: There is no obvious reason why the Panamax sailing drafts below 38 ft would change as channel depths increase. These are unaffected by the channel constraint. Those are 86% of traffic al Savannah and 61% elsewhere. The historical data in Table 105 indicates aboul2100 Panamax Vessel transits annually in or out of Garden City. Then, Table 106 relies on a subset of data covering only two carriers responsible for only about 300 transits (?) annually. The smaller subset represents a significantly lower percentage of Panamax vessels sailing at or below 38 It. This equation makes little sense. Other Harbors Panamax /Some Savannah Panamax • All Savannah Panamax = Other Harbors Panamax. Some Savannah Panamax = Future Savannah Panamax It would make more sense to hold the percentage of Panamax vessels drafting at or below 38 ft constant as channel depth increases. Then that percentage may decrease as more Panamax vessels are expected to arrive over the time. This would have been an ideal assumption for sensitivity testing.

Response: Many vessels in the world fleet are classified as "Panamax vessels" but have drafts beyond 39.5 feet. A sizable number of Panamax vessels used in the TCSM have design drafts up to 44 feet. The dimensions of a Panamax vessel are dictated mainly by length and breadth of the Canal, since those characteristics are fixed and not often adjustable (a vessel's draft can always be adjusted to safely transit the canal). The 44-foot design draft vessels would need to sail light loaded through the Canal.

760V2-MM-231-EC205

Comment: This equation could not be understood. However, the net effect seems to be directly using the percentages from Table 111 for all drafts greater than 40 ft for a 45 ft channel. This makes sense and no-one should care about shallower drafts for that depth of channel. So is this methodology, applying world-wide sailing draft distributions used throughout the spectrum of alternative channel depths considered?

Response: Yes. Worldwide sailing drafts (empirical data) were used in the development of sailing draft distributions for incremental channel deepening at Savannah.

760V2-MM-231-EC206

Comment: Says from IWR with Pilots assistance. Main report says used assertions from the Pilots. What input did IWR have to this assumption?

Response: The determination or measure of underkeel clearance (UKC) applied in economic studies follows planning guidance that mandates evaluation of actual vessel operator and pilot practice, with adjustment as appropriate or practical for with-project conditions. General "rules of thumb" such as allowing 10 percent of the transit draft for clearance have been long superseded with efforts to evaluate actual practice because such guidelines tended to be conservative and overly generous in allowance compared to what is often actually employed or needed. With respect to reviewer concerns that the allowances of 4.0 feet seem more than needed or excessive, it may be of value to present a general discussion of allowances for underkeel clearance. Generally, practices for underkeel clearance are

determined through review of written pilotage rules and guidelines, interviews with pilots and vessel operators, and analysis of actual past and present practices based on relevant data for vessel movements. With regard to evaluation of data concerning actual practices, typically underkeel clearance is benchmarked or measured relative to measured immersed vessel draft in the static condition (i.e., motionless at dockside). Consideration of when a vessel is moved or initiates transit relative to immersed draft, tide stage and commensurate water depth allows one to reasonably evaluate vessel clearance throughout the duration of vessel transit within a given waterway. When clearance is measured in the static condition, explicit estimation or allowances for squat, trim, and sinkage are unnecessary as the pilot or vessel operator has already accounted for such influences within allowances observed. Alternatively explained, if a pilot or vessel operator is willing to move a vessel with three feet of clearance as measured in the static condition, this indicates that net clearance in the dynamic (moving condition) may be actually one and a half (1.5) to two (2.0) feet given allowances of perhaps as much as a foot to 1.5 feet for squat relative to speed, net changes in trim, and degree of influence for sinkage (where applicable). Evaluation of all movements renders a distribution of underkeel clearances, with many observations or vessel movements employing more than is needed simply due to timing and varying degree of unconstrained drafts for relatively smaller vessels. Evaluation of minimized clearance (i.e., some level of clearance below which operators or pilots will not move a vessel due to concerns for insufficient safety) helps to quantify the window(s) of time each day a given vessel with a specified immersed draft can be moved relative to tide. Given the measurement of clearance in the described manner combined with input from pilots on their practices has revealed that underkeel clearance in Savannah is slightly more than many US coastal ports.

General evaluation of practices for underkeel clearance at most coastal ports in the United States has revealed that clearances for all vessel types are often 2.0 to 3.0 feet measured in the static condition for many historical fleets having Panamax or lesser service, with an average of approximately 2.7 feet for vessels of Handymax up through about Panamax size. Most coastal ports also have comparatively limited runs or distances between ocean approaches and dock facilities (i.e., less than 20 miles) so loss of tidal advantage during transit is less of a concern compared to that at Savannah. Regarding vessel size under with-project conditions, it is understood that most post-Panamax vessels need more clearance depending on blockage factors, currents, and relative confinement of the waterway with most post-Panamax containerships needing about 3.3 to 3.6 feet for vessels with breadths of 120 to nearly 150 feet, lengths overall (LOA) approaching 1,150 feet and summer loadline drafts of 46 to approximately 49.0 feet. At Savannah, the required clearance for vessel sizes of Panamax and up through the first generation of post-Panamax hulls (approximately 123 feet in breadth and up to approximately 1,120 feet in length) based on pilot guidance and actual experience is approximately 4.0 feet. The additional margin above 3.3 to 3.6 feet is due to time for the relatively long run upriver and downriver between the ocean approach and dock facilities (about 25 miles), currents and blockage, and the notable change in salinity and resulting influence for sinkage associated with the more prevalent freshwater environment upriver. During the course of studies, it was discussed with the pilots whether the larger classes of containerships (beyond first generation post-Panamax hulls) would require more clearance. The pilots indicated that larger hulls would likely require some increase in underkeel clearance to maintain an acceptable level of safety, though how much had not been determined. Given experience with hydraulics of the waterway, past traffic, and the relative stability in clearance allowances based on size progression from Handymax and Panamax through first generation post-Panamax, the Corps asked if another quarter of a foot would be sufficient. The pilots indicated this would be acceptable for study purposes, with the estimate rounded up to the nearest tenth of a foot (to

4.3 feet) as ultimately applied for analysis of second generation post-Panamax containerships. Given the preceding discussion concerning distance for transit and freshwater influence characteristic of Savannah Harbor, the allowances for underkeel clearance applied for studies of Savannah Harbor are considered reasonable and consistent when compared to other deep-draft harbors situated along the coastline of the United States.

760V2-MM-231-EC207

Comment: This model, unlike the vessel cost model, is run for 2030.

Response: The transportation cost saving model and the HarborSym model were run for the year 2030.

760V2-MM-231-EC208

Comment: There seem to be 7 existing turning basins. Can these ever be used as meeting areas?

Response: The lengths of the existing turning basins do not provide the required distance necessary for two Post-Panamax vessels to meet within the system.

760V2-MM-231-EC209

Comment: These tables need more descriptive titles. For 135 LNG & Panamax. why do avg. transit costs go down from 2015 to 2020 and up for other vessels? The costs are transit costs and they are multiplied by the number of calls. Is there a misnomer, or should these values be doubled to reflect transits Instead of calls?

Response: The numbers provided in the tables display the number of calls, not transits, for each vessel class. The final reports include revised table headings to indicate that the numbers provided or for annual calls. The average cost for the Panamax class decreases due to the reduction of the total number of annual calls.

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760V2-MM-231-EC210

Comment: Meeting area benefits are at FY2010 costs. Report does not seem to mention the price level that Transportation costs savings were estimated at. All tables displaying benefits should always display price levels and, if applicable, the discount rate.

Response: The numbers provided in the draft report for the transportation cost saving model were at the FY2010 price level. The numbers in the final report are at FY2011 price levels.

760V2-MM-231-EC211

Comment: Meeting area costs are al Oct 09 price levels. So, FY 10 means Oct 09?

Response: The fiscal year for the Federal government begins 1 October for each year. Therefore, the beginning of Fiscal Year 2010 is October 1, 2009.

Comment: Why do the meeting area benefits go down after 2030? Why does the ratio of benefits for two areas to the sum of benefits for individual areas steadily decline from 2016 to 2030? See Meeting Area Benefits table below.

Response: The ratio of benefits varies based on the arrival of the anticipated calls. The HarborSym model was set up so that each call is based on a random date and time for each scenario run. The calls are random to account for uncertainty in operation of the future fleet.

760V2-MM-231-EC213

Comment: The Incremental costs do not seem intuitive because they have no consistent trend. The same can be said about O&M in Table 127.

Increment Of Meetin	al Cost g Areas
45 ft	\$278,253
46 ft	\$159,339
47 ft	\$413,956
48 ft	\$389,723

Response: This table has been updated in the final reports. However, there is still not a consistent incremental change in costs between channel depth alternatives. This is the result of differences in unit dredging prices resulting from differences in bank height and efficiencies in dredging thicker layers of sediment.

760V2-MM-231-EC214

Comment: Operations and Maintenance was considered negligible. This Is due to the harbor being in equilibrium, meaning that there will be no increase in the amount of dredged material within the harbor due to the deepening. If the aerial extent of the channel is enlarged, the meeting areas widen the channel and the sides lopes where cost effective advance dredging occurs wilt be reduced.

Response: The Corps evaluated the effects on maintenance dredging as a result of the meeting areas. The analysis is contained within the GRR-Engineering Appendix, but is summarized as follows: The total shoaling volume for the harbor has remained essentially constant for many years, through several enlargements of the cross-section (both deepening and widening). The Corps believes that trend would continue with the proposed harbor improvements. As a result, it does not expect an increase in total shoaling volume if the meeting areas are constructed. It does expect the location of the shoaling to shift, with the shoaling that presently occurs in the navigation channel in those reaches to instead, occur in the meeting area where channel velocities would be lower than average.

760V2-MM-231-EC215

Comment: In modem times, ships should know well in advance when they can take advantage of the tide. Then they can slow to economic speed from service speed (Table 115) while in transit to minimize the cost of tide delays. This seems especially important for the PPXs which represent well over half the benefits in every decade.

Response: As demonstrated in Table 115 of the Economic Appendix, the hourly vessel operating cost of economic speed for a vessel at sea is higher than the hourly vessel operating cost within a harbor/channel. Vessel costs within the port are used in the HarborSym model. Therefore, if the costs

are associated with an increase in the overall transiting time of a vessel rather than once the vessel arrived at Savannah, the benefits generated would increase.

760V2-MM-231-EC216

Comment: Why are benefits so often negative for the LNG vessels?

Response: LNG transiting costs increase due to the safety zone required when this class vessel calls on Savannah Harbor. As the number of container vessel increase, the delay times associated with the LNG class increase.

760V2-MM-231-EC217

Comment: Do meeting area benefits assume tide delay? Do tide delay benefits assume cannot meet? If the answer to both is yes, you can't sum them. The must be done incrementally.

Response: The tide and meeting area benefits are calculated incrementally. The tide benefits are calculated assuming that two Post-Panamax vessels cannot meet within the channel. The meeting area benefits are calculated independent of the tide delay at each proposed channel depth.

760V2-MM-231-EC218

Comment: This should include a discussion of distribution centers

Response: Additional information has been added to the text to describe the distribution centers located in Savannah. However, the intent of Section 7 is to summarize the efforts performed for the GEC evaluation. Accordingly, distribution center information has been added to Section 2 of the Economics Appendix.

760V2-MM-231-EC219

Comment: *RED is limited to the entire State of Georgia while South Carolina is on the other side of the river.*

Response: The study team has rerun the EIFS model to include the State of South Carolina. The final reports include an explanation of the model and the results.

760V2-MM-231-EC220

Comment: This relationship should not be considered as the impact of traffic on income because the model does not explicitly reveal the causal relation." If the same amount of tonnage moves with or without project, then there seems to be no RED benefit. If delays are reduced, then local pilot hours will decrease, so the REO impact may slightly increase GSP.

Response: A revised regional economic development analysis has been provided in the revised report.

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760V2-MM-231-EC221

Comment:

Yr	Long Island	Oglethorpe	Long Island/ Oglethorpe	LI&O (LI +0)
2015	7,699	20,861	24,792	87%
2016	57,150	63,305	105,597	88%
2017	106,601	105,748	186,403	88%
2018	156,051	148,192	267,209	88%
2019	205,502	190,636	348,015	88%
2020	254,953	233,079	428,821	88%
2021	306,608	274,069	501,972	86%
2022	358,263	315,058	575,123	85%
2023	409,918	356,047	648,274	85%
2024	461,573	397,037	721,426	84%
2025	513,228	438,026	794,577	84%
2026	604,649	515,518	917,184	82%
2027	696,070	593,010	1,039,791	81%
2028	787,491	670,502	1,162,398	80%
2029	878,912	747,995	1,285,005	79%
2030	970,333	825,487	1,407,612	78%
2031	916,739	730,351	1,336,737	81%
2032	863,144	635,215	1,265,863	84%

Table 3-3: Meeting Area Benefits (\$) (RE: Comment on p. 155, Table 124)

Response: The ratio of benefits varies based on the anticipated arrival of the vessel call. The HarborSym model was set up so that each call is based on a random date and time for each scenario run. The calls are random to account for uncertainty in operation of the future fleet.

760V2-MM-231-EC222, 760V2-MM-231-EC223

Comment: The Corps Study explores the impact of port operations in Savannah, however the methodology is weak and the region of study is improperly defined. Although the report does include a brief discussion of planned port improvements, it does not provide insights or analyses with respect to the stimulative economic impact of construction and equipping of new port facilities that have been planned by the Georgia Ports Authority (GPA) in connection with the Savannah dredging project.

Response: The Economic Analysis was performed under Corps guidelines and regulations, such as ER1105-2-100 and the more recent requirements for Independent External Peer Review. The commodity and fleet forecasts have recently been updated and incorporated into the final report. Given the uncertainty surrounding some of the variables in the transportation cost savings model, the study team performed 11 separate sensitivity analyses. All of the sensitivity tests show that project deepening is economically justified and, for most of the time, the project optimizes at the 47-foot depth alternative. The region defined in the study may have some slight overlaps with other ports, but as was explained in the response to Comment 760-JK-400-EC-100, potential shifts in cargo with or without a project would not be large enough to change the project's overall justification or optimization.

The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the gain in the national benefits. All economic benefits from navigation improvements ultimately accrue to individual entities. No

attempt is made to identify the distribution of these benefits in accordance with their geographic location or the extent of their participation in the economic cycle. Production, transportation, distribution, wholesale and retail selling, and consumption are all elements in this cycle. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project transfers business from one port to another (as that would not be considered a gain to the nation, but merely a transfer from one region to another).

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include jobs and income.

760V2-MM-231-EC223, 760V2-MM-231-EC224

Comment: "An impact report addressing Savannah Port operations should include the impact upon Chatham County (GA) and its surrounding communities, inducling those in South Carolina. Further, and as an extension to the work done by Wilber Smith, a separate and distinct report should be generated to understand the regional impact of a large capital investment like the proposed Savannah dredging project."

Response: The Corps evaluates its water resource projects from the National Economic Development (NED) perspective, which comprises the Federal objective and is defined as the net gain in the national benefits. The NED benefits are comprised primarily of the reduced transportation costs as a result of project improvements. In performing NED analysis, Corps analysts are mindful not to claim benefits if a project shifts business from one port to another (as that would not be considered a gain to the nation, but merely a transfer from one region to another).

In recent years, the Corps has undertaken additional analyses which focus on the Regional Economic Development account. In doing so, Corps analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include jobs and income.

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760V2-MM-231-EC225

Comment: On the cover of the report by the US Army Corps of Engineers it is explicitly stated that the expansion project is in Chatham County, Georgia and Jasper County, South Carolina. However, the report ignores any economic impact that would occur in South Carolina, thereby telling me that the economic analysis is seriously flawed.

Response: The Corps evaluates the feasibility of its civil works projects using procedures established by Water Resources Council. It must determine the benefits to the Nation that would accrue from a proposed action, not on benefits that may accrue to individual communities, states, or regions. The final reports include the Corps's evaluation of Regional Economic Development effects in South Carolina. Section 8 of the GRR-Economic Appendix is titled "Socioeconomic and Regional Analyses". Page 170 starts a section that discusses regional economic impact modeling that was performed using the RECONS (Regional ECONomic System) model. The model identifies the likely economic effects of a given

sized construction project. It estimates regional and national job creation and retention, and other economic effects such as income, value added, and sales. The analysis was performed at three geographical levels: Local, Bi-State and National. The local level consists of the area within a 40-mile radius around the project area. The Bi-State level includes the states of Georgia and South Carolina.

760V2-MM-231-EC226

Comment: The Corp's methodology uses a multivariate least-squares regression analysis to forecast impacts. It argues that additional tonnage at the port should generate additional income. While there is correlation with the activity, it is difficu. It to reach a reasonable conclusion about impacts in this manner due to the oversimplification that is inherent in the authors' approach. Realistically, the growth of income (or Domestic Product) should be highly correlated with additional tonnage but with variations that reflect local conditions, such as workforce make-up, availability of transportation and the presence or lack thereof of certain industries. Thus, an increase in tonnage mayor may not have an impact upon the state or substate areas. The economic impacts of a project will be determined by the mix of activity within a study area - which is the reason most economists use an input-output model such as IMPLAN to measure operational impacts.

From this economist's point of view, the inherent weaknesses of data, scope and analytical focus contained in the report make it impossible to obtain a reasonable understanding of the economic impact of pan operations at Savannah on the affected communities from a reading of either document. The Corps Study has not done an adequate job of assessing the operational economic impacts of the Savannah Pan or the construction and installation-related economic impacts of the planned dredging-dependent port facilities improvements at Savannah.

Response: There are many models that are all capable of measuring RED impacts; the models mentioned EIFS and IMPLAN are only two of these. IMPLAN can return more output on a micro level than EIFS for instance, but the choice of which RED model to use is a Corps option. The District is not directed by our guidance to use any specific model. There are more sophisticated models that can render still further detailed output about economic impact; for example, input-output analysis and econometric models. The costs of data collection and model specification, is at times a high penalty when choosing to use these more sophisticated approaches. EIFS, an economic base model, yields a very good estimate of changes in business volume, employment, income and population, based on regional economic theory. In over three decades of use, EIFS analyses are, in aggregate, comparable with more expensive, time consuming, and complex approaches.

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760V2-MM-231-EC227

Comment: The Corps Study makes an attempt to look at the regional impact of the dredging project. However, the methodology is weak and that the regional definition is inappropriate -especially given the fact that the Savannah Port expansion will physically affect Jasper County. Additionally, any impact model should include the impacts of capital investment. Although Section 3 of the Corps Study contains a description of planned improvements that go hand-in hand with the proposed dredging project, there is no discussion of the stimulative economic impact of such investments in that document or the impact on the tax bases of the impacted South Carolina communities.

Response: See responses to previous comments on this issue.

Page 4-1

760V2-MM-231-EC228

Comment: See Section beginning with "This analysis evaluates the assumed capacity of Garden City Terminal to determine baseline conditions under the Without Project condition. The Without Project condition at Savannah Harbor relies on several assumptions to define the baseline case, under which NED impacts as a result of improvements to the navigation features of the Savannah River up to Garden City Container Terminal and the Kings Island Turning Basin are determined."

Response: Under both the without and with project conditions, the Garden City Terminal will reach its build-out capacity [annual] in about 2030 at 6.5 million TEUs per year. This is the maximum number of containers that could reasonably be processed, based factors such as the size of the terminal, the number of gates that provide access to the property, the number and size of the berths, the number and size of the container cranes, the number of jockey trucks that move the containers within the terminal, how the containers are stacked within the terminal, and the number of railroads that service the terminal and the frequency of their trains. It is predicted that without deepening, more vessels will be required to transport the cargo that transits the port. With deepening, the total number of vessels decreases as they will be able to load/unload without the current constraints of draft. The firm Moffatt & Nichol conducted an analysis in 2011 which concluded that it is reasonable for the Garden City Terminal berth to achieve a 6.5 million TEUs throughput. The berth productivity required would not need to be particularly exceptional in that time frame.

MAYOR Jason Buelterman

CITY COUNCIL Shirley Sessions, Mayor Pro Tem Wanda Doyle Bill Garbett Frank Schuman, Sr. Kathryn Williams Paul Wolff



CITY OF TYBEE ISLAND

CITY MANAGER Diane Schleicher

> CITY CLERK Vivian Woods

CITY ATTORNEY Edward M. Hughes

25 January 2011

Colonel Jeffrey M. Hall District Commander U.S. Army Engineer District, Savannah Attn: PD P.O. Box 889 Savannah, GA 31402-0889

Re: Savannah Harbor Expansion Project Draft Tier II E.I.S. and G.R.R. Submittal to the Record

Dear Colonel Hall,

Subsequent to the 15 November 2010 Public Notice issued by the Savannah District, COE for comments regarding the above project, the City of Tybee Island has made two (2) submittals requesting additional clarifying or supplementary information (dated January 4th and January 13th, 2011). Moreover, along with representative(s) of the GA DNR, we met with both you and the District staff on 11 January 2011 seeking to receive data, analyses, or answers to questions posed by our 4 January 2011 Request for Additional Information (RAI). Unfortunately, it appears that the type, the extent and the nature of the responses requested for proper evaluation cannot be provided by the Savannah District to either the City of Tybee Island, or the GA DNR. At a 20 January 2011 Public Workshop on Tybee specifically held to address this issue, the City Council voted unanimously to *not* accept or support the present 13M cy disposal plan addressed by the above documents. For that reason, we are formally submitting the following information to the record in accordance with federal procedures required to solicit comment from private and public agencies, or parties directly adversely affected by the proposed federal actions.

PREFACE

The proposed deepening of Savannah Harbor to -48-ft in order to handle the new class of Panamax vessels will necessitate the removal of various types of material from the project entrance channel including varying amounts of beach quality sediment. Similarly, sediments containing some percentage of beach quality sand will be episodically removed with each subsequent maintenance dredging operation occurring within certain segments of the entrance channel. Up until the present time, very little beach quality material dredged has been returned to the littoral zone of the State of Georgia at this federal navigation project. Instead, most has historically been subject to incidental disposal at either the Jones-Oyster Bed upland spoil site, or in deeper offshore waters via the ODMDS.

Effective June 1, 2003 the *Georgia Law (O.C.G.A. 52-9-1, et. seq.)* was amended to specifically address impacts to the State's sand sharing system due to existing and future dredging operations. Previously, such operations were *not* consonant with appropriate regional sediment management and/or State policy. The Savannah Harbor Navigation Project construction, improvements and maintenance over the last century was a specific focal point for the enactment of this landmark legislation (*i.e.*, O.C.G.A. 52-9-1, et seq., amendments authored by Rep. Burke Day) due to its large-scale sediment budget impacts which have historically adversely affected Tybee Island.

Simplistically, the legislation requires that all *beach-quality sand* originating from the dredging of navigation channels within tidal inlets, as well as the improved entrances to harbors and rivers be required to be placed on the adjacent coastal beach, if possible. The law further requires that if such sand is placed elsewhere, an equivalent quality and quantity of sand from an alternate location be placed on the adjacent coastal beaches. Further, it requires the disposition of sand shall be completed by the person or entity undertaking the dredging.

For decades, the City of Tybee Island has maintained that the entrance channel portion of the federally maintained Savannah River Harbor Navigation Project was a root cause of beach erosion on Tybee Island. This opinion has been corroborated by numerous coastal engineers and geologists acting as consultants to the City over the years. More specifically, they have pointed out that the federal navigation project improvements at the mouth of the Savannah River which include rock jetties, a deep draft channel, and a submerged breakwater constitute a complete barrier to alongshore sediment transport. Many of these large scale improvements were initiated in the mid-1800's. Until 2006, the Savannah District's longstanding public position with respect to the City's claims as to impact has been that the navigation project was not at fault in causing beach erosion. In 2006, a channel specific impact study authorized by

Congress and performed by the Engineering Research and Development Center (ERDC), which is the inhouse technical arm of the USACOE nationally, corroborated that the existing Savannah Harbor navigation project was responsible for an estimated 80% of Tybee Island's long-term erosion – both onshore and nearshore. The fundamental impact of the navigation project was the longstanding modification of the naturally occurring sediment budget for the region and ensuing large scale changes in ebb tidal platform and insular morphology.

Historical Precedents – The Savannah Harbor Navigation project, historically, has not included the beneficial disposal of *beach quality* sand on the adjacent coastal barriers or in the active littoral zone. This has been primarily due to the maintenance practices that were established by the Savannah District with the inception of the navigation project over 100 years ago. Dredging technology that existed during the early history of the project dictated maintenance procedures and dredged material disposal practices. As a result, the "Federal Standard" for maintaining certain navigation projects, like Savannah Harbor, initially became the cost and impacts associated with hopper dredging and ocean disposal of the dredged material in water depths of 30 feet or more. With the advent of regional sediment management within the COE hierarchy nationally, that type of a "standard" resulting in resource loss is presently prohibited in most States.

The early establishment of the "Federal Standard" for maintenance of the Savannah Harbor project did not consider the cumulative long-term impacts of removing beach quality sediment from the littoral system. This was due in part to the limited coastal development that existed in the mid-1800's when such projects were first constructed, but also due to lack of sufficient scientific understanding of coastal processes and the sand-sharing system associated with tidal inlets and adjacent beaches. Subsequent decades of research by the U.S. Army Corps of Engineers and practical knowledge gained from the operation of numerous coastal navigation projects around the country has resulted in the realization that littoral material must be conserved. Natural supplies from rivers and streams are not replenishing littoral sediments, particularly on the East Coast of the United States. Accordingly, it is now recognized that the removal of a cubic yard of littoral sediment from a tidal entrance or inlet with deposition outside the active littoral zone of the beach will ultimately cause a cubic yard deficit somewhere within the sand-sharing system affected by that particular entrance or inlet. The impact of continual removal of sediment from the active littoral zone through channel maintenance is identified as a major cause of man-induced erosion in the U.S. Army Corps of Engineers - Coastal Engineering Manual (CEM). From an engineering perspective, the primary requirement for the Savannah Harbor maintenance program, apart from assuring that the channel remains navigable year-round, should be to prevent project induced erosion of the adjacent beaches, by conserving the limited natural resource, sand, through deposition directly on the adjacent beaches, or as allowed by

O.C.G.A. 52-9-1 et. seq. from an alternate source if determined to be more cost-effective - or more appropriate quality.

In responding to a relatively recent State of Georgia observation (*i.e.*, S. Shipman, GA DNR – correspondence dated August 2009) that beneficial use of dredge material from the subject project has been neither forthcoming, nor in compliance with the Shore Protection Act (as modified by O.C.G.A. 52-9-1, et. seq.) the Savannah District's public position has been that –

"If the State prefers a sediment placement plan that is different from that proposed by the Corps, the Corps could implement the State's proposal after receipt of the incremented additional cost of that alternate placement plan".

That is to say, the Savannah District's historic position has been that if additional costs are incurred for resource recovery in the State of Georgia (*i.e.*, *beach quality* sand), or strategic and constructive implementation of regional sediment management practices that are in the public interest, a third party – other than the District – should pay for the incremental cost of the action. This position is inconsistent with State Law, State policy, and CZMP precepts codifying same – or practices of the Corps to the contrary in other States. The City of Tybee Island notes that even if the Savannah District determined that strategic beach disposal of *maintenance material* resulted in additional cost, the Corps of Engineers, under authority of Section 207 of the Water Resources Act of 1996, can elect to use a more costly disposal method if there are overriding environmental and erosion control benefits associated with the more costly disposal scheme.

Interestingly, the "position" historically embraced by the Savannah District is neither emulated nor interpreted similarly by either the Wilmington District USACOE, to the north, or the Jacksonville District to the south. In contrast, within the State of Florida for example, *all* beach quality sediment removed from all federal navigation projects, as well as the maintenance of the Atlantic Intracoastal Waterway, is placed *on* the State's Atlantic and Gulf coast shorelines at essentially no cost to the State or local government. This is standard procedure in keeping with State law, policy and the Florida Coastal Zone Management Plan. Accordingly, all such federal projects in Florida (for maintenance as well as new construction) are formulated by the Jacksonville District, USACOE with this precept in mind.

State of Georgia CZM Plan Compliance – The City of Tybee Island, GA is of the opinion that ongoing maintenance activities of the Savannah District, USACOE, as performed for the Savannah Harbor Navigation Project entrance channel, fail to comply with the requirements of the Georgia law (O.C.G.A. 52-9-1, et seq. as amended). This law necessitates the strategic recovery (or in-kind replacement) of

beach quality sand removed from the coastal zone by dredging operations, whether they be by federal or non-federal interests. Accordingly, the City of Tybee Island, GA likewise opines that the Savannah District, as the federal navigation project sponsor, is *not* currently in compliance with the State's Coastal Zone Management (CZM) Plan.

Similarly, it is the City's opinion that future dredging activities necessitated by the proposed Savannah Harbor Deepening Project – navigation channel expansion activities, if constructed as currently planned without direct mitigation to Tybee Island for non-replacement of *beach quality* sediment, will likewise be inconsistent with the State of Georgia CZM Plan. This inconsistency includes the stated position of the Savannah District that the assessment of project related impacts in the National Environmental Policy Act (NEPA) process need only be limited to those discerned by the District to be "incremental" in nature. Reinforcing the City's opinions in this regard is the fact that the recent study sponsored by the Savannah District, and performed by the USACOE's Engineering Research and Development Center (ERDC) in Vicksburg, MS, has documented the existing navigation project to be responsible for approximately 80% of Tybee Island's long-term erosion. Both failure to comply with the Statute referenced above and the State of Georgia CZM Plan could in all probability jeopardize the basis for the federal Environmental Impact Statement (EIS) for the pending Savannah Harbor Deepening Project. It is the City's position that the project sponsors have ample options available to assure the placement of "beach quality" material in order to both comply with Georgia Law and likewise achieve consistency with the State's CZM Plan.

Environmental Review – A Draft (Tier II) Environmental Impact Statement (DEIS) and General Re-Evaluation Report (GRR) have been formulated and were released on 15 November 2010 for public comment. The District documents have acknowledged that the proposed Savannah Harbor Deepening Project will include certain "mitigation" items to be both funded (at an estimated cost exceeding \$220M) and constructed as part of the navigation project. These currently include, but are not necessarily limited to the following:

- · Adverse impacts to tidal wetlands, marshes, etc.,
- · Adverse impacts to the endangered short-nosed sturgeon,
- · Adverse impacts to Striped Bass,
- · Adverse impacts to the City of Savannah freshwater intake system, and
- Potential impacts to cultural resource (i.e., shipwrecks).

All of these items, as addressed by the draft project documents are to be directly funded as distinct elements of the navigation project deepening program. That is to say, the costs for these items will be a part of the construction program and cost shared by the two (2) project sponsors. There is however,

presently no direct mitigation intended for downdrift damages, new or historical, to the sandy *beaches* of Tybee Island as part of the Harbor Deepening Project, irrespective of the 2006 federally sponsored study findings to the contrary. *This is unacceptable to the City of Tybee Island*

Instead, the Savannah District has formulated a large scale dredged material disposal program which proposes to dispose of varying quality sediments either immediately seaward of the island Mean Low Water Line (MLWL) or farther eastward in the form of offshore berms, or other similarly configured disposal sites. Unfortunately, none of the subject dredge material in aggregate can be classified as "beach compatible" due to the presence of varying quantities of non-sand constituents (*i.e.*, organics and in particular clays). As a result, direct mitigation to Tybee's beaches resulting from the current 13M cy entrance channel sediment disposal plan cannot occur without significant adverse and undesirable consequences to Tybee Island, its citizens, its businesses and the general public which is dependent upon access and usage of the State's largest and most accessible recreational beach resource.

As either a result of our evaluations, as well as a lack of supporting information provided to the contrary within either the DEIS or GRR, or supplementary information recently requested from the Savannah District, the City Council of the City of Tybee Island has adopted the following opinions and associated positions regarding proposed federal disposal activities:

ISSUE – DISPOSAL SEDIMENT QUALITY

The subject DEIS and GRR documents propose the placement of sediments excavated from the navigation project entrance channel along some 14,200 lineal feet of oceanfront shoreline on Tybee Island. As proposed, the "sediment would be deposited at the mean low water (MLW) line and be allowed to mound up to MSL or mid-tide". If constructed as proposed, option MLW 500 would effectively extend the majority of the oceanfront intertidal beach located northward of the Tybrisia Pier seaward by some 500-ft. MLW 200 proposed to be constructed westward of the north terminal groin, would extend the beach seaward of the MLW line by 200-ft. As a result, both of these options are considered to be *direct* beach disposal and would constitute an extension of the most active portion of the beach profile in a seaward direction by significant distances. It is well known from both previous experience with *attempted* beach disposal at Tybee Island with sediments derived from the previous 1993 Harbor Deepening Project, *as well as* the project specific geotechnical data and analyses provided by the DEIS and the GRR, that the placement of significant volumes of non-beach compatible material would occur during the construction of disposal options MLW 200 and MLW 500.

The formulation of multiple disposal sites – for the currently proposed Harbor Expansion Project – appear to be heavily influenced by sediment quality analyses over the last decade or more performed originally for the assessment of annual maintenance related dredge material disposal. Moreover, sediment testing for new work does not appear to evaluate the probability of excavation of virgin material flanking the theoretical channel cross-section to be deepened which is prone to include seams or layers of marine clay. In this regard, sediment "quality" determinations have centered upon percentage of fines *only* and *not* grain size, probability of occurrence of consolidated layers or seams of marine clays, or other factors of concern influencing the quality of the dredge effluent proposed for beach disposal at or seaward of Tybee Island.

The same omissions, or mis-interpretation as to the probability of the nature of the sediments to be excavated and placed at Tybee Island likewise occurred in 1993 as part of the last federally sponsored Harbor Deepening Project. More specifically, in 1992 the GPA, their consultant, and the Savannah District, USACOE proposed to place some 1.2 M cy of Harbor Deepening sediment along the Tybee Island shorefront described at the time as being "beach compatible". As such, the overfill ratio for the sediment as computed by the District varied between 1.0 and 2.0. Had that been accurate, the material would have been of excellent quality and highly suitable for beach construction.

At the time, both the GA DNR and the City of Tybee Island accepted the project sponsors' determination and firm written assurances that the Harbor Deepening Project material *was* beach compatible and therefore suitable for constructing or re-nourishing the dry recreational beach within the limits of the authorized shore protection project.

Unfortunately several weeks after the initiation of beach disposal on Tybee, it was determined that the material being placed on the City shoreline was *not* as described by the COE or the GPA. That is to say, the fill berm that had been created by the dredge contractor over a several week period exhibited a very high percentage of non-beach compatible material and in particular significant quantities of clay (both mixed with sand and as varying sized "balls" or "clumps").

As a direct result, the federal 1993 beach disposal project operation (intended to be a 1.2 M cy "oceanfront beach fill") was terminated and the contractor was directed to fill only below the MLWL until the subject limited segment of channel widening/deepening was completed. In order to not result in a breach of contract between the COE and the dredge contractor, the City, the USF&WS and the GA DNR agreed to allow highly confined disposal directed seaward to the nearshore water to continue to occur. Accordingly, the remaining disposal work was reduced in scope and limited to the area north of and adjacent to the north terminal groin and *not* the more intensely utilized recreational beach southward thereof.
It is the opinion of the City of Tybee Island that insufficient analyses have been performed by the Savannah District to provide adequate assurances of sediment quality for the two (2) disposal options (i.e., MLW 200 and MLW 500) which are alleged by the two documents to be of "benefit" to the existing oceanfront shoreline.

ISSUE – NEARSHORE VS. ONSHORE (MLW 200 AND MLW 500) DISPOSAL OF DREDGED SEDIMENTS

The current COE disposal plan describes the Tybee Island MLW 200 and MLW 500 disposal sites as being "nearshore" fill operations (*i.e.*, not onshore). As such, the District has proposed the placement of sediment with up to 20% fines at the two (2) oceanfront shoreline locations. Similarly, the District has acknowledged the probable occurrence of clay balls. Documented experience with the 1993 Harbor Deepening Project necessitating disposal of similar materials from the dredging of the entrance channel likewise predicts the occurrence of a sandy/clay mix constituting the surface of the beach intertidal zone immediately after construction – in addition to clay balls.

It is the opinion of the City that the proposed two (2) MLW disposal sites intended for sediment placement along the Tybee Island shorefront are not "nearshore" as defined by the District but rather "onshore" disposal locations. That is to say, they propose to both widen and raise the existing intertidal beach. As such, any sediment placed at this location in the manner proposed must contain less than 10% fines (5% by State Standards), be free of clay balls, cobble or other objectionable material.

The DEIS, GRR and associated documents consistently confuse the concepts of "dry beach" construction and "nearshore" sediment placement. Conventionally, the latter is expected to occur seaward of the most dynamic portion of the beach profile at Tybee Island typically defined as the -10ft. (mol.) MLW contour – depending upon location along the island's shorefront. In its simplest sense, the seaward approximate limit of the active beach can be effectively defined as the seaward "toe of slope" of the existing beach profile. Nearshore disposal is considered to be seaward of the active beach but within the depth of closure where depositional features constructed can be moved by the local wave climatology.

It is extremely important to note that the Savannah District has clearly altered or revised their definitional scheme regarding the concept of "nearshore disposal" from what was previously presented in their report entitled "Environmental Assessment – Savannah Harbor Advance Maintenance of Entrance Channel, Savannah, GA" – dated December 2004. For example, pgs 9-11 of that document depict beach nourishment on Tybee Island as fill placement beginning at the MLW and extending seaward. Similarly,

that document defines *nearshore deposition* or disposal (as recommended at Tybee Island) as the placement of dredged material beginning some 1,000-ft. or more from the existing shoreline. These two (2) descriptions of varying forms, types or methods of sediment disposal at Tybee Island are therefore *not consistent* with those presently proposed in the DEIS and the GRR. As a direct result, the quality of the sediments proposed for construction of disposal options MLW 200 and MLW 500 is incorrect. The placement of material with up to 20% fines and with known quantities of clay balls is *not* appropriate at these two (2) locations.

It is the finding of the City of Tybee Island that as proposed, the nature of the new work sediments intended for direct disposal along the oceanfront shorefront is not of sufficient quality to be considered suitable for such an application. Simply changing the definition of the term "nearshore" does not justify the direct placement of inappropriate sediment along the oceanfront of Tybee Island.

ISSUE – OFFSHORE DISPOSAL OPTIONS

As part of a 13M+ cy disposal requirement for the expansion and deepening of the Savannah Harbor Navigation Project entrance channel (only), the DEIS and GRR documents propose the following additional disposal sites and sediment volumes located varying distances seaward of Tybee Island: ERDC nearshore (1.2M cy); Site 2 (3.2M cy); Site 2 Expansion (4.4M cy).

In justifying the proposed least-cost disposal and most operationally constructible plan for entrance channel dredged material, the subject documents consistently reference a 2003 numerical modeling study of offshore/nearshore sediment placement – seaward of Tybee Island performed for the Savannah District by the U.S. Army COE – Engineering Research and Development Center (ERDC). The latter modeling effort essentially addressed the currently authorized channel depth of 44-ft and the potential for beneficial use of an estimated 500,000 cy of material potentially dredged annually as channel maintenance. Accordingly, the subject numerical models and analyses did *not* address the currently considered disposal plan components for Harbor Expansion comprised of some 13M cy of sediment as described by the DEIS and GRR.

Furthermore, the 2003 ERDC study did not evaluate the placement of sediment along the MLW shoreline, such as proposed in the DEIS as the MLW200 and MLW500 disposal options. The DEIS proposed nearshore berm placement -- is 7 times greater in volumetric scale and significantly shallower in crest elevation than that modeled in the ERDC study. As such, it would magnify the predicted alongshore

effects of the berms many times over relative to that predicted in the 2003 ERDC study. Specifically, it is therefore logically expected that there could be much greater erosion along the north and south shorelines (and accretion at the north-central shoreline) than that predicted by ERDC.

The 2003 ERDC analysis did not consider the effect of the sediment properties in regard to its propensity to move onshore or offshore. Likewise, the ERDC analysis did not consider the granulometric size of the sand (non-cohesive) fraction of the material and its propensity to move shoreward versus seaward. The ERDC analysis did not specifically consider or compare the sediment quality – including granulometric size – of the berm material relative to the existing littoral environment; i.e., the beach or the nearshore seabed upon which the berms would be placed. Nonetheless, even if it the study had made such analysis – it would have pertained to maintenance dredged material and *not* the new-work dredged material proposed in the DEIS.

The City of Tybee Island is extremely disappointed to note that the Savannah District, COE has not provided any additional analyses (via numerical model) of the offshore berms, mounds or other offshore options beyond the initial study dated 2003. It is therefore the position of the City that neither the Corps nor the City can make an informed decision as to the extent and probability of littoral impacts resulting from the offshore disposal plan presented in the DEIS and GRR. The City therefore objects to their construction as proposed. This objection likewise extends to any and all disposal berms in use, or proposed for use, along the south side of entrance channel (in either State or Federal waters) until appropriate analyses have been performed.

ISSUE - BORROW SITE AND SAND RESOURCE IMPACTS

The City of Tybee Island presently has a federally authorized shore protection project which requires renourishment or maintenance on average every 8-years. The most recent renourishment was performed by the Savannah District, USACOE in 2008. Moreover, the last two (2) dredging operations implemented by the District utilized an offshore borrow site located approximately 6,000-ft seaward of the southern end of Tybee Island. Future development of that borrow site over time is expected to occur in a northerly direction. A significant concern raised by federal resource agencies in the permitting of the last borrow site excavation associated with alterations in sediment composition (*i.e.*, principally a potential accumulation of fines). It is presently the City's finding that the nature and extent of currently proposed offshore disposal of Harbor expansion project sediments with high percentages of non-sandy material (*i.e.*, fines consisting of organics and clays) will constitute a direct threat to the continued use of the subject borrow area. This potential phenomenon was not acknowledged by either the DEIS or the GRR. Interestingly,

any reference to the existence of the borrow site is completely omitted in the documents. As a result, the borrow site was not addressed by the 2003 ERDC modeling study noted above. The results of the ERDC report which do address magnitude and directionality of existing and future sediment transport seaward of Tybee Island clearly indicate that disposal material would be expected to move from one or more of the ERDC Disposal feature(s) in the direction of the borrow site.

Accordingly, the City is in opposition to any offshore disposal alternative which would adversely affect the subject borrow site and sand resource necessary for future beach restoration at Tybee Island. It is the City's opinion that the existing 2003 ERDC modeling study clearly indicates the probability of such an occurrence, considering the nature and extent of the disposal features proposed by the GRR and DEIS.

ISSUE – TIMING OF DISPOSAL OPERATIONS

The DEIS and GRR acknowledge and suggest that proposed disposal activities at/or immediately adjacent to Tybee Island may need to be performed in the summer months coincident with sea turtle nesting season. Since the initiation of beach restoration activities at Tybee Island in the 1970's, it has been the City's (and the GA DNR's) unwavering position to *not* allow any major beach construction activities to be performed during the annual tourist season (or sea turtle nesting season). As the largest and most intensely utilized publicly accessible beach resource in the State of Georgia, as well as a coastal community strongly influenced financially by a tourist based economy, the City has elected to only allow beach restoration to be performed in the low use (winter) months of the year -- outside of sea turtle nesting season.

The City is completely opposed to any beach disposal option (irrespective of compatibility of sediment) which would adversely affect recreational use of the publicly accessible beach during peak tourist season.

ISSUE – IMPACTS TO NAVIGATION

In addition to the predictable (but as yet unanalyzed) alteration of nearshore wave climatology at Tybee Island, the proposed elevations of several offshore disposal features will serve to adversely affect navigation – both recreational and commercial. The DEIS states that the limitation of sediment placement heights to -4 ft MLW at these locations would ensure "that recreational boats could pass over the sites". Similarly, the document states that "commercial fishing boats that draw more water would either have to time their passing (with the tide) or pass further oceanward in deeper water".

Records recently supplied by the GA DNR indicate that the areas of proposed offshore deposition are used by the local commercial shrimping industry. Hence, simple "passage" around the offshore depositional features may *not* be the sole issue of concern to shrimpers.

Furthermore, the District has failed to recognize that an elevation of -4 ft Mean Low Water (MLW) may not be sufficient to protect even the general boating public. For example, typical astronomical spring tides seaward of Tybee Island result in predicted spring tide water levels occurring almost monthly some 2-ft *below* MLW datum. Hence, effective depths over the disposal features would be essentially -2 ft at those times. It is also well documented that offshore winds can depress water levels another foot, mol. thereby further exacerbating the issue of boating safety.

The City of Tybee Island opposes any dredge disposal alternative (new work or continuing maintenance) which can be documented to be significantly detrimental to public or commercial navigation.

ISSUE – STATE OF GEORGIA COASTAL ZONE MANAGEMENT (CZM) PLAN CONSISTENCY

The City of Tybee Island, GA is on the record that ongoing channel maintenance activities of the Savannah District, USACOE, as performed for the Savannah Harbor Navigation Project entrance channel, have failed to comply with the requirements of the Georgia law (O.C.G.A. 52-9-1, et seq. as amended). This law necessitates the strategic recovery (or in-kind replacement) of *beach quality* sand removed from the coastal zone by dredging operations, whether they be by federal or non-federal interests. Accordingly, the City of Tybee Island, GA has likewise noted that the District, as the federal navigation project sponsor, is therefore *not* in compliance with the State's Coastal Zone Management (CZM) Plan.

Future dredging activities necessitated by the proposed Savannah Harbor Deepening Project – navigation channel expansion activities, if constructed as planned without direct mitigation to Tybee Island for non-replacement of *beach quality* sediment (only), will likewise be inconsistent with the State of Georgia CZM Plan. This inconsistency includes the stated position of the Savannah District that the assessment of project related impacts in the National Environmental Policy Act (NEPA) process need only be limited to those discerned by the District to be "incremental" in nature. Reinforcing the City's position in this regard is the fact that the recent (2006) study sponsored by the Savannah District, and performed by the USACOE's Engineering Research and Development Center (ERDC) in Vicksburg, MS, has documented the existing navigation project to be responsible for approximately 80% of Tybee Island's long-term erosion.

The Draft Environmental Impact Statement (DEIS) and General Re-Evaluation Report (GRR) as formulated for the Savannah Harbor Expansion Project have acknowledged that the proposed Savannah

Harbor Deepening Project will include certain "mitigation" items to be both funded and constructed as part of the navigation project. These currently include, but are not necessarily limited to the following:

- · Adverse impacts to tidal wetlands, marshes, etc.,
- · Adverse impacts to the endangered short-nosed sturgeon,
- · Adverse impacts to Striped Bass,
- · Adverse impacts to the City of Savannah freshwater intake system, and
- Potential impacts to cultural resource (i.e., shipwrecks).

All of these items, as addressed by the draft project documents are to be directly funded as distinct elements of the navigation project deepening program. That is to say, the costs for these items will be a part of the construction program and cost shared by the project co-sponsors. Presently, the GRR indicates that such mitigation costs account for approximately 40% of the total project cost-to-construct. That is to say, over \$221M will be spent initially to mitigate project impacts. Annual maintenance cost will be addition to that amount. There is however, presently no direct mitigation intended for downdrift damages, new or historical, to the sandy *beaches* of Tybee Island as part of the Harbor Deepening Project budget, irrespective of the 2006 federally sponsored study findings to the contrary.

Instead, the Savannah District has formulated a large scale dredged material disposal program which proposes to dispose of varying quality sediments either immediately seaward of the island Mean Low Water Line (MLWL) or farther eastward in the form of offshore berms, or other similarly configured disposal sites. Unfortunately, none of the subject dredge material can be classified as *wholly* "beach compatible" due to the presence of non-sand constituents (*i.e.*, organics and clays). As a result, direct mitigation to Tybee's beaches resulting from the current 13M cy entrance channel disposal plan will not occur. Rather, the current plan of disposal of variable quality new work sediments along Tybee's MLWL (if constructed) would significantly adversely impact the beach system as a recreational, economic and environmental resource.

Although, various elements of the proposed disposal program seaward of Tybee Island could serve to offset offshore deflation of the seabed at that location, resulting from multi-decadal impacts of the navigation works, both the volume and spatial distribution of the disposal sites (as currently defined) may serve to contaminate or otherwise adversely impact the City's sole offshore borrow site utilized for purposes of addressing beach re-nourishment.

It is the position of the City of Tybee Island that the Savannah District USACOE has not addressed the potential for impact to Tybee Island and its surrounding environs sufficient for the proposed project activities to comply with either State Law or State of GA CZM Plan Consistency requirements. ISSUE – FUTURE CHANNEL MAINTENANCE

The project GRR indicates that all future maintenance dredging will be performed by hopper dredge and in all probability taken to the ODMDS. The same document however notes that some 325,000 cubic yards of sediment excavated annually between STA(s) -30+000B and -40+000B could be recovered and placed in a beneficial manner by a hopper dredge with pump-out capability. The City of Tybee Island concurs with this assessment for the following reasons: a.) the material would be washed by the dredging process and therefore exhibit probably less than 5% residual fines, and b.) the probability of marine clays which will occur during the new work construction will be eliminated, or at a minimum greatly reduced at that point in time.

The City's finding is that such material excavated by hopper dredge will be highly suitable for both offshore and potentially onshore disposal at Tybee Island. Moreover, it should be pointed out that 1.) the volume of sand potentially recovered each year is in keeping with the findings and recommendations of the 2003 ERDC study, and 2.) non-impactive offshore placement sites can be readily identified for the use intended.

It is the opinion of the City of Tybee Island that if future maintenance material from the above section of the entrance channel is strategically placed by hopper dredge, such an activity will be in conformance with State law and consistent with the State of Georgia Coastal Zone Management Plan.

ISSUE – RISK BASED ASSESSMENT

Both at the 11 January meeting at the COE offices in Savannah and as addressed by a 19 January 2011 letter (w/encl) sent to the Mayor of Tybee Island, the District has recommended that Tybee Island make a "risk-based" decision regarding the impacts and benefits potentially associated with the federal disposal options proposed for entrance channel deepening. Based upon the nature of the two (2) RAI's submitted by the City to the Savannah District, COE it should be abundantly clear that the City's opinion is that insufficient planning, analyses and engineering design have been performed sufficient for *either* the Savannah District or the City to make an educated "risk based" assessment. It is therefore both illogical and inequitable to put the onus and burden of addressing the inadequacies of the GRR, DEIS and associated federal harbor expansion disposal program for the improved entrance channel on the shoulders of the City. As a result the City's only recourse at this time is to oppose all aspects of the 13M cy disposal program for the entrance channel and recommend for disposal of the subject material in the existing authorized ODMDS.

SUMMARY

To date, the City of Tybee Island has two (2) separate standing requests for additional information (RAI's) intended to seek quantitative data, analyses or engineering insight sufficient to address numerous concerns and opinions regarding adverse impacts or undesirable conditions associated with the entrance channel sediment disposal plan outlined by the GRR and DEIS. As of 20 January 2011, insufficient information had been received from the Savannah District, USACOE in order to satisfactorily address the principal questions or issues of concern to the City. As a direct result, the City Council formally met on that date, allowed for public discussion and subsequently voted unanimously to oppose all aspects of the current federal plan for the disposal of some 13M cy of new work sediments to be excavated for purposes of deepening the Savannah Harbor entrance channel. The City has instead recommended for disposal of such material only within the authorized ODMDS.

Accordingly, the City of Tybee Island is in strong opposition to all elements of the 13M cy sediment disposal plan for the deepening of the navigation project entrance channel until the above discussed concerns and opinions have been suitably resolved to the satisfaction of the City through both comprehensive and applied engineering due-diligence performed by the COE for that express purpose. The City is of the opinion however, that future maintenance dredging operations can be performed in such a manner that" beach quality" material can be recovered and strategically placed in either offshore or onshore disposal sites which can be determined to be both environmentally acceptable and in the public interest.

We appreciate the opportunity to provide this information to the record pursuant to the Public Notice dated 15 November 2010. Thank you.

Sincerely,

Jason Buelterman Mayor

CC: City Council Brad Gane, GA DNR Bubba Hughes, Esq. William Bailey, P.E., COE E. Olsen, P.E.

City of Tybee Island

Page 1

761-MM-21-EV01

Comment: Subsequent to the 15 November 2010 Public Notice issued by the Savannah District, COE for comments regarding the above project, the City of Tybee Island has made two (2) submittals requesting additional clarifying or supplementary information (dated January 4''' and January 13''', 2011). Moreover, along with representative(s) of the GA DNR, we met with both you and the District staff on II January 2011 seeking to receive data, analyses, or answers to questions posed by our 4 January 2011 Request for Additional information (RAJ). Unfortunately, it appears that the type, the extent and the nature of the responses requested for proper evaluation cannot be provided by the Savannah District to either the City of Tybee Island, or the GA DNR. At a 20 January 2011 Public Workshop on Tybee specifically held to address this issue, the City Council voted unanimously to not accept or support the present 13M cy disposal plan addressed by the above documents. For that reason, we are formally submitting the following information to the record in accordance with federal procedures required to solicit comment from private and public agencies, or parties directly adversely affected by the proposed federal actions.

Response: During the extended formulation period for SHEP, the District provided extensive information to the City of Tybee and GA DNR-CRD to provide those organizations with data that the District had obtained and analyses that had been performed on that data. This information was sufficient for a reasoned evaluation of the issues at hand. Additional data and analyses could always be obtained, but further information would not necessarily lead to more cogent decisions. The City of Tybee has been an active participant through the entire study process. The Corps has met and worked with its staff on these issues for several years. As noted in the comment, a joint meeting [January 11, 2011] was held with ERDC, Savannah District subject matter experts, the City of Tybee, and GA DNR-CRD to discuss outstanding requests and, more importantly, reach resolution on this question. The District is satisfied that the analyses performed and the data presented in the EIS and GRR are sufficient to reach decisions regarding the placement of dredged sediments.

Page 2

761-MM-21-EV02

Comment: The proposed deepening of Savannah Harbor to -48-ft in order to handle the new class of Panamax vessels will necessitate the removal of various types of material from the project entrance channel including varying amounts of beach quality sediment. Similarly, sediments containing some percentage of beach quality sand will be episodically removed with each subsequent maintenance dredging operation occurring within certain segments of the entrance channel. Up until the present time, very little beach quality material dredged has been returned to the littoral zone of the State of Georgia at this federal navigation project. Instead, most has historically been subject to incidental disposal at either the Jones-Oyster Bed upland spoil site, or in deeper offshore waters via the ODMDS.

Response: The amount of beach quality sand on the Savannah Harbor entrance channel is relatively low compared to neighboring ports in Florida and the Carolinas. However, new work material from the entrance channel extension is expected to be of beach quality. Unfortunately, its distance of over 10 miles from the beach would make its transport and placement in that location fairly expensive. As the

City of Tybee noted at the January 11, 2011 meeting, the remaining new work and O&M materials are highly variable [consolidated and unconsolidated in nature]. During a typical O&M cycle, large quantities of beach quality sand are not removed from the bar channel.

Page 4

761-MM-21-EV03, 761-MM-21-EV04

Comment: That is to say. the Savannah District's historic position has been that if additional costs are incurred for resource recovery in the State of Georgia (i. e., beach quality sand), or strategic and constructive implementation of regional sediment management practices that are in the public interest, a third party - other than the District - should pay for the incremental cost of the action. This position is inconsistent with State Law, State policy, and CZMP precepts codifying same - or practices of the Corps to the contrary in other States. The City of Tybee Island notes that even if the Savannah District determined that strategic beach disposal of maintenance material resulted in additional cost, the Corps of Engineers, under authority of Section 207 of the Water Resources Act of 1996, can elect to use a more costly disposal method if there are overriding environmental and erosion control benefits associated with the more costly disposal scheme.

Interestingly, the "position" historically embraced by the Savannah District is neither emulated nor interpreted similarly by either the Wilmington District USACOE, to the north, or the Jacksonville District to the south. In contrast, within the State of Florida for example, all beach quality sediment removed from all federal navigation projects, as well as the maintenance of the Atlantic Intracoastal Waterway, is placed on the State's Atlantic and Gulf coast shorelines at essentially no cost to the State or local government. This is standard procedure in keeping with State law, policy and the Florida Coastal Zone Management Plan. Accordingly, all such federal projects in Florida (for maintenance as well as new construction) are formulated by the Jacksonville District, USACOE with this precept in mind.

Response: Sedimentation patterns are unique to each harbor, and practices used elsewhere are not necessarily applicable to Savannah Harbor. As noted above, during a typical O&M cycle relatively small quantities of beach quality sand are removed from the Savannah entrance channel.

Maintenance of the Savannah Harbor Navigation Channel is fully compliant with the enforceable provisions of Georgia's Coastal Management Program.

As defined in Corps of Engineers policy, the *Base Plan* (Federal Standard) is the dredged material placement alternative that represents the least costly option consistent with sound engineering practices and appropriate environmental standards. For the Savannah Harbor Navigation Project, the Corps identified that plan through the 1996 Long Term Management Strategy. The LTMS (and its Base Plan) received approval from the State of Georgia, Corps Headquarters, and others. In conformance with that plan, Savannah District removes O&M sediments from the entrance channel on a yearly basis by hopper dredges and deposits those sediments in the Offshore Dredged Material Disposal Site (ODMDS) or existing upland confined disposal facility (CDF). Two nearshore sites (shown as Sites 2 and 3 in Figure 3-3) just south of the entrance channel are also available. If used, material would be placed into these sites to construct submerged feeder berms.

761-MM-21-EV05

Comment: State of Georgia CZM Plan Compliance - The City of Tybee Island, GA is of the opinion that ongoing maintenance activities of the Savannah District, USACOE, as performed for the Savannah Harbor Navigation Project entrance channel, fail 10 comply with the requirements of the Georgia law (0. C. G.A. 52-9-1, et seq. as amended). This law necessitates the strategic recovery (or in-kind replacement) of beach quality sand removed from the coastal zone by dredging operations, whether they be by federal or non-federal interests. Accordingly, the City of Tybee Island, GA likewise opines that the Savannah District, as the federal navigation project sponsor, is not currently in compliance with the State's Coastal Zone Management (CZM) Plan.

Response: Maintenance of the Savannah Harbor Navigation Project is fully compliant with the enforceable provisions of Georgia's Coastal Management Program. The Corps and Georgia DNR-CRD (who administers the Georgia CMP) meet and periodically discuss the Corps dredging activities in the coastal zone. CRD has not notified the District that the Savannah Harbor Navigation Project does not comply with the State's Coastal Zone Management Plan.

Page 5

761-MM-21-EV06, 761-MM-21-EV07

Comment: Similarly, it is the City's opinion that future dredging activities necessitated by the proposed Savannah Harbor Deepening Project - navigation channel expansion activities, if constructed as currently planned without direct mitigation to Tybee Island for non-replacement of beach quality sediment, will likewise be inconsistent with the State of Georgia CZM Plan. This inconsistency includes the stated position of the Savannah District that the assessment of project related impacts in the National Environmental Policy Act (NEPA) process need only be limited to those discerned by the District to be "incremental" in nature. Reinforcing the City's opinions in this regard is the fact that the recent study sponsored by the Savannah District, and performed by the USACOE's Engineering Research and Development Center (ERDC) in Vicksburg, MS, has documented the existing navigation project to be responsible for approximately 80% of Tybee Island's long-term erosion. Both failure to comply with the Statute referenced above and the State of Georgia CZM Plan could in all probability jeopardize the basis for the federal Environmental Impact Statement (EIS) for the pending Savannah Harbor Deepening Project. II is the City's position that the project sponsors have ample options available to assure the placement of "beach quality" material in order to both comply with Georgia Law and likewise achieve consistency with the State's CZM Plan.

Response: Savannah District prepared a Consistency Determination [with respect to the Georgia Coastal Management Program] for the SHEP [EIS Appendix I]. Through the DEIS, the Corps coordinated that Determination with the GADNR Coastal Resources Division for review and comment. GADNR-CRD's initial finding was that the SHEP is generally consistent with the enforceable provisions of the Georgia Coastal Management Program. However, certain changes were requested regarding the dredged material placement plan, viz., the State expressed concern about the proposed deposition in the nearshore sites and the two offshore [fish enhancement] sites. Consequently, proposed dredged material placement areas: Site MLW 200, Site MLW 500, ERDC Nearshore, Site 2, Site 2 Extension, and Sites 3, 4, 5, 6, 11, and 12, were deleted from the proposed action, and the Corps would not deposit new work dredged sediments in those locations as part of the Savannah Harbor Expansion Project.

761-MM-21-EV08

Comment: All of these items, as addressed by the draft project documents are to be directly funded as distinct elements of the navigation project deepening program. That is to say, the costs for these items will be a part of the construction program and cost shared by the two (2) project sponsors. There is however, presently no direct mitigation intended for downdrift damages, new or historical, to the sandy beaches of Tybee Island as part of the Harbor Deepening Project, irrespective of the 2006 federally sponsored study findings to the contrary. This is unacceptable to the City o/Tybee Island

Response: The District recognizes that the City of Tybee disagrees that the SHEP authorization does not include the ability to mitigate for adverse impacts that may occur as a result of the existing Savannah Harbor Navigation Project. Nonetheless, the cumulative impacts of the Savannah Harbor Navigation Project are fully addressed in the EIS and its cumulative impacts analysis [Appendix L]. The Corps is willing to identify, quantify and mitigate (if appropriate) for such impacts, but it must comply with Congressional laws and follow established procedures in doing so. The Tybee Channel Impacts Study provides authorization for the District to examine the extent of these impacts (Phase I) and determine appropriate mitigation measures (Phase II). Phase I of the study was completed in 2008. The technical studies (ERDC 2008) identified the existing Savannah Harbor Navigation Project as being the cause of nearly 80% [78.5%] of the loss in sand volume on the Tybee Island shelf and its shoreline, with the remainder of the erosion being attributed to natural processes. The District was working with the City of Tybee to continue with Phase II of the study. However, in September 2010, the City of Tybee Island stated that it did not have the matching funds required of a non-federal cost-sharing partner to complete the study. The District is disappointed that the City has been unable/unwilling to fund the Phase II studies needed for the Corps to identify and evaluate the best way to mitigate those effects. If the City of Tybee secures matching funds, the District would seek Federal funding to resume the study. Under the civil works process, a feasibility report, Record of Decision, and Chief of Engineer's Report would be completed. In turn, the Chief's Report would be provided to Congress, which could authorize the District to implement the determined mitigation measures.

The Corps evaluated potential impacts from the SHEP on Tybee Island. The reports that describe the coastal engineering studies are included in the Engineering Appendix to the GRR. The studies found that the project's incremental effects to the Tybee shoreline do not warrant mitigation.

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761-MM-21-EV09

Comment: Instead, the Savannah District has formulated a large scale dredged material disposal program which proposes to dispose of varying quality sediments either immediately seaward of the island Mean Low Water Line (MLWL) or farther eastward in the form of offshore berms, or other similarly configured disposal sites. Unfortunately, none of the subject dredge material in aggregate can be classified as "beach compatible" due to the presence of varying quantities of non-sand constituents (i.e., organics and in particular clays). As a result, direct mitigation to Tybee's beaches resulting from the current 13M cy entrance channel sediment disposal plan cannot occur without significant adverse and undesirable consequences to Tybee Island, its citizens, its businesses and the general public which is dependent upon access and usage of the State's largest and most accessible recreational beach resource.

Response: In general, the District agrees with the City's characterization that materials to be excavated from the entrance channel are not beach compatible. However, the District does not concur with the premise that the entrance channel sediment placement plan would result in significant adverse and undesirable consequences to Tybee Island, its citizens, its businesses, and the general public. Based on extended coordination and correspondence with GA DNR-CRD and the City of Tybee Island, the Corps has revised the dredged material placement plan. Placement of all sediments excavated from the entrance channel would now be restricted to previously-approved areas, viz., in the Offshore Dredged Material Disposal Site or an upland confined disposal site. The Final EIS describes these revisions to the sediment plane.

Page 8

761-MM-21-EN01

Comment: It is the opinion of the City of Tybee Island that insufficient analyses have been performed by the Savannah District to provide adequate assurances of sediment quality for the two (2) disposal options (i.e., MLW 200 and MLW 500) which are alleged by the two documents to be of "benefit" to the existing oceanfront shoreline.

Response: The data obtained and analyses performed and presented in the EIS and GRR are sufficient to reach decisions regarding the placement of dredged sediments. However, in light of GA DNR-CRD and the City of Tybee Island's concerns about the quality of the sediments, the Corps has revised the dredged sediment placement plan to delete use of the MLW 200 and MLW 500 sites.

761-MM-21-EV10

Comment: It is the opinion of the City that the proposed two (2) MLW disposal sites intended for sediment placement along the Tybee Island shorefront are not "nearshore" as defined by the District but rather "onshore" disposal locations. That is to say, they propose to both widen and raise the existing intertidal beach. As such, any sediment placed at this location in the manner proposed must contain less than 10%fines (5% by Stale Standards), be free of clay balls, cobble or other objectionable material.

Response: The District characterized dredged material placement sites MLW 200 and MLW 500 as nearshore [in nature] since sediments would have been restricted below the MLW line. Regardless, the Coastal Resources Division of the Georgia Department of Natural Resources requested that the Corps eliminate these sites from the SHEP plan. The District agreed and the sediments would now be deposited in the Jones/Oysterbed Island CDF or the ODMDS.

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761-MM-21-EV11

Comment: It is the finding of the City of Tybee Island that as proposed, the nature of the new work sediments intended for direct disposal along the oceanfront shore/rant is not of sufficient quality to be considered suitable for such an application. Simply changing the definition of the term "nearshore" does not justify the direct placement of inappropriate sediment along the oceanfront o/Tybee Island.

Response: The City of Tybee's position regarding placement of material at Sites MLW 200 and MLW 500 is acknowledged. In light of GA DNR-CRD and the City of Tybee Island's concerns about the quality of the sediments, the Corps has revised the dredged sediment placement plan to delete use of the MLW 200 and MLW 500 sites.

Page 10

761-MM-21-EV12

Comment: The City of Tybee Island is extremely disappointed to note that the Savannah District, COE has not provided any additional analyses (via numerical model) of the offshore berms, mounds or other offshore options beyond the initial study dated 2003. It is therefore the position of the City that neither the Corps nor the City can make an informed decision as to the extent and probability of littoral impacts resulting from the offshore disposal plan presented in the DEIS and ORR. The City therefore objects to their construction as proposed. This objection likewise extends to any and all disposal berms in use, or proposed for use, along the south side of entrance channel (in either State or Federal waters) until appropriate analyses have been performed.

Response: The District is satisfied that the analyses performed and the data presented in the EIS and GRR are sufficient to reach reasoned decisions regarding the placement of dredged sediments. Additional data and analyses could always be obtained, but that additional information is not necessarily needed to reach more cogent decisions.

Page 11

761-MM-21-EV13

Comment: Accordingly, the City is in opposition to any offshore disposal alternative which would adversely affect the subject borrow site and sand resource necessary for future beach restoration at Tybee Island. It is the City's opinion that the existing 2003 ERDC modeling study clearly indicates the probability of such an occurrence, considering the nature and extent of the disposal features proposed by the GRR and DEIS.

Response: The District does not agree with the allegation that the borrow site would in some fashion become "contaminated". However, with elimination of the nearshore placement of sediments, the issue is irrelevant.

761-MM-21-EV14

Comment: The City is completely opposed to any beach disposal option (irrespective of compatibility of sediment) which would adversely affect recreational use of the publicly accessible beach during peak tourist season.

Response: The District does not agree with the allegation that nearshore deposition of sediments would have adversely affected recreational use of the publicly accessible beach during peak tourist season. However, with elimination of the nearshore placement of sediments, the issue is irrelevant.

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761-MM-21-EV15

Comment: The City of Tybee Island opposes any dredge disposal alternative (new work or continuing maintenance) which can be documented to be significantly detrimental to public or commercial navigation.

Response: The District would also oppose any sediment placement alternative (new work or continuing maintenance) that was documented to be detrimental to public or commercial navigation. In this instance, the District believes that the sediment placement plan, as initially proposed, would not have been detrimental to public or commercial navigation.

Page 14

761-MM-21-EV16

Comment: It is the position of the City of Tybee Island that the Savannah District USACOE has not addressed the potential for impact to Tybee Island and its surrounding environs sufficient for the proposed project activities to comply with either State Law or State of GA CZM Plan Consistency requirements.

Response: The EIS contains a comprehensive discussion of the impacts expected to occur from the Savannah Harbor Expansion Project (Section 5). As discussed in the main document and in Appendix L (Cumulative Impacts), the existing navigation project has played a significant role in the long-term erosion of the Tybee Island beach and adjacent shelf. The documents clearly show that all of the channel alternatives would have only negligible impacts on the Tybee Island beach and its adjacent shelf. Savannah District prepared a Consistency Determination [with respect to the Georgia Coastal Management Program] for the SHEP [EIS Appendix I]. Through the DEIS process, the Corps coordinated that determination with the GA DNR Coastal Resources Division for review and comment. CRD's initial finding was that the SHEP is generally consistent with the enforceable provisions of the Georgia Coastal Management Program.

716-MM-21-EV17

Comment: It is the opinion of the City of Tybee Island that if future maintenance material from the above section of the entrance channel is strategically placed by hopper dredge, such an activity will be in conformance with State law and consistent with the State of Georgia Coastal Zone Management Plan.

Response: The Federal standard (least cost, environmentally acceptable) for disposal of O&M sediments from Stations -30+000B to -40+000B is to place the material into the ODMDS. If GA-DNR CRD or the City of Tybee wish to pursue changes to the existing O&M practices, environmental surveys could be pursued for nearshore placement and a demonstration project performed. However, a non-Federal entity would have to pay the cost differential above the Federal Standard.

For your information, the preliminary cost estimate for the Federal standard is \$2.5 million to place the 700,000 cubic yards of sediment from Stations -30+000 to -40+000 in the ODMDS. It is estimated to cost an additional \$4.4 million to pump the same material into the nearshore or intertidal zone. The quantities used in the estimate are those to clean the entire dredging prism, including over depth. The amount removed during a typical O&M cycle, however, is about one third of the total estimated amount

available due to budget constraints. See the summary table below for a breakdown of estimated dredging costs. Note that the table does not include the costs to pursue the additional environmental clearances required to place sediment in areas not previously approved. Environmental clearances would at a minimum include side scan sonar and hard bottom surveys in new nearshore disposal sites.

Station Range	Type of Material	Placement Site	Unit Price	Quantity (cubic yards)	Total Cost	Variation From Federal Standard	
						Unit	
						Price	Total Cost
-30 to -40	0&M	ODMDS	\$3.50	700,000	\$2,450,000	N/A	N/A
		ERDC Near					
-30 to -40	0&M	shore/ Intertidal	\$9.75	700,000	\$6,825,000	\$6.25	\$4,375,000

Summary Table of Dredging Costs Comparisons for Alternate Placement Areas

Note: Quantities listed are amounts to clean dredging prism, including overdepth. For a typical O&M cycle, about 1/3 the quantity is actually removed.

Note: Red Italics text indicates current placement method (Federal Standard)

761-MM-21-EV18

Comment: Both at the 11 January meeting at the COE offices in Savannah and as addressed by a 19 January 2011letter (w/encl) sent to the Mayor of Tybee Island, the District has recommended that Tybee Island make a "risk-based" decision regarding the impacts and benefits potentially associated with the federal disposal options proposed for entrance channel deepening. Based upon the nature of the two (2) RAJ's submitted by the City to the Savannah District, COE it should be abundantly clear that the City's opinion is that insufficient planning, analyses and engineering design have been performed sufficient for either the Savannah District or the City to make an educated "risk based" assessment. It is therefore both illogical and inequitable to put the onus and burden of addressing the inadequacies of the GRR, DEIS and associated federal harbor expansion disposal program for the improved entrance channel on the shoulders of the City. As a result the City's only recourse at this time is to oppose all aspects of the 13M cy disposal program for the entrance channel and recommend for disposal of (he subject material in the existing authorized ODMDS.

Response: The City of Tybee's position regarding placement of sediment at the subject sites is acknowledged. The Corps revised the sediment placement plan in the Final EIS to show all sediments excavated from the entrance channel would be deposited in previously-approved areas: Offshore Dredged Material Disposal Site or an upland confined disposal site.

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761-MM-21-EV19

Comment: To date, the City of Tybee Island has two (2) separate standing requests for additional information (RAI's) intended to seek quantitative data, analyses or engineering insight sufficient to address numerous concerns and opinions regarding adverse impacts or undesirable conditions associated with the entrance channel sediment disposal plan outlined by the GRR and DEIS. As of20 January 2011, insufficient information had been received from the Savannah District, USACOE in order to satisfactorily address the principal questions or issues of concern to the City. As a direct result, the City

Council formally met on that date, allowed for public discussion and subsequently voted unanimously to oppose all aspects of the current federal plan for the disposal of some 13M cy of new work sediments to be excavated for purposes of deepening the Savannah Harbor entrance channel. The City has instead recommended for disposal of such material only within the authorized ODMDS.

Response: The District acknowledges receipt of the City of Tybee Island's RAIs and has either held meetings to discuss the data in detail or provided answers based on existing information available at the time of the request. However, the analyses performed and the data presented in the EIS and GRR are sufficient to reach decisions regarding the placement of dredged sediments.

761-MM-21-EV20

Comment: Accordingly, the City of Tybee Island is in strong opposition to all elements of the 13M cy sediment disposal plan for the deepening of the navigation project entrance channel until the above discussed concerns and opinions have been suitably resolved to the satisfaction of the City through both comprehensive and applied engineering due-diligence performed by the COE for that express purpose. The City is of the opinion however, that future maintenance dredging operations can be performed in such a manner that" beach quality" material can be recovered and strategically placed in either offshore or onshore disposals which can be determined to be both environmentally acceptable and in the public interest.

Response: The City of Tybee Island's opposition to the placement plan for entrance channel material is acknowledged. In light of GA DNR-CRD and the City of Tybee Island's concerns about the quality of the sediments, the Corps has revised the dredged sediment placement plan and intends to deposit all sediments from the entrance channel in either the Ocean Dredged Material Disposal Site or approved upland confined sediment placement sites. The Final EIS has been revised accordingly.

January 24, 2011

Mr. William G. Bailey Savannah District, US Army Corps of Engineers 100 West Oglethorpe Avenue Savannah, GA 31401

RE: Savannah Harbor Expansion Project Draft Tier II Environmental Impact Statement Review Comments

Mr. Bailey,

The City of Savannah appreciates the opportunity to review and provide relevant comments concerning the Draft Tier II Environmental Impact Statement for the Savannah Harbor Expansion dated November 2010. Savannah understands the vital role that the Georgia Ports Authority plays not only on a local level, but also on the state and national levels. As such, Savannah has great interest in the successful operation of the Georgia Ports Authority and very much wants to support the efforts of the Georgia Ports Authority to expand their capabilities of handling the larger vessels soon to passing through the Panama Canal.

Unfortunately, and after 14 years of study, the issue of increasing chlorides within the area of Savannah's water supply intakes remains. The draft Tier II EIS, with regard to projected chloride increases, is based on a chloride model and analyses that were rejected by the Corps own technical reviewers and has subsequently been replaced with an updated model and analyses. Unfortunately, the updated model and analyses were not released and only vaguely mentioned as part of the draft Tier II EIS documents. The updated model shows that increases in chloride levels at Savannah's intakes will not be negligible, but will instead be significant to Savannah and its customers. However, most readers of the draft Tier II EIS would not be aware of this issue and would easily be mislead by the inclusion and recommendations of the original model and results. This is particularly true with respect to the adequacy and reasonableness of the principle of "Adaptive Management".

While Savannah has no desire to impede the legitimate progress or efforts of the Georgia Ports Authority to deepen the Harbor, it is imperative that Savannah insist that its water supply and quality be protected. Therefore, the use of "Adaptive Management" for this portion of the SHEP project is not acceptable. Based on the updated model's projections of increased chlorides, Savannah must insist that

[1]

the mitigation measures (i.e. construction of a supplemental intake and associated transmission lines) be included and funded as an integral part of the SHEP project. It is also necessary for this work to be scheduled such that its completion will coincide with the completion of the channel deepening.

A more detailed discussion of the City's concerns and comments are provided as follows:

 Savannah has been involved in discussions with the Georgia Ports Authority and the Corps of Engineers from essentially the inception of the project. The majority of Savannah's concern has focused on the potential for increases in chlorides at the City's raw water intakes along Abercorn Creek. Over the course of that time, Savannah has voiced its concerns repeatedly in both open meetings and letters with regard to the potential of the project to increase the concentration of chlorides at the City's raw water intakes.

The <u>Draft Feasibility Report and EIS;</u> Enclosure H – Responses to Comments Received as a Result of Public Review of the Draft Feasibility Report and EIS; pages H-304 thru H-325 and dated 08/11/98 includes letters from the Office of the City Manager dated June 7, 1998 and June 12, 1999 providing the requested comments. The Corps response to the City's comments included the following statement:

"The additional studies and resulting mitigation plan will be subject to a Tier II EIS."

Since the time that responses to the City's 1998 and 1999 comments were provided, the Corps of Engineers has embarked on several occasions to obtain acceptable data and to develop a usable model for projecting potential chloride increases. Unfortunately, most of the attempts did not result in either suitable data or model.

In a letter to Mr. Bill Bailey of the Corps of Engineers and dated July 18, 2007, Savannah provided review and comment to the first chloride modeling report entitled <u>Savannah Harbor</u> <u>Expansion Project – Chloride Data Analysis and Model Development</u>, dated November 15, 2006 as well as the <u>Chloride Impact Evaluation</u> dated February 2007, the <u>Chloride Mitigation</u> <u>Evaluation</u> dated March 2007, the Memorandum of Record entitled Acceptability of Savannah Harbor Chloride Model dated January 10, 2007 and revised February 13, 2007. Savannah's comments included strong concerns regarding the acceptability of the data used and the foundational algorithm employed in the development of the model. The <u>Draft General Re-</u><u>Evaluation Report for Savannah Harbor Expansion Project Chatham County, Georgia and Jasper County, South Carolina</u>; Section 8.2.4 Chloride Impacts to Savannah's Municipal and Industrial Water Intake and dated November 2010 includes the following statement:

"...substantial uncertainty has been expressed about the ability of the model to make reliable predictions at such low chloride concentrations. The City expressed such concerns, as did the USGS Independent Technical Reviewer and Wilmington District Engineering Division in their final assessment of the chloride model. Additional chloride data collection followed by reanalysis of

[2]

the chloride modeling with the new data was authorized in order to address those concerns. This reanalysis has not yet been complete but will be included in the final report."

Savannah acknowledges that an updated draft chloride study and model have now been made available to Savannah for review. However, this draft was not made available until December 15, 2010. In addition, it should be noted that as of January 6, 2011 the updated draft chloride study had not been disseminated to the regulatory agencies of the State of Georgia. It is Savannah's understanding that the latest modeling and associated results could have been made available, at least in draft form, for review and discussed as early as September, 2010. However, the entire updated modeling and associated results were withheld awaiting final technical review on the basis of protocol. As a result, the draft Tier II EIS uses the original chloride analysis report, which was known to the Corps of Engineers to have already been rejected by the technical reviewer and their own Wilmington District, as the basis for all conclusions relative to potential chloride impacts. In addition, the Tier II EIS makes only cursory mention that additional studies of potential chloride impacts were underway leading the reader to gloss over the very real potential for serious consequences to Savannah's water supply. Savannah acknowledges that there are several places throughout the draft Tier II EIS that mention our concerns regarding the adequacy of the predictive model. However, the concurrence with Savannah's concerns by the technical reviewer and the Wilmington District Engineering Division are mentioned only twice in a document containing over 11,600 pages of report and attachments.

The release of the Tier II EIS based on a modeling effort known to be unacceptable and with full knowledge that the additional chloride investigations were essentially complete and could have been issued in draft form in September will unnecessarily mislead all readers except those most intimate with the chloride issues. This action has also caused Savannah to necessarily respond with comments to both the discussion of chlorides as provided in the officially released draft Tier II EIS document as well as the draft chloride document received on December 15, 2010, but not included within the draft Tier II EIS document.

Comments on Draft Tier II EIS as issued:

Table 3-6 SUMMARY OF HYDRODYNAMIC-RELATED IMPACTS WITHOUT MITIGATION; Page 3-20

The table provides results based on the original chloride study which is known by the Corps to be in error and is anticipated to be replaced with an updated study dated December 15, 2010. Therefore, the results indicated in this table are incorrect and must be updated accordingly.

3. Table 3-7 SUMMARY OF HYDRODYNAMIC-RELATED IMPACTS WITH MITIGATION; Page 3-21 The table provides results based on the original chloride study which is known by the Corps to be in error and is anticipated to be replaced with an updated study dated December 15, 2010. Therefore, the results indicated in this table are incorrect and must be updated accordingly.

[3]

4. Section 5.1.2.2 Impacts Without Mitigation

The draft Tier II EIS states the following:

"State water resource managers have capped the total volume of water that can be withdrawn from the main water-bearing aquifer..."

This is a correct statement. However, it should be noted that not only have available groundwater withdrawals been capped, but have also been reduced to 2004 withdrawal levels. In addition, discussion continues via special councils appointed by the governors of Georgia and South Carolina concerning saltwater intrusion on Hilton Head Island and the potential for further reductions. These efforts have been underway since 2005 to find amicable solutions to the saltwater intrusion problem and to avoid interstate law suits such as currently exists between Georgia, Alabama, and Florida. Initial groundwater modeling efforts have shown that reductions in groundwater withdrawals as high as 90 percent may be needed to stop saltwater intrusion altogether. Therefore, the reliance upon the Savannah River may be much greater than anyone has anticipated to date.

5. Section 5.2.3 Chloride Concentrations

The draft Tier II EIS states the following:

"The Corps had an Independent Technical Review performed of the chloride model by a staff member of the USGS in Columbia, SC. The reviewer expressed [concerns] about the ability of the model to make reliable predictions at the low chloride concentrations occurring at the City's intake. The Corps technical staff expressed similar views in their final assessment of the chloride model. The Corps' technical decision-makers stated that the predictive tool was the best one that could be developed using the information which was available, including data collected as part of the project specifically for development of this tool. ... The basic evaluation indicates that no changes to chloride levels would occur under drought flow conditions (1999 flows; 8-year drought). Under average flows (1997), the 48-foot depth alternate would increase chloride concentrations by 0.01 ppm. Under a severe drought flow conditions (similar to 2001; 20-year drought), chloride levels would increase marginally across the entire chloride frequency distribution. With those flows, the 48-foot depth alternative would increase the maximum chloride concentration by 3% or 0.13 ppm (14.58 to 14.71 ppm)."

In spite of concerns with the Corps own technical reviews, the decision-makers chose to recommend continued use of the original model outputs while stating "...the predictive tool was the best one that could be developed using the information which was available...". It is most difficult to understand how the decision-makers could possibly have reached this conclusion knowing that a subsequent refining of the model had been completed with the exception of a final technical review. Not only was the updated model available, at least in draft form, but it revealed that increases in chloride increases and associated mitigation will not be marginal, but will instead be substantial. Base chloride concentrations will increase from approximately 10 ppm to approximately 20 ppm with periodic increases reaching into the 50 to 70 ppm range. Unfortunately, the entire draft Tier II EIS with regard to chlorides has been based on this initial recommendation and thus all discussion, results, and mitigation recommendations are flawed and invalid.

6. Section 5.2.4 Mitigation Techniques for Chloride Concentrations The draft Tier II EIS states the following:

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"[NOTE: The City had informed the Corps that the capacity of their plant was roughly 30 MGD. Since the analyses were performed, the City has indicated that the plant's capacity is now 62.5 MGD.]" This is incorrect. The question posed to the City was with regard to the production volume and not the capacity. At the time of the question, production was in-fact roughly 30 MGD. The capacity of the plant has been 62.5 MGD since its expansion in 1998.

7. Appendix D – Monitoring and Adaptive Management Plan, Section 5.C(4) – Chloride Monitoring

The draft Tier II EIS proposes to employ Adaptive Management with regard to increased chloride levels at the City's raw water intakes along Abercorn Creek. In spite of concerns with the Corps own technical reviews, the decision-makers chose to recommend continued use of the original model outputs including the results which indicated no significant impact to chloride levels. As a result, mitigation was limited to Adaptive Management which would be based on eight years of monitoring.

However, subsequent refining of the model has been completed and reveals that increases in chlorides will not be marginal, but will instead be substantial. Therefore, all discussion, results, and mitigation recommendations are flawed and invalid and the Adaptive Management plan, including associated monitoring, is no longer a sufficient or acceptable resolution.

Appendix D – Monitoring and Adaptive Management Plan, Section 7.B – Post Construction Monitoring

The draft Tier II EIS states the following:

"Continue to monitor chloride levels in groundwater at the wells that the Corps installed to identify any large/unforeseen adverse impacts to the Floridan drinking water aquifer."

Savannah is not opposed to the continued monitoring. However, Savannah questions how the Corps would mitigate any large/unforeseen adverse impacts should they occur, as the removal of several feet from the top of the upper confining layer cannot be undone?

9. Appendix I – Federal Consistency Determination Georgia Coastal Zone Management Program, Section 6.26.3 – Consistency

A. The draft Tier II EIS states the following:

"Studies conducted for this project predict that deepening the navigation channel would slightly increase chloride levels in Abercorn Creek at the intake of the City of Savannah's Water Treatment Plant during low flow conditions. Impacts would not occur under normal or high river flows. The expected impacts are less than 5% and would not increase chloride levels above 50 ppm, well below the drinking water standard of 250 ppm."

In spite of concerns with the Corps own technical reviews, the decision-makers chose to recommend continued use of the original model outputs. A subsequent refining of the model has been completed

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and reveals that increases in chlorides will not be marginal, but will instead be substantial. Base chloride concentrations will increase from approximately 10 ppm to approximately 20 ppm with periodic increases reaching into the 50 to 70 ppm range. Unfortunately, the entire draft Tier II EIS with regard to chloride increases and associated mitigation has been based on this initial recommendation and thus all discussion, results, and mitigation recommendations are flawed and invalid.

B. The draft Tier II EIS states the following:

"If chloride levels in Abercorn Creek become unacceptable, project funds would be used to install a supplemental water line further up river to near Georgia Pacific."

It would not appear that the draft Tier II EIS includes funding for the installation of supplemental water lines and new intake structure. If these funds are not appropriated as part of the total project as approved by Congress, a separate request for these funds will be required. Actual construction of the mitigation measures described will therefore be subject to an independent approval by Congress which may or may not be granted.

It is the City's opinion that all funding necessary for the construction of potential mitigation shall be included in the final document to be sent forth to Congress for approval.

10. Appendix L – Cumulative Impact Analysis, Section 11 – Groundwater The draft Tier II EIS states the following:

"The EPA has established drinking water standards of 500 mg/l for total dissolved solids and 250 mg/l for the chloride ion. Water having chloride levels of less than 250 mg/l is considered safe and palatable to drink."

While this statement is technically correct, it fails to consider that the secondary limit of 250 mg/l for chloride is specific only to the direct consumption of chloride. However, this secondary limit does not account for the resulting impacts increased chlorides will have on the corrosivity of the water. As chlorides increase, corrosivity will also increase. Increased corrosivity will subsequently lead to increases in lead and copper at the customers tap. Lead and Copper have primary maximum contaminate levels of 0.015 mg/l and 1.3 mg/l respectively. It should be noted that lead and copper are the only substances required by EPA for a water purveyor to sample and control within a consumer's home and at their tap. It should also be noted that where lead and copper are above the maximum contaminate levels, the water purveyor is required to take action specifically to reduce water corrosivity.

Therefore, to continually state that anticipated increases in chlorides are below the secondary limit of 250 mg/l is both misleading and short sighted.

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11. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 9.8 – Chloride Mitigation Plan Development

The draft Tier II EIS states the following:

"These impacts would only affect industrial uses of water and would not affect residential users, as the chloride levels would not approach the drinking water standard."

This statement is incorrect. In addition to the numerous verbal discussions on this issue, the following has been provided to the Corps in writing:

Reference Savannah's June 12, 1998 letter to Mr. Myron Yuschishin of the Corps of Engineers in response to the Draft Environmental Impact Statement as follows:

"6. Although current regulations set a Maximum Contaminant Level (MCL) of 250 ppm for chlorides, increased distribution system corrosion (thus increased lead and copper levels) as well as future regulations—including current scheduling for phased regulations of Trihalomethanes and Disinfection By Products—may also be effected without raw water chlorides actually exceeding the current MCL.

Reference Savannah's September 22, 2008 letter to Colonel Edward Kertis Jr., Commander, US Army Corps of Engineers in response to information requested by the Colonel as follows:

"However, it is well regarded within the water and corrosion industries that a direct cause and effect relationship exists between increases in chloride levels and subsequent increases in corrosivity. It is also well known that the more corrosive a water supply is, the more the materials such as iron, lead, and copper leach from the water piping and plumbing into the water. Of particular concern is lead and copper which do have Primary MCLs of 0.015 mg/l and 1.3 mg/l respectively. Lead and Copper are the only MCLs that are regulated in such a manner as to place the burden of meeting these limits on the water supplier all the way to the customer's tap. Therefore, Savannah must insure that the corrosivity of the water will not cause lead and/or copper to exceed the MCL at customer's tap.

While it is recognized that increased levels of chlorides may not constitute a direct violation of the federal Secondary MCL it must be understood that increases in chlorides will increase the water's corrosivity and thus a potential for causing the failure of the federal Primary MCLs for lead and copper."

It is very difficult to understand how the Corps of Engineers, whose expertise is not in drinking water treatment, can summarily dismiss the impacts of increased chlorides on drinking water supplied to Savannah's residential population.

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12. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 9.8 – Chloride Mitigation Plan Development

The draft Tier II EIS states the following:

"Impacts at those levels do not warrant the expenses shown above."

In spite of concerns with the Corps own technical reviews, the "decision-makers" chose to recommend continued use of the original model outputs. A subsequent refining of the model has been completed and reveals that increases in chloride increases and associated mitigation will not be marginal, but will instead be substantial. Base chloride concentrations will increase from approximately 10 ppm to approximately 20 ppm with periodic increases reaching into the 50 to 70 ppm range. Unfortunately, the entire draft Tier II EIS with regard to chlorides has been based on this initial recommendation and thus all discussion, results, and mitigation recommendations are flawed and invalid.

13. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 10.3.3 – Incremental Mitigation Costs

It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 10-4 does not include the costs for mitigation of increased chlorides at Savannah's raw water intakes. This table must be amended to include the full cost of mitigation.

14. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 11.5.1 – Environmental Effects of the Maximum Authorized Plan

It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-6 includes "Chloride @ City's Water Intake" as an un-mitigated environmental effect of the maximum authorized plan. This is unacceptable. The full cost for chloride mitigation must be included in the maximum authorized plan.

15. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 11.5.2 – Maximum Authorized Plan Mitigation Details

It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Chloride mitigation must be included as part of the maximum authorized plan mitigation details.

16. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 11.5.3 – Maximum Authorized Plan Mitigation Costs

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It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-7 must be modified to include the full cost for chloride mitigation.

17. Draft General Re-Evaluation Report for Savannah Harbor Expansion Project Chatham County Georgia and Jasper County South Carolina, Section 11.6 – Maximum Authorized Plan Construction

It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-8 must be modified to include construction of chloride mitigation. Scheduled timing must be such that chloride mitigation is completed and in service not later than reaching final proposed harbor depth.

18. Draft Engineering Report, Section 8.1.7

The Draft Engineering Report states the following:

"Impacts to chloride concentrations at the City of Savannah's freshwater intake are currently unclear....Currently, the predicted increases in chloride levels at the City of Savannah's surface water intake in Abercorn Creek do not warrant mitigation. No chloride increases would occur on high and average river flows. A small increase would occur on low flows, but those increases would be relatively minor and not preclude any existing use of the water.

The City of Savannah questioned the reliability of the Corp's impact prediction tool, so Savannah District recently obtained additional field data to enhance its reliability. That additional data has not yet been incorporated into the prediction tool. The Final GRR will contain either a confirmation of the existing impact prediction or a new prediction based on a more reliable impact prediction tool." It is most difficult to understand how on one hand the impacts to chloride concentrations are unclear, but on the other hand those same impacts do not warrant mitigation, would not exist on high and average flows, and will be negligible during low flows.

It is Savannah's understanding that with the exception of the final technical review, the updated prediction tool was ready for use in September. While it is certainly desired to complete the technical review, the likely results of the updated prediction tool would also have been known during that time frame. As these results would have indicated a much larger increase in chlorides than those predicted by the original tool, it is difficult to understand why these improved results were not mentioned even as a footnote. Instead all discussions, results, mitigation measures, costs, and etc. are based on the prediction tool known to be unacceptable.

Savannah Harbor Expansion Project- Chloride Data Analysis and Model Development; November 15, 2006

This document is the basis for all discussion, results, mitigation measures, costs, and etc. as relates to potential increases in chlorides at Savannah's raw water intakes along Abercorn Creek. This document has been determined by the USGS and the Corps of Engineers to be unacceptable and should be so noted in the EIS. The document has been replaced with a document entitled <u>Chloride Modeling</u>

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<u>Savannah Harbor Expansion Project Savannah, Georgia</u> and dated December 15, 2010. Subsequently, all discussions, results, mitigation measures, costs, and etc. based on the November 15, 2006 document are invalid and should either be so noted in the EIS or removed altogether. It is understood that it may be desirous to retain this document as a historical appendix for the purposes of record completeness. However, it should be noted as such and not be used or referenced for any manner other than historical record.

Comments on Savannah Harbor Expansion Project – Chloride Impact Evaluation; December 15, 2010 20. Background

The draft report states the following:

"There is a concern that the potential deepening of Savannah Harbor may increase salinity and chloride concentrations in the upper reaches of the Lower Savannah River Estuary, including Abercorn Creek. However, this concern is primarily for industrial water supply, not drinking water."

It is true that Savannah is concerned with regard to increased chloride at its raw water intakes. However, it is not correct that this concern is primarily for industrial water supply, not drinking water. It is most difficult to understand how the Corps can reach this conclusion. As has been explicitly expressed in numerous meetings, there are a number of potential problems associated with higher chloride levels including but not limited to serious economic impacts on industrial customers, increased corrosion rates for all municipal customers including residential, and increased levels of lead and copper for all municipal customers including residential. The following written references are also noted:

 Reference Savannah's June 12, 1998 letter to Mr. Myron Yuschishin of the Corps of Engineers in response to the Draft Environmental Impact Statement as follows:

"6. Although current regulations set a Maximum Contaminant Level (MCL) of 250 ppm for chlorides, increased distribution system corrosion (thus increased lead and copper levels) as well as future regulations—including current scheduling for phased regulations of Trihalomethanes and Disinfection By Products—may also be effected without raw water chlorides actually exceeding the current MCL.

- Reference Savannah's September 22, 2008 letter to Colonel Edward Kertis Jr., Commander, U.S. Army Corps of Engineers in response to information requested by the Colonel as follows:

"However, it is well regarded within the water and corrosion industries that a direct cause and effect relationship exists between increases in chloride levels and subsequent increases in corrosivity. It is also well known that the more corrosive a water supply is, the more the materials such as iron, lead, and copper leach from the water piping and plumbing into the water. Of particular concern is lead and copper which do have Primary MCLs of 0.015 mg/l and 1.3 mg/l respectively. Lead and Copper are the only MCLs that are regulated in such a manner as to place the burden of meeting these limits on the water supplier all the way to the customer's

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tap. Therefore, Savannah must insure that the corrosivity of the water will not cause lead and/or copper to exceed the MCL at customer's tap.

While it is recognized that increased levels of chlorides may not constitute a direct violation of the federal Secondary MCL it must be understood that increases in chlorides will increase the water's corrosivity and thus a potential for causing the failure of the federal Primary MCLs for lead and copper."

As has been stated both verbally and in written form on multiple occasions there are numerous impacts that increased chloride concentrations will have on Savannah's water system. These impacts include both long term operation and maintenance costs, as well as the need to make immediate capital expenditures by Savannah and its industrial customers. A short discussion of these is provided as follows:

Approximately 60 percent of Savannah's water distribution system is composed of ferrous based piping. Using the projected increases in chloride levels and durations provided in the draft report, Savannah anticipates that increased corrosion will translate directly into a reduction in the useable life of the ferrous based portion of the distribution system. Therefore, Savannah will be required to expend additional funds to offset the lost usable life of these assets. The expenditures necessary to offset the value of this lost useable life for the ferrous based portion of the water distribution system has been determined to be \$25,650,000.

In addition to the lost value of Savannah's water distribution system, lead and copper levels will be negatively impacted. The following is excerpted from the Home Page of the USEPA's Office of Groundwater and Drinking Water <u>http://water.epa.gov/drink/index.cfm</u>.

"Lead and copper enter drinking water primarily through plumbing materials. Exposure to lead and copper may cause health problems ranging from stomach distress to brain damage. On June 7, 1991, EPA published a regulation to control lead and copper in drinking water. This regulation is known as the Lead and Copper Rule (also referred to as the LCR or 1991 Rule).

The treatment technique for the rule requires systems to monitor drinking water at customer taps. If lead concentrations exceed an action level of 15 ppb or copper concentrations exceed an action level of 1.3 ppm in more than 10% of customer taps sampled, the system must undertake a number of additional actions to control corrosion. If the action level for lead is exceeded, the system must also inform the public about steps they should take to protect their health and may have to replace lead service lines under their control."

The issue of lead and copper is not so much the concentrations of these elements as delivered to the customer within the water matrix itself, but it is instead the leaching of these elements into the water from the customer's plumbing. This leaching is a direct result of 1) the materials from which plumbing and fixtures are made and 2) the corrosivity of the water. It should be noted from the USEPA statement, that the required action for high levels of lead and copper is enhanced corrosion control. It should also be noted that the issue of lead in drinking water was addressed and passed by Congress under the

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Reduction of Lead in Drinking Water Act (SB 3874) in December, 2010. This bill was signed into law by President Obama on January 4, 2011.

In previous documents the Corps responded to Savannah's concerns regarding the potential of increased chlorides as follows:

"Further, the USACE Office of Counsel reports that the City has no legal right to water with chloride levels below those established under the Safe Drinking Water Act, in this case 250 mg/L. Thus, even if a cause and effect relationship is found, there is no legal obligation for the GPA or the federal government to remedy the situation as long as concentrations remain below established Safe Drinking Water Standards. ...".

Does the Corps intend to stand firm on its legal interpretation that the citizens and customers of Savannah have no legal right to water with lead and copper levels below those established under the Safe Drinking water act and even if a cause and effect relationship is found, there is no legal obligation for GPA or the federal government to remedy the situation?

Obviously, Savannah is also concerned with the long term viability of its large industrial customers. As has been stated on numerous occasions, the industries served by Savannah's surface water plant are vital to the economic well being of the entire southeast Georgia region. These industries not only provide over 1,000 direct well paying jobs, but also a wide range and number of jobs associated with the many small business that provide direct and indirect support and services. In addition, these industries use approximately 80 percent of the total water produced by Savannah's surface water system and therefore pay the lion's share of the cost to operate that system. A loss of these industries would require an immediate and substantial increase in water rates to the residential customer base throughout Chatham and Effingham Counties.

21. Data Collection

A. The draft report states the following: *"Literature searches have not yielded documentation of a threshold for chloride concentration for industrial water supply use."*

The lack of a threshold for chloride concentration for industrial water supply use is not surprising. The variability of uses for water throughout the generic base described as "industry" is far too broad to lend itself to such a focused threshold. Even individual plant sites manufacturing the exact same product under the umbrella of a single parent company will have variations in processes each with their own unique needs. Each "industry" will consist of many processes which for a variety of reasons will have their own demands not only for water, but also for power, chemicals, operation, maintenance and any other resources that can be imagined. Determination of the chloride threshold will be process dependent for each specific industrial site.

B. The draft report states the following:

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"References located suggested that 100 mg/l is the greatest chloride concentration acceptable for irrigation water for some sensitive crops."

It is not clear the relevance or exactly what this statement is supposed to convey within the context of the report.

C. The draft report states the following:

"As previously discussed, 250 mg/l is the EPA drinking water standard."

It is most distressing that the Corps continues in its attempts to circumvent the issue of chloride impacts by over stressing the importance of the 250 mg/l secondary standard for chloride as established by EPA under the federal Safe Drinking Water Act. The 250 mg/l secondary standard is stated three times in this one 11 page report contrasted with the fact that only twice in the entire 11,600 page draft Tier II EIS was it mentioned that the Corps own technical evaluations of the chloride study were not acceptable.

This issue of the 250 mg/l secondary limit for chlorides was raised in the <u>Feasibility Report For Savannah</u> <u>Harbor Expansion Feasibility Study, Section 7, page17, Rev. A</u> and dated April 26, 1998, which reads as follows:

"Subsequent to the deepening, chloride concentration readings ranged from highs of 20 mg/L to lows of 6 mg/L. These readings are well below the EPA's Safe Drinking Water Act standards of 250 mg/L... Further, the USACE Office of Counsel reports that the City has no legal right to water with chloride levels below those established under the Safe Drinking Water Act, in this case 250 mg/L. Thus, even if a cause and effect relationship is found, there is no legal obligation for the GPA or the federal government to remedy the situation as long as concentrations remain below established Safe Drinking Water Standards. ..."

Likewise, the <u>Memorandum of Record</u> dated January 10, 2007 and Revised February 13, 2007 states the following:

"The values of chloride that are a concern at the industrial water plant are far below drinking water standards. EPA drinking water standards for chloride, a secondary contaminant, are 250 mg/L. In this study, we are concerned with chloride levels of about 10% of the drinking water standard."

As stated in Savannah's response of July 18, 2007, there are a number of potential problems associated with higher chloride levels including but not limited to serious economic impacts on industrial customers, increased corrosion rates for all municipal customers including residential, and increased levels of lead and copper for all municipal customers including residential. Also, as previously stated, EPA defines the Maximum Contaminant Level (MCL) as *"the maximum permissible level of a contaminant in water which is delivered to any user of a public water system."* We believe that the intent of the MCL is to establish a maximum level which we are not to exceed. We do not believe that the intent of the Safe Drinking Water Act MCL is to establish a level to which we may increase contamination. While the USACE Office of Counsel may be correct within the confines of strict legal definitions, it is Savannah's opinion that avoidance of proper mitigation by hiding behind strict legal definitions is wrong and is a disservice to the residents, businesses, and industries of Savannah and

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Chatham County. While this report of December 15, 2010, does not specifically reject a lack of responsibility on the part of the Corps as has been stated in the past, there is no question that the text is constructed in such a manner and with multiple references to the 250 mg/L MCL so as to imply to the reader that the levels of chloride are negligible, regardless of the increases. This is factually incorrect and misleading to the reader.

22. Mitigation Options

- A. Increasing Freshwater Supply through Bear Creek. To the knowledge of Savannah, no modeling has been conducted to determine the volume of flow through Bear Creek and Abercorn Creek that would be necessary to offset the effects of increased chlorides from the Savannah River or even if the necessary volumes can be made available through these Creeks. Savannah would agree that this option would require a high level of maintenance to reliably mitigate the increased chlorides. It is also Savannah's opinion that the on-going cost and management of such maintenance would not be borne by Savannah.
- B. <u>Groundwater supplementation</u>. Discussions continue via special councils appointed by the governors of Georgia and South Carolina concerning saltwater intrusion on Hilton Head Island and the potential for further reductions. These efforts have been underway since 2005 to find amicable solutions to the saltwater intrusion problem and to avoid interstate lawsuits such as currently exist between Georgia, Alabama, and Florida. Initial groundwater modeling efforts have shown that reductions in groundwater withdrawals as high as 90 percent may be needed to stop saltwater intrusion altogether. Therefore, the reliance upon the Savannah River may be much greater than anyone has anticipated to date. In addition, Savannah's water distribution system is configured to provide some areas with surface water and some areas with groundwater. Although interconnections between these systems do exist, the infrastructure does not lend itself to moving sufficient volumes of either surface water or groundwater throughout its entire service area. Construction of sufficient infrastructure would be extremely costly and would have to be given the utmost attention to geometry and operation to prevent maintenance and water quality issues that would arise from seldom used and reverse flow portions of a modified distribution system.

Therefore, this alternative does not meet with the goal and intent of the State of Georgia EPD with regard to groundwater reductions, nor is it practical or feasible to supplement those portions of the distribution system normally fed by surface water with groundwater.

C. <u>Freshwater Flow Supplementation</u>. It would appear that the Corps does not recommend such an alternative. Savannah questions whether it is within the Corps of Engineers' authority or ability to guarantee sufficient supplemental releases from Thurmond Dam under all conditions to allow this alternative to be a reliable mitigation measure. When coupled with the potential problems for users upriver such as Augusta, Savannah River Site, and Plant Vogtle, Savannah is

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opposed to such an alternative that has the potential to leave Savannah with unacceptable consequences.

D. <u>A combination of increased groundwater withdrawal and greater releases from Thurmond Dam</u> <u>as described above</u>. Savannah does not accept that these alternatives are viable regardless of whether they are independent or in combination. Independently, the reasons have been stated above. The efforts required for routine coordination between Savannah's need to supply acceptable water quality on demand and the Corps need to control releases for all of the upstream requirements would prove extremely arduous. In addition, as the largest increases in chlorides will occur during periods of low river flows, the timing and need by Savannah to have releases increased by the Corps will most often be counter to the need by the Corps to reduce those releases.

Therefore, Savannah finds this to be an unacceptable alternative.

E. The draft report references the wording of the 2009 draft General Re-Evaluation Report as follows:

"If the proposed deepening project is found to produce sustained chloride concentrations that adversely affect the City of Savannah's Municipal and Industrial water intake on Abercorn Creek, then the USACE would construct this supplemental intake line at a cost of \$35.9 million. The supplemental water withdrawal intake would be located above the zone of project influence. The City supports this concept."

It is correct that Savannah supports the concept of locating a supplemental water withdrawal intake upstream of the zone of project influence. However, Savannah does **NOT** support the concept of chloride mitigation based on the Adaptive Management strategy as proposed. Although, adaptive management may be a very useful tool under particular circumstances, it is Savannah's opinion that it will not be an acceptable alternative with regard to the mitigation of chlorides for the Savannah Harbor Expansion Project based on the following issues:

- The monitoring time frames provided for in Draft Tier II EIS does not guarantee that monitoring will occur during periods of either moderate drought and certainly not during a period of extreme drought as was experienced in Georgia during 2007. Under the proposed plan, monitoring would occur for a specific time frame regardless of the conditions. Beyond that time frame no additional funding is available. Therefore, any additional funding and as well as the burden of proof to show impact due to the deepened harbor will necessarily fall on Savannah. This is unacceptable.
- 2) The cost of mitigation is not currently included as part of the draft plan to be authorized by Congress. Therefore, even if the proposed monitoring determines that unacceptable impacts occur, a separate request including detailed justifications must be made to Congress for approval and subsequent supplemental funding. Regardless of the reasoning, failure of

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Congress to approve such subsequent supplemental funding will place the full cost on the citizens, customers, and businesses of Savannah. This is unacceptable.

3) The time requirement for design, bidding, construction, and placing a supplemental intake into operation will be no less than three years. It cannot be expected for Savannah to ask its citizens, customers, and industries to forego their need of water supply for even one day much less three years. Delaying the construction of the supplemental intake until such time problems are actually encountered, proving that the SHEP project has caused the problems, and design and construction of a supplemental intake can take place places Savannah's citizens, customers, and industries in peril in terms of both economics and health/safety. This is unacceptable.

Savannah has no desire to unnecessarily own or bear the long term cost for operations and maintenance for an additional 16 miles of raw water piping and an addition raw water intake structure. However, this most recent draft chloride report clearly shows increases in chlorides to unacceptable levels. As water supply cannot be stopped even for one day during periods of high chlorides, it is imperative that chloride mitigation for the worst case scenario be included as a specific project component which is both authorized and funded by Congress as an integral part of the Savannah Harbor Expansion Project. In the case of chloride mitigation, the principles or use of Adaptive Management are unacceptable.

Again, the City of Savannah appreciates the opportunity to provide input on this very important project. Savannah is well aware of the significant positive impacts that the SHEP will have locally, statewide, and nationally. As such it is Savannah's very strong desire to support the Georgia Ports Authority in the timely efforts to bring this project to fruition, provided that the issue of increased chlorides and the associated mitigation measures are included and funded as an integral part of the project. Savannah must insist that the quality of its water supply be protected from the negative impacts of increased chlorides and that its citizens and customers do not shoulder the economic burden of these detrimental impacts.

If you have any questions or if we can be of any assistance in bringing this issue to closure, please contact me at 651-4241.

Respectfully,

John L. Sawyer, P.E. Water and Sewer Director

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City of Savannah

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657-MR-21-EV01

Comment: While Savannah has no desire to impede the legitimate progress or efforts of the Georgia Ports Authority to deepen the Harbor, it is imperative that Savannah insist that its water supply and quality be protected. Therefore, the use of "Adaptive Management" for this portion of the SHEP project is not acceptable. Based on the updated model's projections of increased chlorides, Savannah must insist that the mitigation measures (i.e. construction of a supplemental intake and associated transmission lines) be included and funded as an integral part of the SHEP project. It is also necessary for this work to be scheduled such that its completion will coincide with the completion of the channel deepening.

Response: Savannah District revised SHEP's chloride mitigation plan based on a suite of recent empirical measurements and modeling projections. Using this expanded/more accurate information [as noted in detail: City of Savannah Seawater Effects Study, November, 2011], the District fundamentally reassessed the project's forecast chloride effects at the City's water intake [and by extension the whole system]. Namely, the conclusion was reached that certain SHEP design elements [channel deepening] could, in fact, have more of an impact on the City's drinking water compliance than initially thought. Specifically, this work presented evidence that increased chlorides would exacerbate lead corrosion and promote formation of adverse disinfectant byproducts. Industrial users [Weyerhaeuser/International Paper] may also experience problems in terms of interference with bleaching processes and reduced lifespan of its water distribution, respectively.

Numerous mitigation measures were examined during the course of the NEPA process, e.g., desalinization, groundwater and various surface water supplementation options, pipelines, and chemical treatment processes. After a great deal of deliberation, it was determined that an appropriately sized raw water impoundment would provide the most effective/efficient mitigation. A number of sites were examined for this facility; however, Parcel #3 in the Savannah International Trade Park received the highest objective ranking. Particularly compelling in its selection was the fact that since it was owned by GPA, the site would be available when needed. While the Trade Park is located in an upland area, the treatment impoundment and its associated infrastructure may adversely impact some small remnant wetlands therein. If this proves to be the case, the District's Regulatory SOP will be used to determine wetland mitigation needs.

Statistical analyses determined that a 35-acre impoundment [97 million gallons] would have sufficient usable volume [77.5 million gallons] to address any incremental elevation in chloride levels attendant to channel deepening [-47' NED alternative]. Operation of the storage impoundment would require that water from the existing Abercorn Creek intake be pumped to the impoundment during periods of low chlorides. When high chloride levels occur, water from the impoundment will be pumped to the City's water treatment plant via a new pump station. During high chloride episodes at the intake, the intake pumps will be stopped and the plant will draw water from the storage impoundment, thereby avoiding the high chlorides occurring in Abercorn Creek. When chloride concentrations on Abercorn Creek return to acceptable levels during low tide, the storage impoundment can be refilled and made ready for use during the next tidal cycle [as necessary].

Page 3

657-MR-21-EN01

Comment: Table 3-6 SUMMARY OF HYDRODYNAMIC-RELATED IMPACTS WITHOUT MITIGATION; Page 3-20 The table provides results based on the original chloride study which is known by the Corps to be in error and is anticipated to be replaced with an updated study dated December 15, 2010. Therefore, the results indicated in this table are incorrect and must be updated accordingly.

Response: The chloride study included in the draft report presented the best information available at that time. Since the Draft EIS was released, additional data has become available and the Corps has conducted additional evaluations to update its impact predictions. As noted in detail in the previous comment, the Corps initiated additional monitoring to refine and update the prediction of water quality impacts at the City's water intake during chloride spikes. The updated chloride study is included in the Final GRR-Appendix C and clarifies this issue and the necessary mitigation.

657-MR-21-EN02

Comment: Table 3-7 SUMMARY OF HYDRODYNAMIC-RELATED IMPACTS WITH MITIGATION; Page 3-21 The table provides results based on the original chloride study which is known by the Corps to be in error and is anticipated to be replaced with an updated study dated December 15, 2010. Therefore, the results indicated in this table are incorrect and must be updated accordingly.

Response: See previous response.

Page 4

657-MR-21-EV02

Comment: This is a correct statement. However, it should be noted that not only have available groundwater withdrawals been capped, but have also been reduced to 2004 withdrawal levels. In addition, discussion continues via special councils appointed by the governors of Georgia and South Carolina concerning saltwater intrusion on Hilton Head Island and the potential for further reductions. These efforts have been underway since 2005 to find amicable solutions to the saltwater intrusion problem and to avoid interstate law suits such as currently exists between Georgia, Alabama, and Florida. Initial groundwater modeling efforts have shown that reductions in groundwater withdrawals as high as 90 percent may be needed to stop saltwater intrusion altogether. Therefore, the reliance upon the Savannah River may be much greater than anyone has anticipated to date.

Response: Agree. The District appreciates that all parties are seeking practical measures to limit saltwater intrusion. In the noted study of potential project effects on the Floridan aquifer, pumping rates were held at a constant level of 80 MGD [which admittedly is high from an historical perspective]. However, the use of this elevated rate constant would yield a comparably higher value of groundwater intrusion. The District used this conservative approach in order to realize the most robust assessment of potential project impacts on the aquifer. Further, the District agrees that future reliance upon the Savannah River as a regional water source may be greater than is currently recognized. With this in mind, the District has sought to reduce [to a zero sum] any perturbation[s] from SHEP on water quality during the NEPA analysis.

Page 5

657-MR-21-EV03

Comment: [NOTE: The City had informed the Corps that the capacity of their plant was roughly 30 MGD. Since the analyses were performed, the City has indicated that the plant's capacity is now 62.5 MGD.]" This is incorrect. The question posed to the City was with regard to the production volume and not the capacity. At the time of the question, production was in-fact roughly 30 MGD. The capacity of the plant has been 62.5 MGD since its expansion in 1998.

Response: This issue was clarified in the FEIS, i.e., distinguishing between production volume and plant capacity.

657-MR-21-EV04

Comment: However, subsequent refining of the model has been completed and reveals that increases in chlorides will not be marginal, but will instead be substantial. Therefore, all discussion, results, and mitigation recommendations are flawed and invalid and the Adaptive Management plan, including associated monitoring, is no longer a sufficient or acceptable resolution.

Response: See explanation in EV01

657-MR-21-EV05

Comment: Savannah is not opposed to the continued monitoring. However, Savannah questions how the Corps would mitigate any large/unforeseen adverse impacts should they occur, as the removal of several feet from the top of the upper confining layer cannot be undone?

Response: Based on the revised impact predictions, the GRR and FEIS have been revised and now include mitigation for expected impacts to chloride levels in Abercorn Creek during low river flows and high tides. The SHEP will include monitoring during and after SHEP's construction to measure chlorides levels (1) at the City's water intake in Abercorn Creek, and (2) in several other locations in the harbor complex. This monitoring will be conducted to verify that predictions of project effects forecasted to occur are not materially exceeded.

657-MR-21-EV06

Comment: In spite of concerns with the Corps own technical reviews, the decision-makers chose to recommend continued use of the original model outputs. A subsequent refining of the model has been completed and reveals that increases in chlorides will not be marginal, but will instead be substantial. Base chloride concentrations will increase from approximately 10 ppm to approximately 20 ppm with periodic increases reaching into the 50 to 70 ppm range. Unfortunately, the entire draft Tier II EIS with regard to chloride increases and associated mitigation has been based on this initial recommendation and thus all discussion, results, and mitigation recommendations are flawed and invalid.

Response: The Final EIS has been revised to reflect the outcome of the updated analyses. Using the expanded/more accurate information [as noted in detail: City of Savannah Seawater Effects Study, November, 2011], the District fundamentally reassessed the project's forecast chloride effects at the
City's water intake [and by extension the whole system]. Namely, the conclusion was reached that certain SHEP design elements [channel deepening] could, in fact, have more of an impact on the City's drinking water compliance than initially thought. Specifically, this work presented evidence that increased chlorides would exacerbate lead corrosion and promote formation of adverse disinfectant byproducts. Industrial users [Weyerhaeuser/International Paper] may also experience problems in terms of interference with bleaching processes and reduced lifespan of its water distribution, respectively.

Numerous mitigation measures were examined during the course of the NEPA process, e.g., desalinization, groundwater and various surface water supplementation options, pipelines, and chemical treatment processes. After a great deal of deliberation, it was determined that an appropriately sized raw water impoundment would provide the most effective/efficient mitigation. A number of sites were examined for this facility; however, Parcel #3 in the Savannah International Trade Park received the highest objective ranking. Particularly compelling in its selection was the fact that since it was owned by GPA, the site would be available when needed. While the Trade Park is located in an upland area, the treatment impoundment and its associated infrastructure may adversely impact some small remnant wetlands therein. If this proves to be the case, the District's Regulatory SOP will be used to determine wetland mitigation needs.

Statistical analyses determined that a 35-acre impoundment [97 million gallons] would have sufficient usable volume [77.5 million gallons] to address any incremental elevation in chloride levels attendant to channel deepening [-47' NED alternative]. Operation of the storage impoundment would require that water from the existing Abercorn Creek intake be pumped to the impoundment during periods of low chlorides. When high chloride levels occur, water from the impoundment will be pumped to the City's water treatment plant via a new pump station. During high chloride episodes at the intake, the intake pumps will be stopped and the plant will draw water from the storage impoundment, thereby avoiding the high chlorides occurring in Abercorn Creek. When chloride concentrations on Abercorn Creek return to acceptable levels during low tide, the storage impoundment can be refilled and made ready for use during the next tidal cycle [as necessary].

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Percent of Time Calculated Chloride Levels Above 25 mg/l







Page 6

657-MR-21-EV07

Comment: It is the City's opinion that all funding necessary for the construction of potential mitigation shall be included in the final document to be sent forth to Congress for approval.

Response: Funding necessary for construction of the proposed mitigation [impoundment] is specified in the Final GRR and Final EIS. See EV01 for details regarding this facility.

657-MR-21-EV08

Comment: While this statement is technically correct, it fails to consider that the secondary limit of 250 mg/l for chloride is specific only to the direct consumption of chloride. However, this secondary limit does not account for the resulting impacts increased chlorides will have on the corrosivity of the water. As chlorides increase, corrosivity will also increase. Increased corrosivity will subsequently lead to increases in lead and copper at the customers tap. Lead and Copper have primary maximum contaminate levels of 0.015 mg/l and 1.3 mg/l respectively. It should be noted that lead and copper are the only substances required by EPA for a water purveyor to sample and control within a consumer's home and at their tap. It should also be noted that where lead and copper are above the maximum contaminate levels, the water purveyor is required to take action specifically to reduce water corrosivity.

Response: The quoted section is from EPA Safe Drinking Water Act, National Secondary Drinking Water Regulations (http://water.epa.gov/drink/contaminants/index.cfm), which have been adopted by the State of Georgia. The District's updated analysis considered potential changes in the water's corrosion coefficient, along with subsequent lead and copper contamination issues and concluded [see GRR Appendix C] mitigation was warranted. See EV01 details regarding how this issue will be resolved.

Page 8

657-MR-21-EV09

Comment: It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 10-4 does not include the costs for mitigation of increased chlorides at Savannah's raw water intakes. This table must be amended to include the full cost of mitigation.

Response: See GRR Appendix C for details regarding the raw water impoundment [cost/design] which will be constructed to address this issue.

657-MR-21-EV10

Comment: It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-6 includes "Chloride @ City's Water Intake" as an un-mitigated environmental effect of the maximum authorized plan. This is unacceptable. The full cost for chloride mitigation must be included in the maximum authorized plan.

Response: See previous discussion on this issue.

Page 9

657-MR-21-EV11

Comment: It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-7 must be modified to include the full cost for chloride mitigation.

Response: See previous discussion regarding this issue.

657-MR-21-EV12

Comment: It is recognized that the discussions, results, mitigation measures and costs contained within the draft Tier II EIS are based on a flawed model that should not have been used. Table 11-8 must be modified to include construction of chloride mitigation. Scheduled timing must be such that chloride mitigation is completed and in service not later than reaching final proposed harbor depth.

Response: See previous discussion regarding how this issue will be resolved. Note: the raw water impoundment will become operational concurrent with harbor deepening.

657-MR-21-EV13

Comment: It is Savannah's understanding that with the exception of the final technical review, the updated prediction tool was ready for use in September. While it is certainly desired to complete the technical review, the likely results of the updated prediction tool would also have been known during that time frame. As these results would have indicated a much larger increase in chlorides than those predicted by the original tool, it is difficult to understand why these improved results were not mentioned even as a footnote. Instead all discussions, results, mitigation measures, costs, and etc. are based on the prediction tool known to be unacceptable.

Response: This issue has been resolved via the revised chloride analysis and mitigation plan which is presented in Appendix C of the GRR and summarized in the GRR and FEIS.

657-MR-21-EV14

Comment: This document is the basis for all discussion, results, mitigation measures, costs, and etc. as relates to potential increases in chlorides at Savannah's raw water intakes along Abercorn Creek. This document has been determined by the USGS and the Corps of Engineers to be unacceptable and should be so noted in the EIS. The document has been replaced with a document entitled Chloride Modeling Savannah Harbor Expansion Project Savannah, Georgia and dated December 15, 2010. Subsequently, all discussions, results, mitigation measures, costs, and etc. based on the November 15, 2006 document are invalid and should either be so noted in the EIS or removed altogether. It is understood that it may be desirous to retain this document as a historical appendix for the purposes of record completeness. However, it should be noted as such and not be used or referenced for any manner other than historical record.

Response: The Final GRR and FEIS include the results of the recent refinement of the chloride predictive tool. The original document [2006] remains in the supplemental materials to Appendix C solely to bolster SHEP's historical record, but is no longer relevant in the decision-making process for chloride mitigation.

Page 10

657-MR-21-EV15

Comment: It is true that Savannah is concerned with regard to increased chloride at its raw water intakes. However, it is not correct that this concern is primarily for industrial water supply, not drinking water. It is most difficult to understand how the Corps can reach this conclusion. As has been explicitly expressed in numerous meetings, there are a number of potential problems associated with higher chloride levels including but not limited to serious economic impacts on industrial customers, increased corrosion rates for all municipal customers including residential. The following written references are also noted:

Response: The District is aware of the potential for secondary impacts to drinking water [for all users] due to increased solubility of lead and copper. The Final EIS was revised to reflect the updated impact analysis and clarify that the City is concerned about potential project impacts to both municipal and industrial water users.

Page 11

657-MR-21-EV16

Comment: As has been stated both verbally and in written form on multiple occasions there are numerous impacts that increased chloride concentrations will have on Savannah's water system. These impacts include both long term operation and maintenance costs, as well as the need to make immediate capital expenditures by Savannah and its industrial customers. A short discussion of these is provided as follows:

Response: The City's estimated cost for the ferrous-based portion of its water distribution system is acknowledged. However, the District believes that replacing this portion of the distribution system is not warranted given construction of the raw water impoundment [which addresses the underlying problem].

Page 12

657-MR-21-EV16.5

Comment: *"Further, the USACE Office of Counsel reports that the City has no legal right to water with chloride levels below those established under the Safe Drinking Water Act, in this case 250 mg/L. Thus, even if a cause and effect relationship is found, there is no legal obligation for the GPA or the federal government to remedy the situation as long as concentrations remain below established Safe Drinking Water Standards. ...".*

Does the Corps intend to stand firm on its legal interpretation that the citizens and customers of Savannah have no legal right to water with lead and copper levels below those established under the Safe Drinking water act and even if a cause and effect relationship is found, there is no legal obligation for GPA or the federal government to remedy the situation?

Response: The City was quoting a passage from the Preliminary Draft General Reevaluation Report [April, 1998]. That wording was removed from the Draft GRR [July, 1998] and is not in the Final GRR.

657-MR-21-EV17

Comment: Obviously, Savannah is also concerned with the long term viability of its large industrial customers. As has been stated on numerous occasions, the industries served by Savannah's surface water plant are vital to the economic well being of the entire southeast Georgia region. These industries not only provide over 1,000 direct well paying jobs, but also a wide range and number of jobs associated with the many small business that provide direct and indirect support and services. In addition, these industries use approximately 80 percent of the total water produced by Savannah's surface water system and therefore pay the lion's share of the cost to operate that system. A loss of these industries would require an immediate and substantial increase in water rates to the residential customer base throughout Chatham and Effingham Counties.

Response: The proposed raw water impoundment [and associated mitigation plan] should provide relief to both industrial and municipal water users.

657-MR-21-EV18

Comment: Increasing Freshwater Supply through Bear Creek. To the knowledge of Savannah, no modeling has been conducted to determine the volume of flow through Bear Creek and Abercorn Creek that would be necessary to offset the effects of increased chlorides from the Savannah River or even if the necessary volumes can be made available through these Creeks. Savannah would agree that this option would require a high level of maintenance to reliably mitigate the increased chlorides. It is also Savannah's opinion that the on-going cost and management of such maintenance would not be borne by Savannah.

Response: Savannah District did not model increasing flow through Bear Creek [namely, determining the volume of freshwater necessary to eliminate the effects of expected chloride increases in Abercorn Creek] because of concerns about maintenance of a deepened creek. Use of the noted raw water impoundment will provide more efficient/effective mitigation [with greater certitude of success].

Page 15

657-MR-21-EV19

Comment: It is correct that Savannah supports the concept of locating a supplemental water withdrawal intake upstream of the zone of project influence. However, Savannah does NOT support the concept of chloride mitigation based on the Adaptive Management strategy as proposed. Although, adaptive management may be a very useful tool under particular circumstances, it is Savannah's opinion that it will not be an acceptable alternative with regard to the mitigation of chlorides for the Savannah Harbor Expansion Project based on the following issues:

Response: The updated chloride analysis included in the final GRR recommends construction [and operation] of the raw water impoundment feature prior to the completion of the deepening project rather than as a subsequent adaptive management measure.





January 25, 2011

William Bailey ATTN: PD US Army Corps of Engineers Savannah District 100 W. Oglethorpe Ave. Savannah, Georgia 31401-3640

Dear Mr. Bailey,

The deepening of the Savannah Harbor would have a tremendous positive economic impact on the states of Georgia and South Carolina, including communities outside of the immediate area. The Central Savannah River Area will enjoy these benefits, and thus the cities of North Augusta, South Carolina and Augusta-Richmond County, Georgia support the project. In addition to our general support we have interest in aspects of the project that will have a more direct impact on our community.

One item of direct impact on North Augusta and Augusta is the proposed use of a fish passage around the New Savannah Bluff Lock and Dam as one aspect of environmental remediation. This is a positive step forward on the long delayed plan to repair the NSBL&D and create a fish passage as joint projects, as mandated by public law. In addition, the positive impacts on the fish populations in the Savannah River will be a boost for the area environment and sportsmen.

A possibly overlooked benefit of the NSBL&D project to the harbor deepening is the super-saturation of oxygen it creates in the river's water as it passes the project. This oxygen loading helps provide a better quality of water headed down river towards the harbor, which suffers from low oxygen levels at certain depths and certain times. As noted by the study, this issue is a consideration for further deepening.

The deepening of the Savannah Harbor will increase the ability of the port to handle more cargo and materials, and this will be a boost for the economy of the CSRA as

well as the immediate port area. We support this project, and the inclusion of a fish passage around our own critical piece of infrastructure, the New Savannah Bluff Lock & Dam. The people of North Augusta, South Carolina and Augusta-Richmond County, Georgia will be enjoy the positive economic and environmental impact of this project.

Frederick Russell Administrator Augusta-Richmond County Sam Bennett Administrator City of North Augusta

City of Augusta and North Augusta

Comment: Letter of Support.

Response: Comment noted.



Comment on the Savannah Harbor Expansion Project

The Savannah District, U.S. Army Corps of Engineers welcomes your comments on the Savannah Harbor Expansion Project. Once completed, place the card in the "comments" box or add postage and mail it back to us. Comments can also be provided online at CESAS-PD@usace.army.mil.

From: (optional) SAPAH WARD, MPC

Comments:

- Unclear on APE for Environmental Review, Pennyworth Island is a significant automal repouse - was it evaluated for is it outside the APE3

- Unclear on out come for CSS Georgia, will it be remared to a secure location for presentation or is it to be delitroyed?

Sarah Ward MPC

500-MR-02-EV01

Comment: Unclear on APE for Environmental Review, Pennyworth Island is a significant cultural resource- was it evaluated or is it outside the APE?

Response: Pennyworth Island is within the APE and was considered during planning for the proposed project. The site would not be directly affected by the proposed project. The FEIS-Cultural Resources Section has been expanded to address concerns about the fate of cultural resources located on/around Pennyworth Island.

500-MR-02-EV02

Comment: Unclear one outcome for CSS Georgia. Will it be removed to a secure location for preservation or is it to be destroyed?

Response: The CSS Georgia will not be destroyed as a result of SHEP. Plans for the CSS Georgia are described in EIS-Appendix F, Cultural Resources and include artifact recovery, conservation, curation, and the development of an interpretive/display center.



Comment on the Savannah Harbor Expansion Project

The Savannah District, U.S. Army Corps of Engineers welcomes your comments on the Savannah Harbor Expansion Project. Once completed, place the card in the "comments" box or add postage and mail it back to us. Comments can also be provided online at CESAS-PD@usace.army.mil. DC. Or harrise@ them From: (optional) chave Comments: n 57 th subli -spelle APS ð He tio B 1224 60 10 H 55 Geor 6 recos 211 20 DD 1 2 inh = tore the. 6 アエナ AP Pennyworth withi Island he WAS 21 w 6 Nation Ken 992 nomina 21 whent Vunder wal

Ellen Harris MPC

501-MR-02-EV01

Comment: What will be done w/ the CSS Georgia? Removal & data recovery is mentioned but what will happen to the artifacts? Where will they be stored?

Response: The CSS Georgia will not be destroyed as a result of SHEP. Plans for the CSS Georgia are described in EIS-Appendix F, Cultural Resources and include artifact recovery, conservation, curation, and the development of an interpretive/display center.

501-MR-02-EV02

Comment: *Is Pennyworth Island within the APE? It was determined eligible for the national Register in 1993. A nomination is currently underway?*

Response: Pennyworth Island is within the APE and was considered during planning for the proposed project. The site would not be directly affected by the proposed project. The FEIS-Cultural Resources Section has been expanded to address concerns about the fate of cultural resources located on/around Pennyworth Island.

917 bay street, suite 207, beaufort, sc 29902 phone 849.379.3955 fax 843.379.9354



www.low.countrynet.org

January 25, 2011

Mr. William Bailey ATTN PD, US Army Corps of Engineers, Savannah District, 100 West Oglethorpe Avenue Savannah, Georgia 31401-3640

Dear Mr. Bailey,

On Jan. 7, the Lowcountry Economic Alliance offered its public comment relating to the Environmental Impact Statement (EIS) of the Savannah Harbor Expansion Project (SHEP). As the neighboring region, we felt it extremely important to weigh in on a topic so critical to our economy.

As part of that public comment we included an analysis of the Economic Impact Section of the SHEP EIS as completed by Dr. James Kleckley of East Carolina University. As you may recall we determined that the Economic Impact Section contained no fatal flaws but required additional analysis of the SHEP's economic impact on Beaufort and Jasper counties.

We since have contracted with Columbia, S.C.-based Miley & Associates which on Jan. 24 completed a report entitled "The Economic Impact of the Savannah Port Dredging on the Lowcountry of South Carolina" That report is included with this public comment.

Due to the short timeframe the Miley & Associates report was unable to address South Carolina as a whole but rather simply Beaufort and Jasper counties. Additionally, the report does not offer an outlook for potential economic impact, though it does outline the current importance of the Savannah River in terms of providing jobs for S.C. residents.

According to the report the Port of Savannah is responsible for employing almost 900 residents of Beaufort and Jasper counties and accounts for more than \$32 million annually in labor income.

While it is our opinion that further economic analysis is necessary, we believe the Miley & Associates report paints a clearer picture of the Savannah River as an economic driver for not only Georgia but also the South Carolina Lowcountry.

We respectfully submit this letter and information in an effort to go on record in support of the SHEP and note its importance to the Lowcountry.

Sincerely,

Kim Statler Lowcounty Economic Alliance



1. Introduction

The political boundaries between South Carolina and Georgia are delineated by distinct lines -- however the economies of the two states are not nearly so separate. In fact, they are very closely intertwined. This interdependent relationship is no more evident and no more important than that in the Lowcountry of South Carolina and the Savannah Georgia Port.

The on-going operations at the Savannah Port and the proposed dredging project by the Savannah Port are prime examples of this inter-relationship. There are substantial impacts in Beaufort and Jasper counties from the on-going operations at the Savannah Port. In addition, the proposed dredging of the Savannah River to enable larger container ships will have a substantial positive impact on the economy of the South Carolina Lowcountry.

This report summarizes the impacts from the on-going operations at the Savannah Port and the potential economic impacts for the proposed dredging project on Beaufort and Jasper Counties. While the impacts reach deep into the South Carolina economy, this report focuses on the impacts on Beaufort and Jasper Counties. These impacts are estimated to be generated from two major sources; 1) the direct employment by South Carolinians at the Savannah Port in on-going operations and 2) the economic activity generated from the \$800 million in dredging construction. These impacts are outlined below.

2. Economic Impacts from On-Going Port Operations

The on-going operations of the Savannah Port have substantial economic impacts on South Carolina. A recent study by the University of Georgia estimated that the operations at the Savannah Port support over 19,700 full and part-time jobs in South Carolina.¹ Based on the estimates in the Georgia Report, it is estimated that there are 646 employees in Beaufort and Jasper counties that are directly employed by the Savannah Port.² These jobs are very important to the area's economic health.

As seen in Table 1, there were more than 6,500 workers in the two counties looking for jobs in November 2010. The area's unemployment rate was 8.7% at that time. The area's unemployment rate averaged 9.5% for 2010 peaked in early 2010 at 11%. These jobs at the Savannah Port take on more importance in high unemployment times such as the area and State have experienced over the last three years.

Miley & Associates, Inc. January 2011

	November 2010			
County	Labor Force	Employment	Unemployed	Unemployment Rate
Beaufort	65,197	59,644	5,553	8.5%
Jasper _	10,341	9,335	1,006	9.7%
Region Totals	75,538	68,979	6,559	8.7%

Table 1Local Labor Force Indicators

Source: South Carolina Department of Employment and Workforce, January 2011.

The multipliers used in this analysis estimate three components of total change within the local area:

- * Direct effects represent the initial change in the port related activities.
- * *Indirect effects* are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries.
- * *Induced effects* reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.

This cycle of spending continues until leakages from the region (spending on goods and services outside the area) stop the cycle. Due to these multiplier effects, the initial, direct investment results in indirect and induced impacts of many more dollars.

As seen in Table 2 below, the 646 jobs in Beaufort and Jasper Counties directly supported by the Savannah Port have a multiplied impact on the local economy of the Lowcountry. The direct employment of 646 support an additional 245 jobs in the two-county area through indirect and induced impacts for a total employment impact in the area of almost 900 jobs.

Miley & Associates, Inc. January 2011

2

		Table 2		
		Conomic Impacts	to	
	Beau	ifort and Jasper C	ounty	
	From On-g	oing Savannah Por	rt Operations	
-	Direct	Indirect	Induced	<u>Total*</u>
	· · · · · · · · · · · · · · · · · · ·			
	¢42.207.697	¢10 124 006	¢14 142 704	¢67 175 100
Output	\$43,207,687	\$10,124,006	\$14,143,794	\$67,475,488
Output Labor Income	\$43,207,687 \$23,609,884	\$10,124,006 \$4,212,728	\$14,143,794 \$4,591,836	\$67,475,488 \$32,414,447
Output Labor Income	\$43,207,687 \$23,609,884	\$10,124,006 \$4,212,728	\$14,143,794 \$4,591,836	\$67,475,488 \$32,414,447

The Economic Impact of the Savannah Port Dredging Project

The direct employment of residents of Beaufort and Jasper counties generates substantial labor income and economic output in the two-county area. As seen in Table 2, there is more than \$32 million in labor income generated in the area on an annual basis from the residents living in Beaufort and Jasper counties directly supported by the Savannah Port.



Miley & Associates, Inc. January 2011

3. Economic Impacts from Savannah Port Dredging Operations

In addition to the positive economic impacts from the on-going operations of the Savannah Port, the proposed \$800 million dredging project to deepen the river for larger ships will also have substantial economic impacts on South Carolina. The \$800 million for the dredging project will be spent primarily in the immediate vicinity of the Port. It is likely that as much as 50% of the expenditures would be spent in South Carolina since half of the river bed is in South Carolina and half is in Georgia. Therefore, there could be \$400 million of expenditures in South Carolina over the next few years as the dredging is completed.

However, to be conservative, it is assumed here that only 25% of the \$800 million (\$200 million) is spent in South Carolina. Table 3 summarizes the impacts on Beaufort and Jasper counties from the expenditures of the dredging operations.

As seen in Table 3, the dredging operations are estimated to generate an additional \$269 million in economic activity in the two-county area. The dredging operations would generate more than \$21 million in local labor income in Beaufort and Jasper counties. Perhaps as important to the local economy, the dredging operations are expected to generate over 550 jobs in the Lowcountry economy.

Table 3 Economic Impacts on Beaufort and Jasper County From Savannh Port Dredging Activities						
	Direct	Indirect	Induced	<u>Total*</u>		
Output	\$227,609,459	\$6,825,896	\$35,069,773	\$269,505,127		
Labor Income	\$7,976,971	\$2,222,036	\$11,385,313	\$21,584,320		
Employment	146	55	357	558		

Miley & Associates, Inc. January 2011

4. Summary

As outlined in the accompanying analysis, it is clear that the on-going operations of the Savannah Port have substantial positive economic impacts on Beaufort and Jasper counties. In addition, the proposed dredging project will also generate substantial economic impacts to the Lowcountry.

Direct operations of the Savannah Port support almost 900 jobs in the two-county area. It is estimated that the dredging project will support and additional 550 jobs. Together, the on-going operations and the dredging project will support almost 1,450 jobs in the Lowcountry. Together they will generate over \$337 million in total economic activity. And finally, the on-going operations and dredging project will generate \$53.9 million in labor income in the area.

And finally, these estimates do not include future jobs and related economic activities that will result from any increased volume of traffic at the Savannah Port once the dredging project is completed. The increase in volume that has been projected would also have positive impacts on Beaufort and Jasper counties above those estimated here.



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Endnotes:

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 ¹ "The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009", Selig Center for Economic Growth, The University of Georgia, April 2010.
² Based on the relative share of value added in Beaufort and Jasper Counties and estimates for total

² Based on the relative share of value added in Beaufort and Jasper Counties and estimates for total employment impacts from "The Economic Impact of Georgia's Deepwater Ports on South Carolina's Economy in FY 2009", Selig Center for Economic Growth, The University of Georgia, April 2010.

METHODOLOGY

This study estimates the economic impacts on the state of South Carolina from the Savannah Port operations and the proposed dredging project by the Ports Authority. The methodology used in this study is the IMPLAN regional input-output modeling system developed by MIG, Inc. of Stillwater, Minnesota. This study uses 2009 data, the most recent data available for the IMPLAN models.

IMPLAN was developed by MIG, Inc. as a cost-effective means to develop regional input-output models. The IMPLAN accounts closely follow the accounting conventions used in the "Input-Output Study of the US Economy" by the Bureau of Economic Analysis (1980) and the rectangular format recommended by the United Nations.

The IMPLAN Input-Output Model mathematically describes commodity flows from producers to intermediate and final consumers. Purchases for final use (final demand) drive the model. Industries producing goods and services for final demand also purchase goods and services from other producers. These other producers, in turn, purchase goods and services. This buying of goods and services (indirect purchases) continues. Leakages from the region eventually stop the cycle.

The IMPLAN input-output model mathematically derives the indirect and induced effects. The resulting multipliers describe the change in output for every regional industry caused by a one-dollar change in final demand for any given industry. The notion of a multiplier rests upon the difference between the initial effect of a change in final demand and the total effects of that change. Total effects are the direct effects plus indirect effects, plus induced effects. Direct effects are the production changes associated with initial final demand changes. Indirect effects are production changes in backward-linked industries caused by the changing input needs of directly effected industries. Induced effects result from the household expenditures from the directly or indirectly generated labor income.

The multipliers used in this analysis estimate three components of total change within the local area:

- * Direct effects represent the initial change in the industry in question.
- * *Indirect effects* are changes in inter-industry transactions as supplying industries respond to increased demands from the directly affected industries.
- * Induced effects reflect changes in local spending that result from income changes in the directly and indirectly affected industry sectors.

7

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This cycle of spending continues until leakages from the region (spending on goods and services outside the area) stop the cycle. Due to these multiplier effects, the initial, direct investment results in indirect and induced impacts of many more dollars.

In essence, the multipliers estimated by this methodology represent the consecutive rounds of buying and selling that ripple through an economy. To produce one dollar of new product, employees must be hired and paid. The wages paid to these workers will then be spent on goods and services, such as food, gasoline, clothes, housing, etc. within the region and outside the region. As these cents are spent, they become income to the recipient, and the spending continues over and over again. The induced effect is the cumulative amount of spending.

The economic activity of the project also requires intermediate inputs to be purchased such as electricity, raw materials, transportation services, labor etc. These expenditures become income to the recipient and pay for the purchases of raw materials, labor, etc. They, in turn, are then spent over and over again in the economy. Purchases made from outside the region are considered "leakages" from the economy. The consecutive rounds of selling goods and services continue until these leakages from the region end the cycle. The indirect effect is the cumulative amount of such spending.

Data for this analysis is 2008 data unless otherwise noted.

Additional data such as employment and unemployment data are from the South Carolina Department of Employment and Workforce, the Lowcountry Economic Network, the Bureau of Labor Statistics, US Department of Labor; and the US Department of Commerce, Bureau of Economic Analysis.

The Study Area

The economic impacts of the Savannah Port operations will extend throughout the Lowcountry area, the surrounding counties and the entire state. However, the focus of this analysis is to estimate the impacts on the Beaufort and Jasper county area. For the purposes of this analysis, the study area is defined as the following two counties:

Beaufort Jasper

Factors of production such as labor and materials freely flow between and across these county lines. Today's workforce is very mobile and many workers travel 40-50 miles to work everyday.

Miley & Associates, Inc. January 2011

MILEY & ASSOCIATES, INC.

Miley & Associates is one of the Southeast's leading economic and financial consulting firms. The firm specializes in economic impact analyses, fiscal impact analyses, feasibility reports, impact fee studies and benefit/cost modeling. Our clients include national and prominent local real estate developers, school districts, local governments, regional development agencies, and other private sector development firms. Miley & Associates partners appear regularly before decision-makers at all levels of government and understand the values, needs and desires of the clients they represent.

Miley & Associates appreciates that every research project is unique and deserves a custom solution. Public policy decisions are not made overnight, and we excel at providing advice and counsel along the way. We represent our clients. Our business plan is simple: we focus on exceeding our client's expectations and building long-term relationships.

Miley & Associates, Inc. was founded in 1993 by Harry W. Miley, Jr. Ph. D. The Company is an economic and financial consulting firm providing a range of analytical services to public and private sector clients. Miley & Associates conducts fiscal and economic impact analyses of proposed new developments and has extensive experience in assisting clients with their economic development and community revitalization projects.

Dr. Miley served as Chairman of the South Carolina Board of Economic Advisors (BEA) under two Governors. The BEA is responsible for estimating the State's revenues for the Governor and the General Assembly to use in formulating the State's annual budget. Dr. Miley was originally appointed as Chairman by Governor Carroll Campbell and continued to serve as Chairman for Governor David Beasley.

Dr. Miley was the Senior Executive Assistant for Economic Development to Governor Campbell from 1987 to 1989. Dr. Miley served as principal advisor to Governor Carroll Campbell on the state's policies for economic development, employment and training, work force and adult illiteracy, technical education and transportation issues.

Prior to joining the Governor's Office, Dr. Miley was on the faculty of the Moore School of Business at the University of South Carolina and Associate Director of the Division of Research at the School.

Miley & Associates, Inc. January 2011

GENERAL LIMITING CONDITIONS

This economic impact analysis is not a budget or forecasting document and is not intended to depict a definitive course of action. Moreover, economic impact analysis is not designed as a space or facility-planning document. Many assumptions underlying impact analyses are based on policy decisions which, if modified, would affect the overall results.

This study is based on estimates, assumptions and other information developed by Miley & Associates, Inc. from its independent research effort, consultations with the client and its representatives, and primary and secondary sources. We have utilized sources that are deemed to be reliable but cannot guarantee their accuracy. Moreover, estimates and analysis are based on trends and assumptions and, therefore, there will usually be differences between projected and actual results because events and circumstances frequently do not occur as expected, and those differences may be material. No responsibility is assumed for inaccuracies in reporting by the client, the client's agent and representatives or any other data source used in preparing this study.

This report is based on information that was current as of January, 2011 and Miley & Associates, Inc. has not undertaken any update of its research effort since that date. We have no obligation, unless subsequently engaged, to update this report or revise this analysis as presented due to events or conditions occurring after the date of this report.

Possession of this study does not carry with it the right of publication thereof in any manner without first obtaining the prior written consent of Miley & Associates, Inc. No abstracting, excerpting or summarization of this study may be made without first obtaining the prior written consent of Miley & Associates, Inc. This report is not to be used in conjunction with any public or private offering of securities or other similar purpose. This study may not be used for purposes other than that for which it is prepared or for which prior written consent has first been obtained from Miley & Associates, Inc.

Miley & Associates, Inc. January 2011

Lowcountry Economic Alliance

756-JK-08-EC01

Comment: According to the report the Port of Savannah is responsible for employing almost 900 residents of Beaufort and Jasper counties and accounts for more than \$32 million annually in labor income.

Response: It is recognized that the Port of Savannah positively impacts the regional economies of Georgia and South Carolina. The Economic Appendix in the final GRR includes a socioeconomic resources section that includes similar information to that provided by the commenter.

Page 1

756-JK-08-EC02

Comment: This report summarizes the impacts from the on-going operations at the Savannah Port and the potential economic impacts for the proposed dredging project on Beaufort and Jasper Counties. While the impacts reach deep into the South Carolina economy, this report focuses on the impacts on Beaufort and Jasper Counties. These impacts are estimated to be generated from two major sources; 1) the direct employment by South Carolinians at the Savannah Port in on-going operations and 2) the economic activity generated from the \$800 million in dredging construction. These impacts are outlined below.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix in the final GRR includes a socioeconomic resources section that includes similar information to that provided by the commenter.

756-JK-08-EC03

Comment: As seen in Table 1, there were more than 6,500 workers in the two counties looking for jobs in November 2010. The area's unemployment rate was 8.7% at that time. The area's unemployment rate averaged 9.5% for 2010 peaked in early 2010 at 11%. These jobs at the Savannah Port take on more importance in high unemployment times such as the area and State have experienced over the last three years.

Response: The updated and expanded socioeconomic resources section in the Economics Appendix includes additional information regarding potential regional economic impacts associated with the proposed project.

Page 2

756-JK-08-EC04

Comment: As seen in Table 2 below, the 646 jobs in Beaufort and Jasper Counties directly supported by the Savannah Port have a multiplied impact on the local economy of the Lowcountry. The direct employment of 646 support an additional 245 jobs in the two-county area through indirect and induced impacts for a total employment impact in the area of almost 900 jobs.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix includes a socioeconomic resources section that includes similar information to that provided by the commenter.

Page 3

756-JK-08-EC05

Comment: The direct employment of residents of Beaufort and Jasper counties generates substantial labor income and economic output in the two-county area. As seen in Table 2, there is more than \$32 million in labor income generated in the area on an annual basis from the residents living in Beaufort and Jasper counties directly supported by the Savannah Port.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix includes a socioeconomic resources section that includes similar information to that provided by the commenter.

Page 4

756-JK-08-EC06

Comment: In addition to the positive economic impacts from the on-going operations of the Savannah Port, the proposed \$800 million dredging project to deepen the river for larger ships will also have substantial economic impacts on South Carolina. The \$800 million for the dredging project will be spent primarily in the immediate vicinity of the Port. It is likely that as much as 50% of the expenditures would be spent in South Carolina since half of the river bed is in South Carolina and half is in Georgia. Therefore, there could be \$400 million of expenditures in South Carolina over the next few years as the dredging is completed.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix includes a socioeconomic resources section that includes similar information to that provided by the commenter.

756-JK-08-EC07

Comment: As seen in Table 3, the dredging operations are estimated to generate an additional \$269 million in economic activity in the two-county area. The dredging operations would generate more than \$21 million in local labor income in Beaufort and Jasper counties. Perhaps as important to the local economy, the dredging operations are expected to generate over 550 jobs in the Lowcountry economy.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix includes a socioeconomic resources section that includes similar information to that provided by the commenter.

Page 5

756-JK-01-EC08

Comment: Direct operations of the Savannah Port support almost 900 jobs in the two-county area. It is estimated that the dredging project will support and additional 550 jobs. Together, the on-going operations and the dredging project will support almost 1,450 jobs in the Lowcountry. Together they will

generate over \$337 million in total economic activity. And finally, the on-going operations and dredging project will generate \$53.9 million in labor income in the area.

Response: It is recognized that Savannah Harbor impacts the regional economies of Georgia and South Carolina. The Economic Appendix includes a socioeconomic resources section that includes similar information to that provided by the commenter.

From: To: Subject: Date: Attachments: Kim Statler <u>CESAS-PD_SAS</u> Comments from the Lowcountry Economic Alliance Friday, January 07, 2011 5:00:26 PM Review of SavPort Studies 20110105final.pdf Alliance SHEP response (3).doc

January 7, 2011

Mr. William Bailey ATTN: PD, US Army Corps of Engineers, Savannah District, 100 West Oglethorpe Avenue Savannah, Georgia 31401-3640

Dear Mr. Bailey,

Thank you for the opportunity to review and submit comments relating to the Environmental Impact Statement (EIS) of the Savannah Harbor Expansion Project (SHEP). As the neighboring region, we certainly appreciate the significance of this project and massive scope of the work presented.

The Lowcountry Economic Alliance (LEA) is a regional economic development group jointly formed by Beaufort and Jasper counties to promote the region and create a format for evaluating and supporting projects of significance to our area.

To that, we have reviewed the SHEP EIS and specifically the Economic Impact Section and have consulted with Dr. James Kleckley of East Carolina University for additional review.

In summary, we did not find any fatal flaws in the economic analysis contained in the EIS. We can conclude from the data that the project will create a more competitive shipping environment, but the report stops short of translating that eventual cost savings into relevant economic impact data for the purpose of community stakeholder review.

The analysis does not provide us with information whereby we can determine the value of the project to our region. Additional economic review must be done in order to properly understand the economic value of this project on counties in South Carolina and Georgia.

This project is critical to our economic development efforts. The market is clearly demonstrating that to us in our business recruitment efforts. The residents of both states need to be aware of the immediate and long-term benefits.

We respectfully request your consideration of more in-depth economic analysis as we move forward with our regional partners to do the same.

Sincerely, Kim Statler Lowcounty Economic Alliance 917 Bay Street, Suite 207 Beaufort, SC 29902 O: (843) 379-3955 F: (843) 379-3954 kstatler@lowcountrynet.org www.lowcountrynet.org

Lowcountry Economic Alliance

166-JK-04-EC01, 166-JK-04-EC02, 166-JK-04-EC03, 166-JK-04-EC04

Comment: In summary, we did not find any fatal flaws in the economic analysis contained in the EIS. We can conclude from the data that the project will create a more competitive shipping environment, but the report stops short of translating that eventual cost savings into relevant economic impact data for the purpose of community stakeholder review.

The analysis does not provide us with information whereby we can determine the value of the project to our region. Additional economic review must be done in order to properly understand the economic value of this project on counties in South Carolina and Georgia.

This project is critical to our economic development efforts. The market is clearly demonstrating that to us in our business recruitment efforts. The residents of both states need to be aware of the immediate and long-term benefits.

We respectfully request your consideration of more in-depth economic analysis as we move forward with our regional partners to do the same.

Response: The District evaluates its water resource projects from a National Economic Development (NED) perspective which, in essence, is the alternative [meeting project objectives] that produces the greatest net economic benefits. In this instance, the NED benefits are comprised primarily of the reduced transportation costs resulting from removing the current constraints of draft. It is important to note that these economic benefits accrue from the use of larger, more cost-effective container ships, not an incremental increase in the number of containers. The savings are presumably passed on to U.S. consumers and businesses in the form of lower prices. In performing the NED analysts, the Corps is mindful not to claim benefits if a project merely redistributes commerce between ports, rather than actually increase the size of the market.

In recent years, additional analyses have been undertaken which focus on Regional Economic Development [RED]. In doing so, analysts calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in such an RED analysis are jobs and worker income from the project construction expenditures. Chapter 8 of the Economic Appendix details regional economic impacts.

The study team reran the EIFS model to include the State of South Carolina and the GRR Economic Appendix includes a write up explaining the model and its results.



Savannah Maritime Association

33 Bull St, Suite 550, Savannah, Georgia 31401 Phone 912-233-0415 Fax 912-232-1733 Email: smasavga@bellsouth.net

December 29, 2010

Mr. William Bailey ATTN: PD, US Army Corps of Engineers, Savannah District 100 West Oglethorpe Avenue Savannah, GA 31401-3640

SUBJECT: Comments on the USACE Draft Tier II Environmental Impact Statement and Draft General Reevaluation Report for improvements and continued maintenance of the Savannah Harbor Federal Navigation Project, Chatham County, Georgia and Jasper County, South Carolina.

Dear Mr. Bailey.

The Savannah Maritime Association supports and encourages the expansion of the Savannah Harbor to 48 ft as described in the subject documents.

The Savannah District has been outstanding in including the maritime community and public in every phase and every decision for the Savannah Harbor Expansion Project. At the conclusion of project planning, the Stakeholders Evaluation Group is a team working on a project that benefits the entire community.

The engineering aspects of the project have been evaluated in detail and result in a positive approach to expansion. There are no unanswered questions or excessive risk in completing the project. An adaptive management approach provides resources to address any unknown or evolving risks.

The environmental issues and associated mitigation improve the overall environment of the Savannah River basin. When the project is approved, there will be more protected wetlands, more fish and wildlife support and no risk to the Floridian Aquifer.

The economic analysis of the project is conservative in calculating benefits and the cost/benefit ratio will greatly exceed 4 to 1. Increased efficiencies in transportation costs will benefit both imports and exports. The economic analysis does not predict what would actually happen if the project is not approved. The analysis indicates no change in volume if there is no change in the channel depth. It is clear that the more efficient Post-Panamax vessels will shift to other ports and trade in Savannah, both import and export will falter if the channel is not deepened.

USACE has done an outstanding job in managing the project but there have also been delays, most recently over two additional years for the economic analysis. USACE must complete the work and gain approval as quickly as possible. Anything else will be a disappointing failure to support all the people who work in our port and the southeast.

Charles E. Sutlive Executive Director

Savannah Maritime Association

521-DC-02-EC01, 521-DC-02-EC02

Comment: The economic analysis of the project is conservative in calculating benefits and the Cost/benefit ratio will greatly exceed 4 to I. Increased efficiencies in transportation costs will benefit both imports and exports. The economic analysis does not predict what would actually happen if the project is not approved. The analysis indicates no change in volume if there is no change in the channel depth. It is clear that the more efficient Post-Panamax vessels will shift to other ports and trade in Savannah, both import and export will falter if the channel is not deepened.

Response: *Global Insight's* commodity forecast was one of the algorithms used to determine the benefit/cost ratios for SHEP alternatives. It includes a large number of economic factors and was vetted several times by economists for its applicability [reasonable assumptions] to the Savannah Harbor study. Moreover, Corps guidance on deep-draft navigation projects emphasizes using empirical data whenever possible and forecasting over a 50-year period of analysis. Data on the past and present navigation problems are used to help identify the future without-project condition scenario. This, in turn, serves as a baseline for project formulation and evaluation. As would be expected, a 50-year forecast contains uncertainty; therefore, several sensitivity analyses were performed to identify the sensitivity of the forecasts to different input parameters. These include using lower growth rates, no growth, and increased packaging densities. For the most part, the results show the feasibility of the proposed project improvements is not particularly sensitive to small variations in the input parameters.

The *HarborSym* analysis considers benefits to all vessels by estimating their efficiency gains from reduced congestion. The Transportation Cost Savings Model estimates the efficiency gains from vessels being able to load/unload without the current constraints of draft. Conversion of the operating fleet to larger vessels would substantially reduce transportation costs after implementation of SHEP. In fact, the largest vessels would benefit the most from the deepening proposal. However, there would be some incremental gains in efficiency to smaller vessels as a result of reduced harbor/channel congestion and reduced waiting for sufficient tidal windows.

The without-project condition describes the future conditions that are expected to prevail in the planning area [Harbor] if no federal action is taken to solve the current navigation problems. The economic analysis describes the without-project (-42 depth) condition and calculates the transportation costs required to move the forecasted cargo over the period of analysis.

It is possible that some of the cargo currently transiting Savannah could move to a nearby port if the proposed deepening does not occur. However, the Corps' analyses indicate that – based on economics alone – that is not likely. The multi-port analysis, which involves a systematic determination of alternate routing possibilities, indicate that it is costly to ship many goods to other ports only to have them transported back to the Savannah area's distribution centers. Landside trucking costs within the local area of Savannah are estimated to range from \$100 to \$150 each round trip whereas movements outside of the local area are estimated to average \$1.50 to \$2.00 per round trip mile. Since these costs exceed the savings a deepening project could provide, the likelihood of major cargo shifts is very unlikely from a cost standpoint.



The International



December 28, 2010

Mr. William Bailey ATTN: PD, US Army Corps of Engineers, Savannah District, CESAS-PD@usace.army.mil 100 West Oglethorpe Avenue Savannah, GA 31401-3640

SUBJECT: Comments on the USACE Draft Tier II Environmental Impact Statement and Draft General Reevaluation Report for improvements and continued maintenance of the Savannah Harbor Federal Navigation Project, Chatham County, Georgia and Jasper County, South Carolina.

Dear Mr. Bailey,

The Port of Savannah Propeller Club supports and approves development of a 48 ft channel with associated turn widening and meeting lanes in the Savannah River. Indeed, failure to expand the channel will have an adverse effect on port traffic and all the people who work on the river.

The Savannah Harbor Expansion provides overall benefits to the trade and distribution network on the United States East Coast and contributes to the continued viability of the United States market in the world economy.

The subject reports are effective in explaining and justifying needed development of the channel to 48 ft. The reports do not acknowledge that failure to provide the deepening needed for Post-Panamax vessels will result in a reduction in trade in the port. The effect will become more negative when shipping costs increase compared to other ports and start to affect export materials as well as imports.

USACE staff and associated organizations have provided a thorough and complete evaluation of the expansion of the Savannah River. There are no unanswered questions or issues. The project will enhance the environment and improve the quality of life for those people who work on and around the Savannah River and throughout our country. It is critically important that the project be approved as quickly as possible and without further delays. Savannah must be ready for the larger vessels who will start using the Panama Canal in 2014.

Sincerely,

Jim Myrick President, Port of Savannah

Port of Savannah

PO Box 9480

Savannah, GA 31412

The International Propeller Club of the United States

524-DC-01-EC01

Comment: The subject reports are effective in explaining and justifying needed development of the channel to 48 ft. The reports do not acknowledge that failure to provide the deepening needed for Post-Panamax vessels will result in a reduction in trade in the port. The effect will become more negative when shipping costs increase compared to other ports and start to affect export materials as well as imports.

Response: Savannah Harbor has experienced remarkable growth over the last 15 years, even with its current channel depth constraints. However, each port is [relatively] unique and its success can be attributed to many factors. In the case of Savannah, recent construction of distribution centers, availability of affordable land, incentives by local governments, congestion at West Coast ports, type of ships calling and their rotations, and the commodities being processed – all played a role in its growth. Moreover, forecasts anticipate a continued upward trend line for Savannah over the 50-year period of analysis. Nonetheless, given the present depth restrictions, many vessels are constrained by draft. This creates economic inefficiencies and this problem will be exacerbated as the container fleet grows in average vessel size and more cargo is moved by the larger vessels.

7-814



January 25, 2011

Mr. William G. Bailey ATTN: PD Savannah District, U.S. Army Corps of Engineers 100 West Oglethorpe Ave Savannah, GA 31401

RE: Comments on Draft EIS for the Savannah Harbor Expansion Project

Dear Mr. Bailey:

The Maritime Association of South Carolina has significant concerns about the proposed SHEP insofar as it may adversely affect the future construction of a bi-state container terminal located in Jasper County, South Carolina.

First, we do not understand why a proposed Jasper Ocean Terminal, though mentioned in the DEIS, is not considered as a viable, lower-cost alternative to the recommended plan. This is especially difficult to fathom when the DEIS projects that a no-build alternative would result in the same growth in container ship traffic to Savannah that would be experienced if the SHEP is completed as proposed.

Second, it does not appear possible that a Jasper Ocean Terminal could be available when South Carolina and Georgia would require it, based on cargo projections, if the Army Corps of Engineers intends to use the JOT site for SHEP dredge disposal until the year 2060.

Thank you for your consideration of these concerns.

Sincerely,

n.J. Hasseron IM

John F. Hassell, III President

JFH/hs

899 MORRISON DR.

P.O. BOX 494 CHARLESTON, SC 29402 JEL: 843-577-PORT FAX: 843-722-3433
The Maritime Association South Carolina

814-MM-02-EV01

Comment: First, we do not understand why a proposed Jasper Ocean Terminal, though mentioned in the DEIS, is not considered as a viable, lower-cost alternative to the recommended plan. This is especially difficult to fathom when the DEIS projects that a no-build alternative would result in the same growth in container ship traffic to Savannah that would be experienced if the SHEP is completed as proposed.

Response: Congress asked that the Corps perform additional analyses when it authorized the Savannah Harbor Expansion Project in Section 203 of WRDA, 1999. The Corps identified the existing navigation problems and evaluated alternate ways to solve or reduce those problems. Those considerations included non-structural and structural solutions, and deepening to alternate terminal locations. Three of those alternate terminal locations were ones that were being considered for siting a new container terminal in Jasper County. The Corps released a report for public comment in 2005 that documented its findings. The report concluded that deepening to the existing Garden City Terminal would be less expensive than the combined cost of constructing a new terminal in Jasper County and deepening to that location. The report can be found in the EIS-Appendix O. See also numerous other responses to comments regarding Jasper terminal issues.

814-MM-02-EV02

Comment: Second, it does not appear possible that a Jasper Ocean Terminal could be available when South Carolina and Georgia would require it, based on cargo projections, if the Army Corps of Engineers intends to use the JOT site for SHEP dredge disposal until the year 2060.

Response: There are some obvious impediments to its implementation, but the present Jasper Terminal [JOT] site could be used to develop a viable port operation. There are numerous actions that would need to occur before a terminal could become operational. One of those is that the US Government must be "made whole" if it releases its dredged material disposal easement on those properties. The Government has requested the developers commit to a mechanism that would keep the Government's costs the same after releasing the easements. The Joint Project Office is presently working to identify a way to meet the Government's request. Should a reasonable way be identified and commitments made to implement that action, the Corps would release its dredged material disposal easement on the sites. Until that occurs, the Corps intends to use Disposal Areas 14A/14B [the presently proposed JOT site] to deposit excavated sediments since it is the least-cost, environmentally acceptable alternative. See also numerous other responses to comments regarding Jasper terminal issues.

#1120





January 25, 2011

Mr. William Bailey US Army Corps of Engineers Savannah District 100 W. Oglethorpe Ave. Savannah GA 31401-3640

Dear Mr. Bailey:

On behalf of the South Carolina Manufacturers Alliance and the South Carolina Chamber of Commerce, please accept these comments on the draft environmental impact statement (Draft EIS) for the Savannah Harbor Expansion Project (SHEP).

We have concerns about the analysis undertaken to evaluate the environmental impacts associated with the SHEP. Our primary concern is that the significant environmental impacts of the SHEP may preclude future industrial growth and economic development in South Carolina, and specifically in Jasper County, and that these impacts have not been thoroughly analyzed and accounted for in the analysis. Specifically, while part of the project occurs in South Carolina, the impacts, both environmental and economic, on South Carolina are given short shrift and do not appear to have been given due consideration. For example, the negative impacts on the SHEP on water supplies in Georgia have been reviewed, with no parallel consideration on the negative impacts on water supplies in South Carolina.

The underlying assumption of the analysis is that there will be no increase in ship traffic, but that additional containers will be carried on each ship so that the throughput for the Georgia Ports Authority and its Savannah terminals will increase while the ship traffic will remain static. This is a faulty premise that fails to reflect the realities of waterborne commerce and the shipping industry. The SHEP is meant to accommodate bigger ships traversing the Panama Canal. The industry projects this to lead to an increase in the number of routes and ships on the East Coast, meaning an increase in the ship calls on East Coast ports. There is no analytical support for the Corps' assumption of less ship traffic. Because the environmental analysis is predicated on this faulty assumption, the entire Draft EIS must be revisited. This is especially critical since the development of a port jointly owned by the States of Georgia and South Carolina in Jasper County (Jasper Port) is not given any consideration in the Draft EIS. Instead, the Jasper Port is treated as "not reasonably foreseeable" and its development suffers from a "high degree of uncertainty." However, the Georgia Ports Authority has entered into an intergovernmental agreement with the South Carolina State Ports Authority for the development of the Jasper Port, and a Bi-State Commission exists to pursue the Jasper Port development. Millions of dollars have been spent towards the development of a Jasper Port. The Draft EIS fails to consider the impact on the Jasper Port, and given the environmental uncertainties and significant impact in the area this deepening could ultimately preclude a Jasper Port.

The water quality impacts, and especially the negative impact on dissolved oxygen (DO), deserves further consideration and should include a discussion about the impact on future development, especially given the prospect that the U.S. Environmental Protection Agency (EPA) has already designated the Savannah Harbor as a "no discharge" zone regarding DO. This points to the possibility that the SHEP would, for all practical purposes, prevent future discharges and thus future development. Saltwater intrusion and salinity are also significant issue for the South Carolina communities and industries. However, the Draft EIS does not appear to consider the impacts of DO, saltwater intrusion, and salinity on these adversely affected South Carolina communities and industries.

The analysis in the Draft EIS is internally inconsistent in any number of places, including in its analysis of the scope and need, the water quality impacts, the natural resource impacts, the impacts on wildlife and fisheries, and air quality impacts. All of these sections should be reexamined to ensure the integrity of the analysis and the inconsistencies reconciled or explained.

For example, the air quality discussion is not an analysis,ⁱ but is an inventory. No air dispersion modeling was done. In the inventory itself, it claims on the one hand that the number of ships calling on the Savannah terminals will not change regardless of the depth of the harbor, but in the inventory the number of ships calling is actually reduced as the harbor deepens.ⁱⁱ This gives the illusion that a deepened harbor would have no impact on air quality, and in fact the Draft EIS makes the bold (and unproven) claim that air quality will improve. This statement is contrary to other scientific studies and evidence and is unsupported by a mere air emissions inventory. No conclusion can be reached about the impact on air quality unless air dispersion modeling is undertaken.

Similar to the evaluation of environmental impacts, the mitigation efforts are focused on Georgia, and do not appear to account for the significant environmental impact this project will have on South Carolina. The mitigation plan should be revisited to include and incorporate specific mitigation efforts for the impacts on South Carolina communities and industries.

We also incorporate by reference the comments of all other South Carolina governmental agencies and their representatives. Thank you for your time and consideration.

Sincerely,

Levi F. Anet

Lewis Gossett President South Carolina Manufacturers Alliance

Otis B. Rawl, Jr. *President and Chief Executive Officer* South Carolina Chamber of Commerce

ⁱ Notably, the air emissions discussion concludes that vessel traffic will remain the same with a harbor deepening depth of 46 feet, which undercuts any deeper alternative. In fact, much of the analysis does not support a deepening to 48 feet.

ⁱⁱ Here again, the Jasper Port has been given no consideration. If this deepening project would aid the Jasper Port and be utilized by the Jasper Port, then vessel calls as a result of this deepening will increase and must be analyzed as a result of the Corps' action, including an air quality dispersion model.

South Carolina Chamber of Commerce

Page 1

1120-BB-09-EV01, 1120-BB-09-EV02

Comment: We have concerns about the analysis undertaken to evaluate the environmental impacts associated with the SHEP. Our primary concern is that the significant environmental impacts of the SHEP may preclude future industrial growth and economic development in South Carolina, and specifically in Jasper County, and that these impacts have not been thoroughly analyzed and accounted for in the analysis. Specifically, while part of the project occurs in South Carolina, the impacts, both environmental and economic, on South Carolina are given short shrift and do not appear to have been given due consideration. For example, the negative impacts on the SHEP on water supplies in Georgia have been reviewed, with no parallel consideration on the negative impacts on water supplies in South Carolina.

Response: The continued deposition of dredged sediments in existing Sites 14A and 14B is the leastcost, environmentally acceptable alternative for the proposed SHEP. However, deposition of sediment at these sites would not preclude their future development as a new container terminal. In fact, in 2011 the consultant working for the Joint Project Office publically stated that the proposed placement of new work sediments there [Areas 14A and 14B] would save the terminal development project over \$300 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would likely benefit the development of a terminal in Jasper County by significantly reducing initial construction costs.

The analysis of potential groundwater impacts discussed in the DEIS apply to the aquifer that supplies water to both Georgia and South Carolina. Extensive groundwater studies have been completed and are discussed in EIS-Sections 4.02.1 and 5.05. The proposed harbor deepening would have minimal adverse impacts on groundwater. The full results of the field work, groundwater modeling, and GIS analyses are described in Section 5 of the Engineering Appendix of the GRR. They are described in further detail in a document titled, *"Supplemental Studies to Determine Potential Groundwater Impacts to the Upper Floridan Aquifer, Savannah Harbor Expansion Project, Final Report, June 2007"*.

Water is withdrawn from the Savannah River by the Beaufort-Jasper Water Authority to serve customers in the SC Low country. That intake is located at roughly River Mile 39. The Corps evaluated potential increases in chloride levels in the upper portion of the estuary and found that no measureable effects should occur as far upstream as that water intake.

1120-BB-09-EC01

Comment: The underlying assumption of the analysis is that there will be no increase in ship traffic, but that additional containers will be carried on each ship so that the throughput for the Georgia Ports Authority and its Savannah terminals will increase while the ship traffic will remain static. This is a faulty premise that fails to reflect the realities of waterborne commerce and the shipping industry. The SHEP is meant to accommodate bigger ships traversing the Panama Canal. The industry projects this to lead to an increase in the number of routes and ships on the East Coast, meaning an increase in the ship calls on East Coast ports. There is no analytical support for the Corps' assumption of less ship traffic. Because the environmental analysis is predicated on this faulty assumption, the entire Draft EIS must be revisited.

Response: The Economic Analysis in the draft report shows a significant increase in ship traffic [calls], i.e., a rise from 2,172 in 2015 to 4,148 in 2032 (See Economic Appendix, Page 73, Table 42). This increase in vessel calls has a direct relationship with the port's future cargo growth. One of the main assumptions used in the transportation cost model is that no cargo would be <u>diverted</u> from a competing port. Instead, SHEP speaks to a project in which the majority of Savannah's cargo is expected to originate and remain in its hinterland market¹. A multiport analysis [2006] was conducted for various hinterland origins and destinations [South Atlantic and Gulf ports including Savannah and nearby Charleston and Jacksonville]. It determined that there would be no substantial changes in origins and destinations of imports or exports to key US markets served by Savannah. Project deepening allows larger ships to call at the Port, as well as enabling them to load/unload without the current constraints of draft. All other things being equal, this reduces the total number of trips required to move the same volume of cargo.

Page 2

1120-BB-09-EV03

Comment: This is especially critical since the development of a port jointly owned by the States of Georgia and South Carolina in Jasper County (Jasper Port) is not given any consideration in the Draft EIS. Instead, the Jasper Port is treated as "not reasonably foreseeable" and its development suffers from a "high degree of uncertainty." However, the Georgia Ports Authority has entered into an intergovernmental agreement with the South Carolina State Ports Authority for the development of the Jasper Port, and a Bi-State Commission exists to pursue the Jasper Port development. Millions of dollars have been spent towards the development of a Jasper Port. The Draft EIS fails to consider the impact on the Jasper Port, and given the environmental uncertainties and significant impact in the area this deepening could ultimately preclude a Jasper Port.

Response: Incremental analyses were conducted [in accordance with NEPA and Section 203, WRDA 1999] to examine alternative actions to harbor deepening at the Garden City Terminal site. Jasper Ocean Terminal (sometimes referred to as Sites 14A/14B in the reports) was one of the alternative port sites considered for deepening [see GRR-Sections 6 and 12, GRR- Appendix D, EIS-Section 3, and EIS-Appendix O. However, the physical absence of a terminal, the uncertainty associated with its construction, the lack of supporting infrastructure, and important environment considerations militate against the Jasper site being considered in detail in this study. The initial evaluations that the Corps conducted found that construction of the required infrastructure and deepening to the site exceeded the costs of deepening to the existing Garden City Terminal (mitigation costs included in both scenarios). Recent events have not indicated that those findings would change if reassessed today. Lack of ratification of a bi-state compact by the two state legislatures since signing the Term Sheet in 2007 does not reduce uncertainties about development of the site into a container terminal. See also other responses to comments on Jasper terminal issues.

¹ This assumption might appear to contradict the port's claims of losing market share without a deepening; but as evidenced by the port's strong growth historically without a project, there are many reasons besides channel depth that foster growth.

1120-BB-09-EV04, 1120-BB-09-EV05

Comment: The water quality impacts, and especially the negative impact on dissolved oxygen (DO), deserves further consideration and should include a discussion about the impact on future development, especially given the prospect that the U.S. Environmental Protection Agency (EPA) has already designated the Savannah Harbor as a "no discharge" zone regarding DO. This points to the possibility that the SHEP would, for all practical purposes, prevent future discharges and thus future development. Saltwater intrusion and salinity are also significant issue for the South Carolina communities and industries. However, the Draft EIS does not appear to consider the impacts of DO, saltwater intrusion, and salinity on these adversely affected South Carolina communities and industries."

Response: The impacts of the SHEP on the dissolved oxygen regime in the Savannah Harbor estuary are discussed in the EIS and in even greater detail in the Engineering Appendix of the GRR. Based on the potential impacts to dissolved oxygen that would be caused by SHEP's implementation, an oxygen injection system is included in the project's mitigation plan. This system has been designed to remove the SHEP's incremental impacts on the estuary's dissolved oxygen regime as well as any adverse impact the project would have had on the harbor's aquatic resources. Implementation of the system would result in an incidental improvement in dissolved oxygen levels in over 90 percent of the estuary. The US EPA issued a draft revised TMDL for dissolved oxygen in the Savannah Harbor in April, 2010. The revised TMDL no longer designates the Savannah Harbor as a "no discharge" area; instead, it has been designated as a "naturally low water body". See also other responses to comments on these issues.

1120-BB-09-EV06

Comment: The analysis in the Draft EIS is internally inconsistent in any number of places, including in its analysis of the scope and need, the water quality impacts, the natural resource impacts, the impacts on wildlife and fisheries, and air quality impacts. All of these sections should be reexamined to ensure the integrity of the analysis and the inconsistencies reconciled or explained.

Response: Comments on the Draft EIS are being used to improve the document and help eliminate inconsistencies.

1120-BB-09-EV07

Comment: For example, the air quality discussion is not an analysis, but is an inventory. No air dispersion modeling was done. In the inventory itself, it claims on the one hand that the number of ships calling on the Savannah terminals will not change regardless of the depth of the harbor, but in the inventory the number of ships calling is actually reduced as the harbor deepens. This gives the illusion that a deepened harbor would have no impact on air quality, and in fact the Draft EIS makes the bold (and unproven) claim that air quality will improve. This statement is contrary to other scientific studies and evidence and is unsupported by a mere air emissions inventory. No conclusion can be reached about the impact on air quality unless air dispersion modeling is undertaken.

Response: There is no compelling evidence to support the allegation that harbor deepening will incrementally increase the number of containers transiting the port on any given year. The Corps' analysis predicts an increase in the number of containers [up to the maximum of 6.5 million TEUs] being processed through Savannah over time as a result of increasing demand, but that growth is predicted to occur with or without harbor deepening.

According to the commodity forecast found in Section 5, *Forecast of Without-Project Condition* in the GRR, the port will reach its landside cargo handling capacity in 2030. It is anticipated that without deepening (i.e., the -42 foot depth) more vessels would be required to transport that larger amount of cargo. With harbor deepening, the total number of vessels decreases [from what would be necessary with the existing -42 foot depth] as they will be able to load/unload without the current constraints of draft.

Since the number of containers per year is not predicted to increase as a result of deepening, per se, no landside changes in emissions would result. With fewer ships calling at the port, total air emissions would decrease [annualized] with harbor deepening (comparing without and with project conditions). Given this situation, there is no technical need for the project to conduct a detailed analysis of the how those emissions disperse.

In summary, any potential adverse effects from expected air emissions would be reduced if the harbor is deepened. See also other responses to comments regarding air quality.

1120-BB-09-EV08

Comment: Similar to the evaluation of environmental impacts, the mitigation efforts are focused on Georgia, and do not appear to account for the significant environmental impact this project will have on South Carolina. The mitigation plan should be revisited to include and incorporate specific mitigation efforts for the impacts on South Carolina communities and industries.

Response: Mitigation for the SHEP was designed in a sequential fashion to avoid, minimize, and compensate for adverse impacts, wherever they may occur.

 From:
 Rick Shields

 To:
 CESAS-PD, SAS

 Subject:
 SHEP Comments

 Date:
 Tuesday, January 25, 2011 5:17:54 AM

William Bailey US Army Corps of Engineers Savannah District

January 24, 2011

Dear Mr Bailey:

After reviewing the draft Environmental Impact Statement (EIS) for the Savannah Harbor Expansion Project and discussing the anticipated impact of the project with the staff of the US Fish & Wildlife Service Savannah Coastal Refuges Complex, I respectfully submit the following comments on behalf of the **Friends of the Savannah Coastal Wildlife Refuges**, Inc:

1. We are concerned about the accuracy of the models used to assess potential damage and to plan mitigation efforts. Loss of habitat, could be considerably more extensive than predicted if the models are wrong and the cost of mitigation could be considerably higher. The experience with the Back River tide gate points out the difficulty in attempting to model a complex system such as the Savannah River.

2. The Savannah River estuary, which once contained 12,000 acres of tidal freshwater wetlands, has already been reduced by 73% to just 3200 acres. The EIS predicts a loss of more than 10% of the surviving wetlands with a deepening to 48 feet, a loss than cannot be mitigated, and which could be greater if the models are wrong. Deepening to 45 feet reduces that wetlands loss to 34 acres – still more than desired but much less irreversibly impactful than losing 335 acres.

3. The adaptive management approach for mitigation efforts lacks sufficient specificity. The plan should stipulate a process and timeline for deciding on additional mitigation steps and for initiating action.

4. There is no provision for the Corps to provide advance funding for the escrow account that is to be used for future mitigation. Without guaranteed funding, implementation of adaptive management procedures becomes highly uncertain.

5. The post-construction monitoring period for mitigation projects is inadequate to allow the system to stabilize and to detect long-cycle problems; it should be increased from 5 to 10 years. Similarly, the monitoring period for future adaptive mitigation projects should be increased from 1 to 3 years.

6. We also have concerns about the ability of the proposed oxygen bubbler to infuse oxygen throughout the river basin. If it doesn't, the impact on the short-nosed sturgeon and other river-spawning fish could be catastrophic and there is no back-up plan available.

7. At a 48-foot depth, the EIS estimates that 28% of striped bass spawning habitat will be destroyed and will have to be mitigated by a stocking program. What if the estimate is wrong and it turns out that 50% of habitat is destroyed? Will the mitigation fund support an increased level of stocking year after year?

Given these concerns and the expense and irreversible environmental damage that river deepening will cause, **Friends of the Savannah Coastal Wildlife Refuges** feels that it is time to recognize that accommodating larger ships is not a suitable goal for a port that is 21 miles upstream on a major river. Such ships are more appropriately serviced at ports located in direct proximity to the ocean.

If deepening is nonetheless pursued, we recommend that the maximum depth be limited to 45 feet or less to provide a larger margin for error in the models used to complete the EIS and to minimize the adverse impact on the Savannah National Wildlife Refuge and its environs.

Sincerely,

Rick Shields President Friends of the Savannah Coastal Wildlife Refuges, Inc. <u>www.coastalrefuges.org</u> A Non-Profit 501(c)3 Corporation



Friends of the Savannah Coastal Wildlife Refuge

722-MR-06-EN01

Comment: We are concerned about the accuracy of the models used to assess potential damage and to plan mitigation efforts. Loss of habitat, could be considerably more extensive than predicted if the models are wrong and the cost of mitigation could be considerably higher. The experience with the Back River tide gate points out the difficulty in attempting to model a complex system such as the Savannah River.

Response: The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Team, which followed in the steps of the modeling technical review group that was established in the late 1990s to oversee the development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

The models employed and the criteria established were developed through an iterative process with the model review team and the water quality interagency coordination team. The model selection, development, and refinement process literally took years [1999 to 2005] and the WASP and enhanced EFDC models were both certified for use in accordance with EC 1105-2-407. The considerable changes that were made over the course of this period and elaborate certification process are an indication of the thorough and deliberative process the District employed to ensure the models met all performance criteria prior to conducting runs to predict impacts associated with the proposed project.

The Monitoring and Adaptive Management Plan provides a discussion of post-construction monitoring and the decision-making process that would determine if additional monitoring and/or mitigation measures are warranted. Purposely, the plan does not identify specific acceptability criteria for water quality or biological parameters that would trigger the need for additional monitoring or modifications to mitigation measures. The District was willing to defer to the judgment of agency technical experts rather than just use a specific parameter in determining when changes are necessary. Based on their experience, some resource experts may see a need to modify the monitoring and/or a mitigation measure, even though a specific [parameter] threshold has not been reached. Further, there is a concern about the potential cumulative/synergistic impacts of multiple parameters, even though the threshold limits had not been exceeded for any one parameter. If thresholds had been established for individual parameters, this flexibility would have been lessened.

Decisions about changes in the monitoring plan or mitigation features can be reached at any time during the post-construction monitoring effort. Monitoring data and reports would be made available to the resource agencies as soon as possible. Data from fixed water quality monitoring stations will be available on a real-time basis [on-line]. The plan provides for an annual meeting [end of monitoring year] between the District and the natural resource agencies to discuss the data and any necessary changes. However, the schedule is sufficiently flexible to convene a meeting any time that concerns dictate. If the monitoring identifies impacts that are outside those predicted, the Corps would consult with the resource agencies. Corrective actions could range from a change in the monitoring plan to a cessation of construction activities until a problem is rectified.

722-MR-06-EV01

Comment: The adaptive management approach for mitigation efforts lacks sufficient specificity. The plan should stipulate a process and timeline for deciding on additional mitigation steps and for initiating action.

Response: Appendix D has been revised to provide more specifics on the process and timelines associated with adaptive management decisions.

722-MR-06-EV02

Comment: There is no provision for the Corps to provide advance funding for the escrow account that is to be used for future mitigation. Without guaranteed funding, implementation of adaptive management procedures becomes highly uncertain.

Response: The District intends to obtain funds for adaptive management as the construction progresses, so that funds would be available should they be needed for some adjustment to the mitigation features. GPA also intends to provide its share of the adaptive management costs in an escrow account at the beginning of the construction period so they would be available if/when needed. Appendix D contains additional explanation regarding funding of adaptive management features.

722-MR-06-EV03

Comment: The post-construction monitoring period for mitigation projects is inadequate to allow the system to stabilize and to detect long-cycle problems; it should be increased from 5 to 10 years. Similarly, the monitoring period for future adaptive mitigation projects should be increased from 1 to 3 years.

Response: The FEIS includes a longer post-construction monitoring period. The monitoring period for a particular adaptive management measure has been extended to two years after its implementation and could be longer, if the agencies believe that to be prudent.

722-MR-06-EN02

Comment: We also have concerns about the ability of the proposed oxygen bubbler to infuse oxygen throughout the river basin. If it doesn't, the impact on the short-nosed sturgeon and other river-spawning fish could be catastrophic and there is no back-up plan available.

Response: Details of the oxygen injection technology proposed for SHEP mitigation are documented in the report, "Oxygen Injection Design Report" [2010]. It is included in the Supplemental Materials to the Engineering Appendix. The oxygen injection system uses a device [Speece Cone] to pull a small side stream of water from the river, super-oxygenates [pure oxygen] the sample, and returns it to the main river. The oxygenated stream would achieve concentrations of 40 to 140 mg/L which, when mixed with the main river, is sufficient to satisfy dissolved oxygen deficiencies [related to SHEP] and avoids the need to treat the entire river flow. Contrary to popular misconception, these high dissolved oxygen concentrations do not spontaneously effervesce, but can be kept in solution long enough to meet mitigation goals. The WASP model was used to determine the optimal number/locations of the oxygen injection facilities together with oxygen loadings necessary to achieve the project's mitigation goals. The extensive model grid allows examination of dissolved oxygen impacts and mitigation achievements throughout the estuary both spatially and by depth [including the navigation channel and the Middle and Back Rivers]. One additional cone [at each location] would be included as a back-up/maintenance spare for ready use when needed. As stated in the Monitoring and Adaptive Management Plan, the District has included sufficient funds to modify the DO systems if needed to meet the noted performance standards. The Monitoring and Adaptive Management Plan also describes the process by which the District and the Cooperating Agencies would jointly review the performance of the project (including its mitigation features) and work collaboratively to ensure the project functions as expected. See also numerous other responses to comments regarding dissolved oxygen.

722-MR-06-EV04

Comment: At a 48-foot depth, the EIS estimates that 28% of striped bass spawning habitat will be destroyed and will have to be mitigated by a stocking program. What if the estimate is wrong and it turns out that 50% of habitat is destroyed? Will the mitigation fund support an increased level of stocking year after year?

Response: An evaluation of SHEP's effects on Striped bass habitat using a combination of field data and results from the updated hydrodynamic- and water quality models has been added to the post-construction monitoring. The Mitigation Plan includes payment to the Georgia DNR for stocking Striped bass fingerlings. These funds could be increased [via the Adaptive Management Plan] if the noted analysis demonstrates the need for same.



The Nature Conservancy Georgia Chapter 1330 West Peachtree Street, Suite 410 Atlanta, GA 30309-2904 tel [404] 873.6946 fax [404] 873.6984

nature.org

January 25, 2011

Mr. William Bailey ATTN: PD US Army Corps of Engineers Savannah District 100 West Oglethorpe Avenue Savannah, Georgia 31401-33640 Email: CESAS-PD@usace.army.mil

Dear Mr. Bailey,

Thank you for the opportunity to review and comment upon the Draft Tier II Environmental Impact Statement (DEIS) for the Savannah Harbor Expansion Project (SHEP).

The mission of The Nature Conservancy is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. With the support of more than one million members, The Nature Conservancy (TNC) has protected more than 120 million acres and 5,000 river miles around the world. We currently have more than 150 marine conservation projects in 32 countries and every coastal state in the U.S.

The Nature Conservancy values the Savannah River for its biodiversity, which includes populations of diadromous fishes including the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) and candidate species Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*). The latter is currently the subject of a Federal Register notice whereby the National Marine Fisheries Service recommends its elevation to endangered status. The Conservancy has worked in partnership with the Savannah District of the Corps of Engineers and a wide variety of scientific organizations, universities, and environmental agencies from Georgia and South Carolina to identify the needs and best management practices for the Savannah River.

The Nature Conservancy has carefully reviewed the DEIS. We appreciate your thorough analysis of the adverse environmental impacts associated with the proposed deepening of the Savannah Harbor and invite you to consider the following recommendations and comments:

- Before implementing proposed mitigation strategies, the Corps should commit to a robust exploration of the mitigation plan with all state, federal and NGO partners. An interagency and NGO review process would allow further consideration of concerns such as the ones outlined below.
- The Corps should identify a long-term, dedicated funding mechanism to support the approved mitigation plan, including ecological monitoring of the system throughout the life of the plan.

The comments below outline our concerns regarding potential impacts to the biological resources of the estuary, proposed mitigation measures, monitoring, and adaptive management.
<u>Indirect Impacts to Wetlands</u>

- The Conservancy appreciates the conservative approach presented in the DEIS with respect to indirect impacts to wetlands, namely the conversion of fresh water marsh to brackish marsh as a consequence of harbor deepening. However, the projected final impact of -337 acres (48-foot deepening plus mitigation), once determined, is treated overconfidently in ensuing discussions. Impacts could be considerably different than this figure and the mitigation plan and associated funding should account for partial or total failure of the mitigation measures. The 5% overoriginal-cost figure for wetland mitigation projects overconfidence in the final impact acreage.
- 2. The mitigation plan for indirect wetland impacts contains some potentially valuable additions to the Savannah National Wildlife Refuge, and The Nature Conservancy fully supports the planned additions portrayed in the DEIS. However, given the potential variability of the final impacted acreage and uncertain willingness of sellers, additional preservation tracts should be identified, unconstrained by the Refuge boundary. Furthermore, while we agree the Refuge should be the priority for acquisition and fee ownership of mitigation tracts, the COE should also entertain potential fee ownerships by other entities outside of the Refuge boundary.

Shortnose Sturgeon

- The modeled existing habitat for the sturgeon does not reconcile with known sturgeon habitat use as established by several years of telemetry data gathered by the SC and GA Departments of Natural Resources, NOAA, The Nature Conservancy, and Southeastern Natural Sciences Academy. This data is very recent and highly relevant to current sturgeon habitat use, and their fate under the proposed action. The modeled portrayal of sturgeon habitat must be reconciled with real data before areal impacts to sturgeon habitat can be calculated. This calculation is essential to devising appropriate mitigation plans for the sturgeon. As portrayed, current sturgeon habitat area is considerably underestimated by the model and therefore, the impacts to the habitat under the proposed action are significantly under-calculated.
- The calculated areal effects of deepening with mitigation appear to assume that shortnose sturgeon will move from their current habitat to new habitat within the post-project system. The DEIS should document the reasoning as to why shortnose sturgeon will successfully relocate to new habitats, based on projected conditions therein.
- 3. Related to #2, shortnose sturgeon are continuous feeders, so food source and benthic substrate are important factors in their habitat selection. The DEIS contains no evaluation of how this factor will play into the self-directed relocation of the sturgeon. Either additional studies must be performed to more clearly understand the habitat selection of shortnose sturgeon in the Savannah estuary or, at a minimum, assertions of habitat relocation must be based in sound behavioral science from other population segments from the southern region. Lastly, this science needs to be clearly cited within the DEIS as the basis for these assertions.
- 4. The fish ladder being proposed is not a proven method for sturgeon passage. There are many uncertainties around potential success of the fish ladder, including contravention of shortnose sturgeon spawning movements by hypolimnetic releases from the Strom Thurmond Dam, the uncertainty of acquiring the necessary land or rights to build the facility, and the uncertainty of the Augusta Canal facility delivering sufficient water to the shoals. The uncertainties do not fully eliminate the promise a fish passage facility might provide, but these uncertainties need to be offset by a sufficient commitment to adaptive management and monitoring of the facility.

Furthermore, standard practice for fish passage facilities is to carry specific goals for numbers of fish passed, commitments to attractant flows, and monitoring of success. Typically, these are developed and applied to all species that will be passed. The DEIS currently does not contain these goals and commitments.

5. The mitigation plan for shortnose sturgeon should include a plan and cost projection for modification of release temperatures at Thurmond Dam via mixing towers or other technology. Mixing towers have proven successful in rectifying resource impacts from hypolimnetic release at other COE facilities; this is known and proven technology. Fish passage at New Savannah Bluff Lock and Dam is unlikely to be successful for any diadromous fish species if Thurmond releases continue to send cold-water pulses downriver during fish spawning season.

Atlantic Sturgeon

 The Atlantic sturgeon is currently the subject of a Federal Register notice recommending elevation of the species to endangered status. The DEIS cannot assume equivalence of habitat requirements from shortnose to Atlantic sturgeon. Atlantic sturgeon adults and juveniles display different staging and spawning requirements than shortnose sturgeon. The DEIS should evaluate impacts to Atlantic sturgeon separately from shortnose sturgeon.

Monitoring and Adaptive Management

- The Monitoring and Adaptive Management Plan contains a very thorough consideration of preproject conditions, and during- and post-construction impacts, particularly with respect to the Monitoring targets and costs. However, the Adaptive Management budget appears to be based on arbitrary percentages of initial costs. Given the difficulties and logistical challenges of construction work in big river environments, benchmarks of 5-10% of original costs seem very low. This is especially true if several mitigation measures need modification at once. Given the COE's long experience in large-scale river engineering and construction, a more thorough and realistic cost projection of modifying mitigation measures should be feasible. If the 5-10% figures were based on real-world cost projections, that should be detailed in the EIS. If not, we suggest this be conducted and made part of the EIS.
- The pre-construction monitoring should include a provision to characterize the benthic food sources at current shortnose sturgeon staging areas. This would be a relatively simple and low cost addition to benthic substrate sampling that is already planned. This knowledge would considerably enhance the confidence of predicted post-project habitat use by shortnose sturgeon.
- 3. The costs of required internal COE reviews of potential Adaptive Management actions should be detailed in the DEIS.
- 4. The Monitoring costs are based on the most optimistic 3-year projection of time of construction, while the DEIS recognizes a possible 6-year construction window. The Monitoring costs should be predicated on a worst-case scenario, as obtaining additional funding once work begins is likely to be difficult.
- 5. Unforeseen monitoring costs arising from Adaptive Management work or other unintended post-project impacts should not be funded at the expense of the Adaptive Management budget, as the DEIS currently proposes. A separate contingency fund should be established for this purpose.
- 6. As any unintended adverse impacts of the project and / or mitigation actions will occur in real time and are potentially lethal to some species and resources, Adaptive Management funding

must be stand-alone sufficient and free of any matching or cost-share requirements. Any such requirements could introduce fatal delays into Adaptive Management actions.

Thank you for your consideration of The Nature Conservancy's recommendations and comments regarding the Draft Tier II Environmental Impact Statement for the Savannah Harbor Expansion Project. The Nature Conservancy has enjoyed a long and productive relationship with the Corps of Engineers and welcomes many more opportunities to work with you on the Savannah River and beyond.

Sincerely,

Shelly Lakly, Ph.D. Executive Director Georgia Chapter

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Mark Robertson Executive Director South Carolina Chapter

Mark L. Robertson

CC: Eric Krueger, Christi Lambert, Alison McGee, Amanda Wrona

The Nature Conservancy

Page 1

730-MR-16-EV01

Comment: Before implementing proposed mitigation strategies, the Corps should commit to a robust exploration of the mitigation plan with all state, federal and NGO partners. An interagency and NGO review process would allow further consideration of concerns such as the ones outlined below.

Response: The mitigation plan was developed with extensive coordination with representatives of federal and state natural resource agencies, NGOs, and the public over several years. The Corps participated in the Stakeholders Evaluation Group that was organized by GPA and met since 1999. Agencies, NGOs and members of the public participated in discussions at those meetings. Public review of the DEIS and FEIS are part of the coordination process.

730-MR-16-EV02

Comment: The Corps should identify a long-term, dedicated funding mechanism to support the approved mitigation plan, including ecological monitoring of the system throughout the life of the plan.

Response: Funding for construction and its mitigation features [oxygen injection, adaptive management, Striped bass stocking, land acquisition, etc.] would be provided through the Corps of Engineers' construction program budget process. The District intends to request funding for Monitoring and Adaptive Management along with the other construction costs. Funds would then be available to implement an Adaptive Management action if it is determined by the Federal Cooperating Agencies to be needed. Costs which exceed the total estimated for Adaptive Management could be sought through the Corps' normal budget process. Monitoring and adaptive management are considered to be mitigation features, so they would be given the highest priority in the Corps budget process. The Corps considers the project in the "construction" phase until the end of the monitoring and adaptive management period. The SHEP would remain in a *construction* status until all of its constituent elements are completed, the post-construction monitoring is finished, and required mitigation actions are implemented. Following completion of these activities, the project would enter into the *Operation and Maintenance* phase, which would become responsible for costs associated with maintaining the mitigation features, i.e., oxygen injection, etc.

Page 2

730-MR-16-EV03

Comment: The Conservancy appreciates the conservative approach presented in the DEIS with respect to indirect impacts to wetlands, namely the conversion of fresh water marsh to brackish marsh as a consequence of harbor deepening. However, the projected final impact of -337 acres (48-foot deepening plus mitigation), once determined, is treated overconfidently in ensuing discussions. Impacts could be considerably different than this figure and the mitigation plan and associated funding should account for partial or total failure of the mitigation measures. The 5% over-original-cost figure for wetland mitigation projects overconfidence in the final impact acreage.

Response: Technical reviews by involved agencies [EPA, USFWS, NMFS, SCDHEC, and GA DNR-EPD] concluded that the EFDC models are acceptable impact prediction tools. The Interagency Coordination

Team validated the model's use through consideration of model grid representation, input parameters, and output presentations. The Corps used the models to evaluate impacts under several conditions (average and low river flows, summer and winter periods, with and without different amounts of sea level rise, etc). Wetland impact comparisons using the EFDC hydrodynamic model are closer [prediction versus actual empirical data] than those identified by other models [e.g., MSM models] at all proposed project depths. Hence, the District's use of the EFDC-derived impacts provides more conservative estimates than those produced by using the more technically-advanced Marsh Succession Model.

The District conducted a functional assessment of wetlands that would be impacted as a result of the SHEP. The results indicate that the differentiation between salt marsh and brackish marsh recommended by the Wetland Interagency Coordination Team and used in the DEIS was narrowly defined. Specifically, the salinity range used in the SHEP model to differentiate between brackish marsh [0.6-4 ppt] and salt marsh [> 4ppt] was restrictive given that brackish marsh salinities have been reported with a range from 0.5-10 ppt [NOAA, 2010] and in other estuarine systems from 0.5-17 ppt [Judd and Lonard, 2004]. An earlier assessment of wetland vegetation coinciding with the salinity range reported for brackish marsh systems [i.e., 5-10 ppt], both of which occur within the area of potential effect, also supports those findings. Thus, the salinity range used to quantify salt marsh in the area of potential effect [i.e., > 4 ppt] over estimates the amount of saltmarsh in the system and underestimates the amount of brackish marsh. As such, the described conversion of salt marsh to brackish marsh, which would occur as a result of harbor deepening, could be negligible. This would be especially true when taking into account the salinity tolerance range of individual species comprising the brackish marsh community [i.e., between 5 and 10 ppt].

Given the wide range of salinity reported in literature for brackish marsh systems, the inherent variability in salinity that exists for all estuarine systems, and the modeling results that report post-deepening salinity concentrations consistent with the aforementioned range, the District concluded the 740-acre calculated conversion of saltmarsh to brackish marsh if the harbor is deepened to 47 feet, may be an high value. In fact, in most instances actual vegetative shifts would not be identifiable *in situ* within the Savannah Harbor. That said, the District chose to be conservative in its assessment of the potential for project-related effects and elected to include the saltmarsh and brackish marsh conversions in its calculation of minor impacts.

The conversion of 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47 feet. Again, it is important to reiterate that the ecological values of the impacted freshwater wetlands would not be completely lost. Instead, those acres would just be converted to brackish marsh. The District's calculation of the freshwater wetlands with the potential for conversion to brackish marsh is based on a shift in 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation [from freshwater marsh to brackish marsh] in this estuary does not occur until salinity concentrations approach 2.5 ppt [Latham et al., 1994]. Even at oligohaline marsh sites [average salinity concentration of 2.1 ppt]], a discriminate function [DF] analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification [Latham et al., 1994].

The District's use of 0.5 ppt as the salinity value that denotes a defined shift from freshwater to brackish marsh is approximately five times lower than traditional observations of 100% vegetative shifts *in situ* within the Lower Savannah Watershed [Latham et al., 1994] and other coastal marsh systems in the southeastern United States [NOAA, 2010]. Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, will likely be sustained in areas predicted to experience salinity concentrations in the range of 0 - <2.5 ppt. For those areas that do transition to more brackish characteristics, they would still continue to provide the traditional ecological functions associated with all emergent wetland systems. Thus, the preservation of 2,245 acres [consisting of bottom land hardwoods and upland buffer] is more than sufficient to offset any conversion in freshwater wetland vegetation that might occur. Using the higher salinity value observed in the Savannah basin for conversion to brackish marsh [2.5 ppt], less conversion would be expected, resulting in a mitigation-to-impacts ratio of roughly 10:1. Using the DF analysis reported by Latham et al [1994] which aligned 37% of freshwater species with oligohaline sites, the 223 acres of freshwater to brackish marsh conversion is reduced further such that the mitigation-to-impacts ratio is increased to 16:1.

When considering the acreage inclusiveness of the models and degree of vegetative shift that can be anticipated, USACE has concluded that the prediction of 223 acres of freshwater conversion is acceptable and the appropriate acreage of preservation mitigation has been defined. Moreover, the ability to acquire additional 5% preservation mitigation acreage is sufficient for the purpose of providing additional mitigation, if necessary.

730-MR-16-EV04

Comment: The mitigation plan for indirect wetland impacts contains some potentially valuable additions to the Savannah National Wildlife Refuge, and The Nature Conservancy fully supports the planned additions portrayed in the DEIS. However, given the potential variability of the final impacted acreage and uncertain willingness of sellers, additional preservation tracts should be identified, unconstrained by the Refuge boundary. Furthermore, while we agree the Refuge should be the priority for acquisition and fee ownership of mitigation tracts, the COE should also entertain potential fee ownerships by other entities outside of the Refuge boundary.

Response: Not all sites would provide the features needed to replace the wetland functions that would be lost through conversion of the marsh. Although the Corps has some flexibility in the tracts that would be acquired, the general area within the estuary is fairly-well decided to ensure the sites contain the needed characteristics.

730-MR-16-EV05

Comment: The modeled existing habitat for the sturgeon does not reconcile with known sturgeon habitat use as established by several years of telemetry data gathered by the SC and GA Departments of Natural Resources, NOAA, The Nature Conservancy, and Southeastern Natural Sciences Academy. This data is very recent and highly relevant to current sturgeon habitat use, and their fate under the proposed action. The modeled portrayal of sturgeon habitat must be reconciled with real data before areal impacts to sturgeon habitat can be calculated. This calculation is essential to devising appropriate mitigation plans for the sturgeon. As portrayed, current sturgeon habitat area is considerably underestimated by the model and therefore, the impacts to the habitat under the proposed action are significantly under-calculated.

Response: The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination Team. NOAA Fisheries, who is responsible for management of SNS under the Endangered Species Act, was a participant in those discussions. NOAA requested a revision to the habitat suitability criteria so they would better reflect the unpublished and newly-developing information to which you refer. The revised modeling results are incorporated into the Final EIS. The criteria, data, and outputs of the models presented in the Final EIS were coordinated with NMFS and are competent to evaluate impacts for each of the project alternatives.

730-MR-16-EV06

Comment: The calculated areal effects of deepening with mitigation appear to assume that shortnose sturgeon will move from their current habitat to new habitat within the post-project system. The DEIS should document the reasoning as to why shortnose sturgeon will successfully relocate to new habitats, based on projected conditions therein.

Response: Impacts to Shortnose sturgeon are difficult to mitigate completely. Section 5.3.1 addresses this and states: The adverse impacts that would remain to Shortnose sturgeon and Striped bass after the flow altering and dissolved oxygen components of the mitigation plan are included remain at levels which warrant further mitigation.

The Fisheries Interagency Coordination Team was queried about potential ways that habitats within the estuary could be restored or improved for SNS. The federal and state fishery experts could not identify measures that would improve its habitat over the wide range of river flow conditions. Similarly, no measures could be identified within the estuary that would compensate for Shortnose sturgeon habitat losses. The public was also consulted through the Stakeholders Evaluation Group, which also contains NGOs. No one could identify measures [structural/nonstructural] in the estuary that would adequately restore Shortnose sturgeon habitat. As a result, the Team agreed in 2007 that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses by providing access to historic spawning areas at the Augusta Shoals. The Biological Opinion prepared by the NMFS provides information as to why Shortnose sturgeon are expected to be able to successfully use these historic spawning and foraging areas. See also following responses.

730-MR-16-EV07

Comment: Related to #2, shortnose sturgeon are continuous feeders, so food source and benthic substrate are important factors in their habitat selection. The DEIS contains no evaluation of how this factor will play into the self-directed relocation of the sturgeon. Either additional studies must be performed to more clearly understand the habitat selection of shortnose sturgeon in the Savannah estuary or, at a minimum, assertions of habitat relocation must be based in sound behavioral science from other population segments from the southern region. Lastly, this science needs to be clearly cited within the DEIS as the basis for these assertions.

Response: Appendix B of the EIS (Biological Assessment of Threatened and Endangered Species) includes a discussion of a study that the Corps had performed in 2010 (Dial Cordy) of the bottom substrate in the upper reaches of the harbor, which SNS use in the summer months and which they would likely use if their winter habitat is impacted, as predicted. The study found the bottom substrates between Interstate 95 and the Houlihan Bridge to be primarily sand, which is the substrate type known to support diverse and vibrant benthic populations, such as those used as forage by SNS.

The Corps also had a study performed around the New Savannah Bluff Lock and Dam of the habitat suitability/availability for Shortnose sturgeon spawning. The 2010 study by Dial Cordy used habitat suitability developed by NOAA to identify areas that would provide suitable spawning habitat. The study included the Augusta Shoals/Savannah Rapids area upstream of the New Savannah Bluff Lock and Dam. Substrate data were collected at 57 sites; 40% of the sites had a substrate type[s] considered suitable for sturgeon spawning. The combined frequency of marginally suitable sites was 37%. The remaining sites [33%] had unsuitable substrates.

Class	Benthic substrate	SI ¹	Number of Sites	Frequency (%)
1	Mud, soft clay/fines	0.0	0	0
2	Silt, sand (diameter < 2.0 mm)	0.0	7	12
3	Sand, gravel (diameter > 2.0 mm to < 64 mm)	0.5	0	0
4	Cobble/gravel (diameter > 64 mm to < 250 mm)	1.0	3	5
5	Boulder (diameter 250 mm to 4,000 mm)	0.8	20	35
6	Bedrock w/ fissures w/ gravel/cobble mixtures	0.6	21	37
7	Bedrock smooth w/ few fissures or gravel	0.2	6	11

¹1.0 indicates highest suitability; 0.0 the lowest.

The following link contains the full report of the investigation of Shortnose sturgeon spawning habitat in the Savannah River [Georgia and South Carolina]: <u>http://www.sas.usace.army.mil/plnew.html</u>

In addition to existing information, an extensive monitoring study in the southeastern U.S. is being funded by NOAA on the Atlantic and Shortnose sturgeon. This effort will begin in the spring of 2011 and will last for 5 years. The work in the Savannah River will be performed by SCDNR.

http://www.nmfs.noaa.gov/pr/conservation/states/funded.htm.

As information becomes available, it will be considered using the processes set forth in the SHEP's Adaptive Management Plan.

730-MR-16-EV08

Comment: The fish ladder being proposed is not a proven method for sturgeon passage. There are many uncertainties around potential success of the fish ladder, including contravention of shortnose sturgeon spawning movements by hypolimnetic releases from the Strom Thurmond Dam, the uncertainty of acquiring the necessary land or rights to build the facility, and the uncertainty of the Augusta Canal facility delivering sufficient water to the shoals. The uncertainties do not fully eliminate the promise a fish passage facility might provide, but these uncertainties need to be offset by a sufficient commitment to adaptive management and monitoring of the facility. Furthermore, standard practice for fish passage facilities is to carry specific goals for numbers of fish passed, commitments to attractant flows, and

monitoring of success. Typically, these are developed and applied to all species that will be passed. The DEIS currently does not contain these goals and commitments.

Response: The decline of Shortnose sturgeon is attributable to many factors, but none is more important than the loss of its upstream spawning habitat. Appendix L provides an historic account of this and other endangered species in Savannah Harbor and details the reason[s] for their decline. Harbor deepening would not affect the Shortnose sturgeon's spawning habitat since it is located over 100 miles upstream from the SHEP effects' area. Rather, the harbor deepening would have a long-term impact on the juvenile sturgeon's winter habitat in the lower Savannah River. The adverse project-induced impacts are caused by an increase in upstream salinity levels. While no critical habitat for Shortnose sturgeon has been designated in the Savannah River, the importance of protecting [and even improving] the habitat for all resident species in the lower Savannah River is obvious.

The results of the extensive analyses and mitigation planning, including flow re-routing and addition of dissolved oxygen, have minimized impacts to Shortnose sturgeon habitat. The latest modeling indicates that harbor deepening would reduce winter habitat for Shortnose sturgeon adults and juveniles, and increase the summer habitat for Shortnose sturgeon adults. Since reduced spawning habitat has become a critical factor in maintaining [and increasing] long-term population levels for Shortnose sturgeon in this river basin, restoring access to upstream historic spawning areas would adequately compensate for the unavoidable impacts to its winter habitat.

There are of course uncertainties with any project, but the Cooperating Agencies and the Fisheries Interagency Coordination Team all support fish passage at the lock and dam since passage will provide anadromous fish access to 20 additional miles of historic habitat for spawning. The Corps estimated roughly 450 acres of SNS spawning habitat exist at the Augusta Shoals. The intent is to increase the population levels of this endangered species, but other anadromous species would also surely benefit. There are no planned changes in releases from the upstream dams due to the proposed fish passage at New Savannah Bluff Lock and Dam. Dissolved oxygen levels in the hypolimnetic discharges from the Strom Thurmond Dam will not be an issue in the late winter and early spring when the sturgeon spawn, since the reservoir waters are well mixed. Hypolimnetic discharges during the late winter and early spring can decrease water temperatures and affect spawning during drought conditions, but there is no feasible method to avoid this without major impacts to hydropower (e.g. spilling surface water).

Adaptive management, attraction flow commitments, and monitoring are described in detail in Appendix D of the EIS. A detailed monitoring plan to determine SNS passage success will be developed in conjunction with the Cooperating Agencies and the Fisheries Interagency Coordination Team if the project is approved and moves to construction. The passage of Shortnose sturgeon through the structure will be monitored to ensure it performs as intended (Appendix D).

Page 3

730-MR-16-EV09

Comment: The mitigation plan for shortnose sturgeon should include a plan and cost projection for modification of release temperatures at Thurmond Dam via mixing towers or other technology. Mixing towers have proven successful in rectifying resource impacts from hypolimnetic release at other COE facilities; this is known and proven technology. Fish passage at New Savannah Bluff Lock and Dam is unlikely to be successful for any diadromous fish species if Thurmond releases continue to send coldwater pulses downriver during fish spawning season.

Response: See Section 5.03.2 of the EIS. Dissolved oxygen levels in the hypolimnetic discharges from the Strom Thurmond Dam will not be an issue in the late winter and early spring when the sturgeon spawn, since the reservoir waters are well mixed. Hypolimnetic discharges during the late winter and early spring can decrease water temperatures and effect spawning during drought conditions, but there is no feasible method to avoid this without major impacts to hydropower (e.g. spilling surface water).

730-MR-16-EV10

Comment: The Atlantic sturgeon is currently the subject of a Federal Register notice recommending elevation of the species to endangered status. The DEIS cannot assume equivalence of habitat requirements from shortnose to Atlantic sturgeon. Atlantic sturgeon adults and juveniles display different staging and spawning requirements than shortnose sturgeon. The DEIS should evaluate impacts to Atlantic sturgeon separately from shortnose sturgeon.

Response: Disagree. The Shortnose and Atlantic sturgeon can be grouped together based on habitat use, distribution throughout the proposed action area, foraging behavior/prey base, and subsequent risk of take relative to dredging/trawling operations. Information on these species can be obtained from the following link and other sources. <u>http://sero.nmfs.noaa.gov/pr/sturgeon.htm</u>

The impacts of the SHEP on the Atlantic sturgeon were evaluated in the BATES (Appendix B). The NMFS reviewed the BATES, and they have submitted their Biological Opinion (Appendix Z) which thoroughly addresses project impacts to both the Shortnose and Atlantic sturgeon. The Corps will adhere to all of the reasonable and prudent measures outlined in the BO to protect Atlantic sturgeon.

730-MR-16-EV11

Comment: The Monitoring and Adaptive Management Plan contains a very thorough consideration of pre-project conditions, and during- and post-construction impacts, particularly with respect to the Monitoring targets and costs. However, the Adaptive Management budget appears to be based on arbitrary percentages of initial costs. Given the difficulties and logistical challenges of construction work in big river environments, benchmarks of 5-10% of original costs seem very low. This is especially true if several mitigation measures need modification at once. Given the COE's long experience in large-scale river engineering and construction, a more thorough and realistic cost projection of modifying mitigation measures should be feasible. If the 5-10% figures were based on real-world cost projections, that should be detailed in the EIS. If not, we suggest this be conducted and made part of the EIS.

Response: As noted, costs for an Adaptive Management program were developed by summing a portion of the initial construction costs for a number of mitigation features. There are no specified

criteria in Corps of Engineers' regulations to determine funding levels for an Adaptive Management plan [to included mitigation features or adaptive changes]. However, given the extensive, long-term planning by the involved parties on this project, the District is confident that when taken as a whole, the estimated amount is reasonable based on current information. Actual funding requirements for individual adaptive management measures will not be known until the project is constructed and monitoring data can be reviewed to determine how the project and mitigation measures are performing. The funds for the SHEP mitigation and adaptive management features greatly exceed usual allocations for similar Corps of Engineers water resource projects.

730-MR-16-EV12

Comment: The pre-construction monitoring should include a provision to characterize the benthic food sources at current shortnose sturgeon staging areas. This would be a relatively simple and low cost addition to benthic substrate sampling that is already planned. This knowledge would considerably enhance the confidence of predicted post-project habitat use by shortnose sturgeon.

Response: The Corps characterized the benthic substrate in the upper harbor area through work performed by Dial Cordy in 2010. The study found the bottom substrates between Interstate 95 and the Houlihan Bridge to be primarily sand, which is the substrate type known to support diverse and vibrant benthic populations, such as those used as forage by SNS.

730-MR-16-EV13

Comment: The costs of required internal COE reviews of potential Adaptive Management actions should be detailed in the DEIS.

Response: The adaptive management costs in Appendix D of the EIS are estimates. Detailed cost estimates would not be developed until monitoring results were available and the performance of the project could be evaluated.

730-MR-16-EV14

Comment: The Monitoring costs are based on the most optimistic 3-year projection of time of construction, while the DEIS recognizes a possible 6-year construction window. The Monitoring costs should be predicated on a worst-case scenario, as obtaining additional funding once work begins is likely to be difficult.

Response: The Monitoring During Construction costs have been increased to accommodate a 4-year construction schedule. Monitoring and channel deepening costs would be funded via the annual construction program budget process.

730-MR-16-EV15

Comment: Unforeseen monitoring costs arising from Adaptive Management work or other unintended post-project impacts should not be funded at the expense of the Adaptive Management budget, as the DEIS currently proposes. A separate contingency fund should be established for this purpose.

Response: If monitoring and adaptive management costs exceed what is expected, the District could seek additional funds. It would follow the same procedure if the dredging costs are substantially higher than anticipated and exceed the contingencies.

730-MR-16-EV16

Comment: As any unintended adverse impacts of the project and / or mitigation actions will occur in real time and are potentially lethal to some species and resources, Adaptive Management funding must be stand-alone sufficient and free of any matching or cost-share requirements. Any such requirements could introduce fatal delays into Adaptive Management actions.

Response: Congress and the Corps consider Adaptive Management to be part of the initial construction. WRDA 1986 determined that the costs of those activities would be shared between the Federal Government and the project's non-Federal sponsor. The non-Federal sponsor, acting through the Georgia Ports Authority, has agreed to set aside, in advance, their cost-shared portion of the adaptive management funds in an escrow account upon approval of the project.



January 25, 2011

Mr. William G. Bailey ATTN: PD Savannah District, US Army Corps of Engineers 100 West Oglethorpe Ave. Savannah, GA 31404

RE: Savannah Harbor Expansion Project

Please accept these comments on behalf of Citizens for Sound Conservation (CSC) regarding the proposed Savannah Harbor Expansion Project (SHEP). Citizens for Sound Conservation is a 501(c)3 non-partisan not-for-profit organization dedicated to improving South Carolina's environmental and economic quality of life. Our support base is comprised of various entities that collectively represent well over 100,000 South Carolinians working in the manufacturing, utility, real estate, home building, contracting and maritime sectors, among others.

With that as background - and upon reviews of the draft EIS and draft GRR - we would like to go on record as voicing serious concerns regarding the proposed Savannah Harbor Expansion Project and respectfully request that the application be withdrawn, amended and resubmitted before moving forward.

Chief among CSC's concerns are the project's environmental and economic impacts, as well as safety and navigability questions.

On the environmental front, the EIS shows a significant adverse impact on the amount of dissolved oxygen in the affected area. And while a "solution" is proposed to this dilemma that involves pumping oxygen back into the river, it is our contention that such a technique has not been thoroughly vetted nor approved for such a massive project. Additionally, the study points to a number of habitats and species that will be adversely affected - including shortnose sturgeon, striped bass and numerous species living in the tidal freshwaters and brackish marsh. Also of particular note is the fact that of twenty-three federal and state environmental laws that apply, this project currently complies with only eight.

Economically, this expansion could very well disturb the river to such a degree that future projects - such as the proposed Jasper Ocean Terminal and/or other industrial prospects - would never be able to receive permitting. Coupled with the finding that the Corps believes the Georgia Ports Authority would enjoy the same growth in container traffic regardless of whether or not the SHEP is done, the question must be asked whether or not this specific project is warranted – particularly when both states have agreed to work jointly on the Jasper Ocean Terminal. The fact that this proposal calls for disposing of the dredge spoil onto cells in Jasper County that are currently "reserved" as part of the future Jasper Ocean Terminal is another red flag for the future of this terminal and associated economic growth.

On the issue of navigability and safety, we concur with the SC Port Oversight Committee's contention that the Corps "fails to reconcile the severe and dangerous limitations imposed by its imprudent recommendations for draft, channel width, vessel speed and single-lane layout." If the channel were in fact built to study specifications, there are serious doubts as to whether or not it would be able to accommodate the number of ships upon which many of the project's benefits are based. This once again calls into question the need and viability of this project.

If we are truly serious about protecting the environment while providing economic growth for both South Carolina and Georgia, more study and review of the alternatives is necessary. For these reasons Citizens for Sound Conservation opposes the Savannah Harbor Expansion Project as currently proposed and calls for an immediate withdrawal and review of the project.

Thank you for the opportunity to comment on this important issue.

Contact: Denver Merrill Executive Director Citizens for Sound Conservation 1643 Savannah Hwy, Suite 284 Charleston, SC 29407 843-737-4333 info@citizensforsoundconservation.org www.citizensforsoundconservation.org

Citizens for Sound Conservation

741-MR-04-EV01

Comment: On the environmental front, the EIS shows a significant adverse impact on the amount of dissolved oxygen in the affected area. And while a "solution" is proposed to this dilemma that involves pumping oxygen back into the river, it is our contention that such a technique has not been thoroughly vetted nor approved for such a massive project. Additionally, the study points to a number of habitats and species that will be adversely affected - including shortnose sturgeon, striped bass and numerous species living in the tidal freshwaters and brackish marsh. Also of particular note is the fact that of twenty-three federal and state environmental laws that apply, this project currently complies with only eight.

Response: The SHEP's impacts on the dissolved oxygen regime in the Savannah Harbor estuary are discussed in the EIS and in greater detail in the Engineering Appendix of the GRR. Based on the potential impacts to dissolved oxygen that would be caused by its implementation, the project's mitigation plan includes an oxygen injection system. While the injection of oxygen into an estuary [to improve dissolved oxygen levels] is a relatively new concept, the technology is not. There is little objective doubt that oxygen injection can eliminate the incremental effects of deepening [all options] on the harbor's dissolved oxygen regime. This position is verified by the results from a field demonstration of the subject oxygen injection equipment and subsequent water quality modeling of the effects of injection, the dissolved oxygen levels [throughout the water column]. Due to the spacing of the injectors, the dissolved oxygen regime would be improved in over 90 percent of the project effect's area compared to existing conditions.

The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are fully discussed in the Risk and Uncertainty Analysis. Specifically, a risk analysis of the water quality model was prepared to predict post-project dissolved oxygen levels. An oxygen demonstration trial verified the efficacy of the Speece Cones to compensate for incremental reductions in dissolved oxygen resulting from harbor deepening. The results are summarized in the Oxygen Injection Design Report Savannah Harbor Expansion Project, dated October 2010. The report, prepared for GPA by Tetra Tech, is included as part of the Engineering Appendix supplemental materials in the GRR. Extensive post-construction monitoring will determine whether initial predictions regarding oxygen levels are correct. Given the depth of these analyses, there is little risk to decision-makers regarding the dissolved oxygen issue. Post-project, the adaptive management plan provides a means to make any required changes to the oxygen injection system. This could range from increasing the amount of injected oxygen, modifying the oxygen injection equipment, or adding injection sites.

Environmental evaluations were conducted in accordance with Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 CFR 1500-1508). This document provides the framework for compliance with applicable environmental laws and regulations. Additional compliance steps were also taken as a result of the conditional authorization of this project (WRDA 1999), i.e., it requires the Secretary of the Interior, Secretary of Commerce, and Administrator of the Environmental Protection Agency along with the Secretary of the Army to approve a selected plan only after determining that the associated mitigation plan adequately addresses the project's environmental impacts. The environmental impact/mitigation planning process included assessment, avoidance, minimization, and mitigation as well as years of close coordination with federal and state agencies. As a result, full compliance with applicable environmental laws will be achieved before the project can be constructed.

741-MR-04-EC01, 741-MR-04-EV02

Comment: Economically, this expansion could very well disturb the river to such a degree that future projects - such as the proposed Jasper Ocean Terminal and/or other industrial prospects - would never be able to receive permitting. Coupled with the finding that the Corps believes the Georgia Ports Authority would enjoy the same growth in container traffic regardless of whether or not the SHEP is done, the question must be asked whether or not this specific project is warranted – particularly when both states have agreed to work jointly on the Jasper Ocean Terminal. The fact that this proposal calls for disposing of the dredge spoil onto cells in Jasper County that are currently "reserved" as part of the future Jasper Ocean Terminal is another red flag for the future of this terminal and associated economic growth.

Response: The District evaluates its water resource projects from a National Economic Development (NED) perspective, which in essence is the alternative [meeting project objectives] having the greatest net economic benefits [benefits - costs]. In this instance, the NED benefits are comprised primarily of a savings in transportation costs from removing the current constraints of draft. It is important to note that these economic benefits accrue from the use of larger, more cost-effective container ships, not an increase in the number of containers. The savings are presumably passed onto US consumers and businesses in the form of lower prices. In performing the NED, analysts are mindful not to claim benefits if a project merely redistributes commerce from one port to another rather, than an actual market increase, per se.

In recent years, additional analyses have been undertaken which focus on Regional Economic Development [RED]. In doing so, analysts often calculate the economic impacts to the region resulting from the influx of construction funds. The primary effects measured in an RED analysis include jobs and worker income from the proposed construction expenditures. Chapter 8 of the Economic Appendix details regional economic impacts.

The Georgia Department of Transportation has requested that the District relinquish its sediment disposal rights for Areas 14A and 14B [the presently proposed location for a Jasper County terminal]. Continued deposition of dredged material in existing Sites 14A and 14B is the least-cost, environmentally acceptable alternative for the proposed SHEP; however, deposition of this new work sediment onto these sites does not preclude future construction of a Jasper terminal. The JPO's consultant observed that placing new work sediments on Areas 14A and 14B would save the terminal development project over \$300 million by raising its elevation to a workable height. Therefore, if SHEP is constructed, it would benefit the development of a terminal at the Jasper site by significantly reducing its initial construction costs. Further, local newspapers report the Joint Project Office agreeing that a terminal at Jasper would also require a navigation channel deeper that the present 42-foot depth. The District is providing technical information to the Joint Project Office to identify a disposal site which would replace this lost capacity for Savannah Harbor as well as existing mitigation features [from previous projects] located there. The District has advised GA DOT and the Joint Project Office that it would not consider releasing the disposal easements until development of a Jasper terminal is imminent, i.e. the developer obtains a Section 404 permit.

As part of the incremental analyses conducted in accordance with NEPA and the language of Section 203, WRDA 1999, deepening other sites in lieu of Garden City Terminal was considered. A Jasper terminal (sometimes referred to as Site 14A/14B) was examined as an alternative port site, as described in Section 6 and Section 12 of the GRR, Appendix D of the GRR, Section 3 of the EIS, and Appendix O of

the EIS. However, the absence of terminal facilities, an uncertain future, and lack of associated transit infrastructure render it impractical as a current option to deepening the Garden City Terminal.

Construction of SHEP will not "exacerbate the impacts of Jasper." The secondary impacts referenced in your comment as regards DEIS-Appendix O are associated solely with construction of the Jasper terminal and have no linkage to construction of SHEP. As noted, the presently proposed site for a Jasper terminal (Sites 14A and 14B), does not have adequate road and rail infrastructure to support a terminal. This access would have to be constructed to operate a port operation; deepening of the existing channel is generally unrelated to these potential impacts. It is true that the use of Sites 14A and 14B for dredge material placement is the current Federal standard [least-cost-most environmentally acceptable] alternative for the Savannah Harbor Federal Navigation Project. Further, the proposed SHEP has no plans to alter the use of these sites or construct new ones. At some future time, plans to construct a port at the present Jasper terminal site may eventuate. However, it would be the responsibility of its local sponsor through the analysis of a Section 404(b) permit application to identify an alternate disposal plan. Any proposal in this regard would have to replace lost disposal capacity as well as the mitigation features currently maintained at Sites 14 A/B [at no additional cost to the federal government]. The potential environmental impacts associated with a potential Jasper terminal can only be described in general outline. The District considered all readily available data, but a comprehensive assessment of the impacts of the notional Jasper terminal is just not practical at this time. Moreover, it is not within the District's existing authorities. The Joint Project Office [JPO] is planning to conduct the necessary analyses and file a Section 404(b) permit application so the Corps may properly assess the potential impacts associated with a Jasper development. The District is working with the JPO to provide technical information as noted previously.

The comment statement that the District "discussed the two projects in a coordinated fashion" is incorrect. As noted above and documented in formal correspondence with GDOT and JPO, the District is working with the JPO (at the request of the GDOT) to provide data and technical assistance within the Corps' statutory authorities. GPA is a participating member of the JPO, but does not control that organization.

741-MR-04-EN01

Comment: On the issue of navigability and safety, we concur with the SC Port Oversight Committee's contention that the Corps "fails to reconcile the severe and dangerous limitations imposed by its imprudent recommendations for draft, channel width, vessel speed and single-lane layout." If the channel were in fact built to study specifications, there are serious doubts as to whether or not it would be able to accommodate the number of ships upon which many of the project's benefits are based. This once again calls into question the need and viability of this project.

Response: The channel was designed in accordance with Corps of Engineers' Design Standards and Procedures outlined in EM-1110-2-1613. Final channel dimensions and navigation requirements were developed using the Corps' state-of-the-art Ship Simulator with input from the Savannah Harbor Pilots Association (SHPA). Since those pilots guide vessels through the harbor on a daily basis, they are thoroughly familiar with environmental conditions that affect the way vessels handle in this particular harbor. The use of ship simulators to establish final design parameters for deep draft navigation channels is the standard practice worldwide and ensures that channels are safe and economical and result in minimal environmental impact and long term maintenance requirements. The use of ship

simulators also provides the harbor pilots who will actually use the channel with the opportunity to provide input into the design and ensure the navigability and safety of the channel.

The existing channel dimensions can accommodate meeting the deepening design vessel (Post-Panamax Generation 2; 140' beam) and a smaller vessel. Two meeting areas are also included to provide for meeting of two design vessels.

The CADET program used for the vertical ship motion predictions is a probabilistic or risk-based model which includes probabilities of waves over a 20-year wave hindcast. SHPA brings in vessels provided 4-feet of underkeel clearance (UKC) is available. Depending on the draft of the vessel, use of tide may be required to maintain that UKC throughout transit. The vertical ship motion study used a ratio of channel depth h to ship draft T of h/T =1.09, which for a light-loaded vessel drafting 46-feet corresponds to a channel depth of 50-feet. This condition matches the SHPA policy of 4-foot UKC. The vertical motion study confirmed that a light-loaded vessel would not touch bottom with a 4-foot UKC and the vessel speed does not exceed 12 knots. The study also showed that given additional water depth, and therefore higher h/T values, ships could reach higher speeds without causing enough squat to cause grounding.

For the fully loaded 47.5-foot draft, using a channel depth h to ship draft T of h/T =1.09, would correspond to a water depth of 52-feet requiring at least a 3-foot tidal increase for the 49-foot project (2-foot tidal increase for the 50-foot project). The vertical motion study showed that ship speed of 14 knots or less would not cause grounding due to squat for this condition. Greater speed would require additional depth to prevent grounding due to squat.

January 24, 2011

Colonel Jeffrey M. Hall District Commander US Army Engineer District, Savannah ATTN: PD Post Office Box 889 Savannah, Georgia 31402-0889

Dear Colonel Hall:

The Georgia Wildlife Federation is pleased to present comments on the Draft Tier II Environmental Impact Statement for the proposed Savannah Harbor Expansion Project. The Federation has been an active stakeholder in the SEG process since its formation in 1999. We look forward to responding to any change in the proposed project as the review and permitting process goes forward. Please consider our comments contained below on pages 1 through 6 as an inseparable part of this letter.

Sincerely,

Jerry L. McCollum Certified Wildlife Biologist President & CEO

Comments of the Georgia Wildlife Federation to the Draft Tier II Environmental Impact Statement for the proposed Savannah Harbor Expansion:

The project is requested by the Georgia Ports Authority in order to be able to more efficiently accommodate post-Panamax generation container ships following widening of the Panama Canal in 2014 and to maintain its competitiveness with other Atlantic ports. The Federation has been an active stakeholder in the SEG process since its formation in 1999 by recommending and reviewing scientific studies to the Georgia Ports Authority for more accurately identifying and evaluating natural resource impacts of alternative channel depths and development of suitable mitigation plans for protection of critical freshwater marsh habitat and trust fishery resources from detrimental salinity incursions and lowered dissolved oxygen in the harbor. Accomplishing these difficult tasks included extensive evaluation and refinement of complex hydrodynamic and water quality models and building consensus as to the selected models' ability to reasonably predict adverse impacts of incrementally deepening channel depths from the existing

42-foot channel to a maximum of 48 feet. Much of the required modeling focused on isolating portions of the estuary, specifically Middle and Back River, to reduce salinity impacts from deepening on Front River and rerouting flow paths by closing or opening various cuts and channels. An enormous amount of effort was directed towards defining and testing viable mitigation measures to hopefully restore the historic hydrology in the Back River and Little Back River (once the primary striped bass spawning habitat in the estuary) and diverting (enhancing) upstream freshwater flow into these systems which supply the Savannah National Wildlife Refuge managed waterfowl impoundments and a major portion of the remaining freshwater marsh areas in the Savannah River estuary.

The Federation's specific comments to the Draft Tier II EIS are primarily limited to (1) salinity mitigation alternatives for freshwater marsh and species protection, (2) the preferred depth plan, and (3) the proposed monitoring and adaptive management program. Other water quality issues and species impacts from reduced dissolved oxygen levels in the dredged harbor channel, liquid oxygen injection mitigation, and development of revised TMDL's and a new dissolved oxygen standard for Savannah Harbor will be deferred to the respective state and federal agencies responsible for issuing the 401 water quality certifications for the harbor deepening project.

Mitigation Plan

As a condition of approval for the deepening projects, the Federation strongly supports implementation of all the final proposed natural resource mitigation plans listed in the draft EIS, regardless of the depth plan selected, including those which would likely be conducted under the Adaptive Management Program following harbor deepening. These include:

1. Constructing and operating flow re-routing features in and near the Savannah National Wildlife Refuge to reduce salinity impacts to tidal freshwater and brackish wetlands and protect and possibly enhance historic striped bass spawning habitats. Recommended **Plan 6a**, the proposed mitigation measure for 45, 46, 47 and 48 foot channel depths, would fill entire Sediment Basin at the mouth of Back River; remove Tide Gate structure and abutments; close Rifle Cut; close western arm of McCoy's Cut; construct a water diversion structure in the main Savannah River at the entrance to New McCoy's Cut; and deepen channel of McCoy's Cut and upper portions of Middle and Little Back River with maintenance under the Adaptive Management Program as required.

2. Acquiring up to approximately 2, 683 acres of riverine bottomland hardwood tracts/fresh water wetlands listed on the Savannah National Wildlife Refuge's approved acquisition list to compensate for salinity increases to tidal freshwater wetlands located in the western most areas of the Refuge near the Front River. These acquired lands would become part of the Savannah National Wildlife Refuge Complex and be managed by USFWS.

3. Constructing and operating a dissolved oxygen system in the Front River Channel for the life of the project to remove the incremental effects of the harbor deepening project.

4. Constructing a sill at the mouth of Middle River to reduce salinity impacts to adult and juvenile shortnose sturgeon refugia holes. Constructing and operating a fish bypass channel at the New Savannah Bluff Lock and Dam near Augusta for accessing over 20 miles of upstream spawning habitats for shortnose sturgeon, American shad and striped bass to compensate for impacts to downstream habitats.

5. Funding to Georgia Wildlife Resources Division to continue an advanced size striped bass stocking program over the life of the project to compensate for impacts to striped bass spawning and nursery habitats within the estuary.

6. Implementing all appropriate adaptive management features for corrective action if post-construction monitoring shows them to be needed. These include but are not limited to removing a Tide Gate sill above the filled Sediment Basin in Back River, enlarging the proposed diversion structure at McCoy's Cut, constructing a diversion structure at the junction of Middle and Little Back Rivers, and acquisition of up to another 10 percent of freshwater wetlands depending on salinity model predictability variation and mitigation success.

Depth Plan Selection

The Corps of Engineers (Corps) developed and evaluated five incremental depth (44 to 48 foot) channel deepening alternatives, in addition to the No Action Alternative. The Corps analysis indicates that incremental net economic benefits (local benefits) of the alternatives are maximized at a depth of 45 feet (3' deepening), decrease from 45 to 47 feet, and are negative at 48 feet. The 47-foot depth provides the greatest total net economic benefits and is identified as the National Economic Development (NED) Plan, the plan that maximizes net economic benefits to the Nation. The maximum authorized depth of 48 feet is the locally preferred plan (LPP) of the non-Federal cost share sponsor, the Georgia Ports Authority. The additional national economic benefits of the LPP relative to the NED plan (approximately 1 percent more), but higher project costs (approximately 6 percent more), reflect negative incremental net benefits. The draft EIS states the present recommended plan is either the 47-foot alternative (NED plan) or the 48-foot alternative (LPP), although three federal agencies must still approve the final plan selection.

The Georgia Wildlife Federation's logical preference for deepening Savannah Harbor is selection of the 45-foot depth alternative, because it minimizes the loss of freshwater wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources, due not only to hydrodynamic model error and variability but a myriad of other unforeseen factors. Previous channel deepening and flow modification projects have reduced tidal freshwater marsh which is critical to successful reproduction, survival, and abundance of important fish and wildlife populations in the Savannah River Estuary from around 12,000 acres to only around 3,300 acres. The majority of the remaining freshwater tidal wetlands are located on Savannah NWR. Further deepening the harbor channel from its present depth of 42 feet would further limit this critical and increasingly rare natural resource. The 45-foot depth plan with approved mitigation included would result in a loss of 32 acres of freshwater marsh and a 3 percent reduction in striped bass reproductive habitat in the estuary, whereas the NED depth plan (47-feet) predicted loss is 223 acres of freshwater marsh and a 27 percent reduction in striped bass reproductive habitat with mitigation. At the LPP depth (48 feet), a net loss of 337 acres of tidal freshwater is predicted after flow-diversion mitigation is implemented. The loss of an additional 114 acres of freshwater tidal wetlands associated with LPP represents a 50 percent increase in impacts to Savannah NWR over the NED plan and a cumulative loss of approximately 10 percent of the basin's remaining freshwater tidal wetlands. For this reason, Georgia Wildlife Federation does not support the LPP.

Monitoring/Adaptive Management

Assuring the effectiveness of the mitigation features proposed in the Draft EIS is essential to approval of the selected project plan. These features were developed using pre-construction data and models to predict potential effects to the estuary. The Draft EIS states that natural variation alone will nearly guarantee conditions in the first few vears after construction different from those under which the models were first calibrated. Currently, the Monitoring and Adaptive Management Plan proposes 5 years postconstruction monitoring of key mitigation features, which we believe is not long enough. It is the Georgia Wildlife Federation's position that 10 years post-construction monitoring is necessary for the adaptive management process to work, i.e., to ensure that impacts to natural resources in this complex system resulting from project construction are limited to those predicted. Further, the Federation recommends a more precise definition of observed conditions that would prompt changes to the mitigation features, and a time-line for making decisions and taking corrective actions thereafter. Most importantly, funding for the plan needs to be clearly defined. The Federation is concerned that funding for adaptive management will be dependent upon the Corps' annual appropriations process. It is relatively certain that impacts to trust resources of the Nation will occur following construction, but the effectiveness of the mitigation features is much less certain. Therefore, the Federation cannot acknowledge that the proposed mitigation adequately addresses project impacts unless contingency funding for monitoring and adaptive management is assured.

Appendix D, Monitoring and Adaptive Management Program

5.C. Pre-construction Monitoring – Details of the Monitoring, page 8 and Figure 3.

There are two existing water quality stations on Back River (021989784 and 021989791), and one on Front River (02198920), that have long-term salinity data. The Federation recommends using this long-term salinity data set, from the end of the last harbor deepening construction to the start of any new deepening construction, as baseline salinity conditions for these sites and to supplement the 1 year of pre-construction water quality monitoring.
5.C. Pre-construction Monitoring – Details of the Monitoring, page 8. Preconstruction monitoring for 1 year is intended to create or supplement a pre-project baseline. However, information based on only 1 year of data may not provide an adequate baseline. Using existing longer-term data from water quality stations on Back River and Front River should help address this problem (see previous comment on Appendix D, section 5.C, page 8 and Figure 3). Similarly, wetland and fishery studies performed during project planning represent useful baseline information. This section and others in the final EIS should describe in greater detail developing baseline conditions for the various monitoring parameters. In addition, this section states: *"Monitoring would be conducted between the time a decision is made on implementing a harbor expansion and the time the construction begins which would affect aquatic resources in the inner harbor."* If construction is delayed for more than 1 year after a decision for harbor expansion, the Federation recommends continuing pre-construction monitoring until construction begins.

7.B. Post-construction Monitoring – Major Components, page 22. No monitoring is proposed for striped bass, but should be. We recommend a post-project assessment of striped bass habitat using the water quality monitoring data and updated water quality simulations. Model updates are already planned that would facilitate a low-cost assessment using the established striped bass habitat criteria. The Federation recommends comparing conditions during the fourth year of post-project monitoring with pre-construction predicted habitat impacts, and formulating corrective actions as necessary based on the results.

7.C. Post-construction Monitoring – Details of the Monitoring, page 24. The Draft EIS shows various post construction monitoring from 2 to 5 years. It is not unlikely that a drought or high-flow period lasting several years would occur during the post-construction monitoring period, which would complicate comparisons with pre-construction monitoring data. In addition, tidal freshwater wetlands respond slowly to salinity change. Therefore, the Federation recommends increasing wetland and continuous water quality monitoring from 5 years post-construction to 10 years.

8.B. Performances Measures – Post-construction Monitoring, page 28. We recommend developing a detailed data analysis plan for the post-construction water quality monitoring. The mitigation features will significantly alter the system, which will complicate the comparisons of pre- and post-construction conditions to determine the efficacy of the mitigation measures. A recent example of the need for such a plan was the re-oxygenation demonstration performed for the Savannah Harbor Expansion project. Monitoring data was collected, but the analysis of that data failed to conclusively quantify the effect of the demonstration project in the highly variable DO dynamics of the system.

9.B. Adaptive Management-Decision Making Process, page 30. This section proposes to provide a post-construction monitoring report within 1 year after the monitoring period, followed by 30 days of agency review, an unspecified time period for further report revision, public review, and a potential elevation process. This time-line

would likely require a minimum of 1.5 years after monitoring to make a decision on adaptive management actions, and could take much longer. The Federation recommends compressing this process so that a final decision on a corrective action is reached within 1 year after the monitoring period.

9.B. Adaptive Management – Decision Criteria, page 31-32. The Federal modeling performance goals in the plan are those provided by review agencies in 2001 during hydrodynamic model development. Because the agencies were aware of the complexity of the system and model limitations, considerable latitude in the performance of the models was allowed. We are concerned that adopting the same tolerances for the performance of the constructed project is inappropriate, because actual impacts could differ substantially from the predicted impacts without triggering remedial action. The Corps modified the goal for <1 ppt salinity based on earlier coordination to +/- 0.1 ppt, and we support this modification. The goal for 1-5 ppt salinity has not been modified, and would allow considerable impact without triggering action. As proposed, the salinity goal for 1 ppt would allow 0.89 to 1.09 to be acceptable. We recommend modifying the goal for salinity in the range 1-5 ppt +/- 10% (not +/- 0.5 ppt) as proposed) to make it more consistent with other goals and triggers for adaptive management.

10. Adaptive Management – Implementing Warranted Modifications, pages 32-33. This section states that the "Corps would seek and obtain its funds for this phase each year through the normal budget process", which creates concern. It is relatively certain that impacts to trust resources of the Nation will occur following construction but the effectiveness of the mitigation features is much less certain. Therefore, now can the stakeholders (SEG) and the regulatory agencies have confidence that the proposed mitigation plan adequately addresses project impacts unless contingency funding for monitoring/adaptive management activities is assured.

This section should also discuss an implementation schedule for needed corrective actions. The Federation recommends initiating construction, or other appropriate remedial actions, within 1 year of a decision to modify a mitigation feature.

10.C. Adaptive Management – Monitoring after Implementing an Adaptive Management Feature, page 35. The Corps proposes to monitor the performance of corrective actions under the adaptive management program. It is unlikely that 1 year of post-construction monitoring is sufficient to determine the outcome of the action in a system as dynamic as the Savannah estuary. The Federation feels that 3 years of post-construction monitoring of adaptive management actions is reasonable.

11.B. Long Term Monitoring – Major Components, page 36. The Corps proposes to fund four water monitoring stations to determine whether the mitigation features are functioning as intended. The Federation recommends adding one additional station. Station 021989784 is located at the intake of the freshwater supply system for the 3,000 acres of managed wetlands on Savannah NWR. Therefore, this station is especially important for monitoring project impacts.

The Georgia Wildlife Federation

Page 4

748-OC-01-OC01

Comment: The Georgia Wildlife Federation's logical preference for deepening Savannah Harbor is selection of the 45-foot depth alternative, because it minimizes the loss of freshwater wetlands, impacts to Savannah National Wildlife Refuge (NWR), and risk and uncertainty of impacts to trust fish and wildlife resources, due not only to hydrodynamic model error and variability but a myriad of other unforeseen factors. Previous channel deepening and flow modification projects have reduced tidal freshwater marsh which is critical to successful reproduction, survival, and abundance of important fish and wildlife populations in the Savannah River Estuary from around 12,000 acres to only around 3,300 acres. The majority of the remaining freshwater tidal wetlands are located on Savannah NWR. Further deepening the harbor channel from its present depth of 42 feet would further limit this critical and increasingly rare natural resource. The 45-foot depth plan with approved mitigation included would result in a loss of 32 acres of freshwater marsh and a 3 percent reduction in striped bass reproductive habitat in the estuary, whereas the NED depth plan (47-feet) predicted loss is 223 acres of freshwater marsh and a 27 percent reduction in striped bass reproductive habitat with mitigation. At the LPP depth (48 feet), a net loss of 337 acres of tidal freshwater is predicted after flow-diversion mitigation is implemented. The loss of an additional 114 acres of freshwater tidal wetlands associated with LPP represents a 50 percent increase in impacts to Savannah NWR over the NED plan and a cumulative loss of approximately 10 percent of the basin's remaining freshwater tidal wetlands. For this reason, Georgia Wildlife Federation does not support the LPP.

Response: The Corps notes the commenter's support of implementation of the mitigation features of the project, preference for the 45-foot depth, and opposition to the LPP (48-foot project). The selected plan is the 47-foot alternative, as discussed in other responses.

748-MR-10-EV01

Comment: There are two existing water quality stations on Back River (021989784 and 021989791), and one on Front River (02198920), that have long-term salinity data. The Federation recommends using this long-term salinity data set, from the end of the last harbor deepening construction to the start of any new deepening construction, as baseline salinity conditions for these sites and to supplement the 1 year of pre-construction water quality monitoring.

Response: All available data sources will be considered in establishing the water quality baseline [in addition to the one year of pre-construction monitoring specifically associated with SHEP].

Page 5

748-MR-10-EV02

Comment: Pre-construction monitoring for 1 year is intended to create or supplement a pre-project baseline. However, information based on only 1 year of data may not provide an adequate baseline. Using existing longer-term data from water quality stations on Back River and Front River should help address this problem (see previous comment on Appendix D, section 5.C, page 8 and Figure 3). Similarly,

wetland and fishery studies performed during project planning represent useful baseline information. This section and others in the final EIS should describe in greater detail developing baseline conditions for the various monitoring parameters. In addition, this section states: "Monitoring would be conducted between the time a decision is made on implementing a harbor expansion and the time the construction begins which would affect aquatic resources in the inner harbor." If construction is delayed for more than 1 year after a decision for harbor expansion, the Federation recommends continuing pre-construction monitoring until construction begins.

Response: All available data useful in establishing baseline conditions in Savannah Harbor will be considered for use. FEIS-Appendix D has been revised to that effect. The pre-construction monitoring would be conducted for a period of one year.

748-MR-10-EV03

Comment: No monitoring is proposed for striped bass, but should be. We recommend a post-project assessment of striped bass habitat using the water quality monitoring data and updated water quality simulations. Model updates are already planned that would facilitate a low-cost assessment using the established striped bass habitat criteria. The Federation recommends comparing conditions during the fourth year of post-project monitoring with pre-construction predicted habitat impacts, and formulating corrective actions as necessary based on the results.

Response: Appendix D has been revised to include an evaluation of the impacts of the SHEP on Striped bass as part of the post-construction monitoring. The updated hydrodynamic and water models would be used in conjunction with the field data collected to conduct this analysis. If the results of this study show impacts beyond those predicted in the EIS, then annual payments to the GADNR-WRD could be adjusted accordingly.

748-MR-10-EV04

Comment: The Draft EIS shows various post construction monitoring from 2 to 5 years. It is not unlikely that a drought or high-flow period lasting several years would occur during the post-construction monitoring period, which would complicate comparisons with pre-construction monitoring data. In addition, tidal freshwater wetlands respond slowly to salinity change. Therefore, the Federation recommends increasing wetland and continuous water quality monitoring from 5 years post-construction to 10 years.

Response: Appendix D has been revised to describe a longer post-construction monitoring program for wetlands and water quality.

748-MR-10-EV05

Comment: We recommend developing a detailed data analysis plan for the post-construction water quality monitoring. The mitigation features will significantly alter the system, which will complicate the comparisons of pre- and post-construction conditions to determine the efficacy of the mitigation measures. A recent example of the need for such a plan was the re-oxygenation demonstration performed for the Savannah Harbor Expansion project. Monitoring data was collected, but the analysis of that data failed to conclusively quantify the effect of the demonstration project in the highly variable DO dynamics of the system.

Response: The Monitoring Plan and Adaptive Management Plan includes sufficient opportunities to analyze water quality data. The Cooperating Agencies and the state natural resource agencies would be provided all monitoring data [annually]. The District will prepare a report at the end of each year summarizing the findings of the data collected that year. At the end of the post-construction monitoring period, the District will prepare a comprehensive report that summarizes the entire data collection period and its determinations relative to SHEP impacts on the water quality regime in Savannah Harbor and any water quality adaptive management measures that should be implemented. The Cooperating Agencies and state natural resource partners will have an opportunity to respond to the District's findings and present their views.

The monitoring plan contains specific measures to evaluate the impacts of the SHEP on the dissolved oxygen regime in Savannah Harbor and the effectiveness of the oxygen injection system including eight continuous recording water quality monitors and a Transfer Efficiency Study to determine the operational requirements for the system. The Corps has conducted further coordination with the USFWS and the NMFS regarding water quality monitoring, and the results of that coordination were used to revise Appendix D accordingly.

748-MR-10-EV06

Comment: This section proposes to provide a post-construction monitoring report within 1 year after the monitoring period, followed by 30 days of agency review, an unspecified time period for further report revision, public review, and a potential elevation process. This time-line would likely require a minimum of 1.5 years after monitoring to make a decision on adaptive management actions, and could take much longer. The Federation recommends compressing this process so that a final decision on a corrective action is reached within 1 year after the monitoring period.

Response: The decision to implement an adaptive management measure could be made during the construction process as well as during the post-construction monitoring period. Paragraph 9 of

Appendix D has been revised to provide a more thorough discussion of the adaptive management decision making process.

Page 6

748-MR-10-EV07

Comment: The Federal modeling performance goals in the plan are those provided by review agencies in 2001 during hydrodynamic model development. Because the agencies were aware of the complexity of the system and model limitations, considerable latitude in the performance of the models was allowed. We are concerned that adopting the same tolerances for the performance of the constructed project is inappropriate, because actual impacts could differ substantially from the predicted impacts without triggering remedial action. The Corps modified the goal for <1 ppt salinity based on earlier coordination to +/- 0.1 ppt, and we support this modification. The goal for 1-5 ppt salinity has not been modified, and would allow considerable impact without triggering action. As proposed, the salinity goal for 1 ppt would allow from 0.5 ppt to 1.5 ppt to be acceptable (+/- 50%), while salinity of 0.99 ppt would allow 0.89 to 1.09 to be acceptable. We recommend modifying the goal for salinity in the range 1-5 ppt +/- 10% (not +/- 0.5 ppt) as proposed) to make it more consistent with other goals and triggers for adaptive management.

Response: For salinity, the goal for model accuracy should be +/- 10 % instead of +/- 0.5 ppt [in the range of 1-5 ppt]. While this is the objective, models do have limitations; hence, this target may not be achieved.

748-MR-10-EV08

Comment: This section states that the "Corps would seek and obtain its funds for this phase each year through the normal budget process", which creates concern. It is relatively certain that impacts to trust resources of the Nation will occur following construction but the effectiveness of the mitigation features is much less certain. Therefore, now can the stakeholders (SEG) and the regulatory agencies have confidence that the proposed mitigation plan adequately addresses project impacts unless contingency funding for monitoring/adaptive management activities is assured.

Response: The Corps would obtain funding sufficient to implement adaptive management measures during the project construction period. The project would remain in a construction status until all of the construction is complete, the Post-Construction Monitoring is complete, and any adaptive management measures implemented that were determined to be required. The Georgia Department of Transportation, the expected non-Federal sponsor of the construction project, would also provide (during the construction period) its share of the funds required to implement these actions. The sponsor has indicated they intend to establish an escrow account at the beginning of the project to have their share of these funds available for expenditure, should they be needed. The District also intends to obtain funds for adaptive management each year it obtains funds to perform regular construction activities. Those adaptive management funds would be expended if the modifications are deemed necessary by the Federal Cooperating Agencies.

If modifications are found to be warranted and they are contained in the group of adaptive management measures described in the EIS, they could be implemented without further public

coordination or environmental approvals. If modifications are identified that are not described in the EIS, the Corps would prepare the documents needed to coordinate the proposed action with the public and the agencies to obtain the required environmental approvals.

If modifications are deemed warranted that are larger in scope than the adaptive management measures described in the EIS, and require additional funding, the Corps would submit the appropriate documents to its Headquarters for approval. If additional Federal funding is required, Congressional action would likely be needed to obtain those funds. Please see Chapter 10 of Appendix D.

748-MR-10-EV09

Comment: The Corps proposes to monitor the performance of corrective actions under the adaptive management program. It is unlikely that 1 year of post-construction monitoring is sufficient to determine the outcome of the action in a system as dynamic as the Savannah estuary. The Federation feels that 3 years of post-construction monitoring of adaptive management actions is reasonable.

Response: The Adaptive Management Plan has been revised to include two years of site-specific monitoring after any modification to a mitigation feature is complete. Monitoring of an adaptive management change to a mitigation feature could continue longer than two years if the resource agencies believe that to be prudent.

748-MR-10-EV10

Comment: The Corps proposes to fund four water monitoring stations to determine whether the mitigation features are functioning as intended. The Federation recommends adding one additional station. Station 021989784 is located at the intake of the freshwater supply system for the 3,000 acres of managed wetlands on Savannah NWR. Therefore, this station is especially important for monitoring project impacts.

Response: The continuous water quality monitoring station at the intake to the Savannah National Wildlife Refuge is already funded by the Georgia Ports Authority.

The Biltmore 817 West Peachtree Street Suite 200 Atlanta, GA 30308 tel 404.876.2900 fax 404.872.9229 mail@gaconservancy.org georgiaconservancy.org

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*Executive Committee Member

Mr. William Bailey ATTN: PD, US Army Corps of Engineers, Savannah District 100 West Oglethorpe Avenue Savannah, Georgia 31401-3640

SUBMITTED TO: CESAS-PD@usace.army.mil.

Dear Mr. Bailey:

The Georgia Conservancy submits the following comments to the draft General Reevaluation Report (GRR) and the draft Environmental Impact Statement (EIS) for the Savannah Harbor Expansion Project (SHEP).

Defining the Project

These comments are directed to the recommended SHEP navigation project depth of 47 feet, MLW. The Georgia Conservancy is aware that the Georgia Department of Transportation and their partner, the Georgia Ports Authority, have indicated their Locally Preferred Plan (LPP) is 48 feet MLW; however, there has been no indication by the U.S. Army Corps of Engineers (the Corps) as to how, whether or when the LPP might be accepted.

We also note that the U.S. Fish & Wildlife Service (USF&WS) has indicated that it does not support deepening beyond 45 feet MLW because of the impacts to the Savannah National Wildlife Refuge, particularly the forecast loss of tidal freshwater wetlands. Although we believe our comments would strengthen a SHEP project of any increment, the Georgia Conservancy places great weight on the ultimate positions of USF&WS and other state and federal natural resource agencies on the SHEP EIS and GRR. No comment on the project as currently proposed should be misconstrued as opposing a project of lesser depth.

Comment Focus

Savannah District Commander Hall's predecessor, Colonel Edward Kertis used to say, "All models are wrong; some models are useful." With this in mind, these comments will not address many of the technical analyses and modeling except to note that --however advanced-- it is only realistic to expect that neither the environmental impacts nor the mitigation measures will perform as predicted.

January 25, 2011

True to our organizational vision, "A Georgia where people and the environment thrive," the Georgia Conservancy wants to see as much dedication to making the project work *after* construction as has been devoted to studying its justification.

In addition to detailing the flaws in the proposed mitigation plan and adaptive management plan, these comments will discuss crucial elements to an effective adaptive management plan.

Ultimately, our support or opposition to the SHEP will rest upon whether the project's mitigation and adaptive management measures create a reliable post-construction process that ensures both the deepening and the mitigation perform as promised, now and in the future.

Flawed Mitigation

The Georgia Conservancy believes the SHEP mitigation plan is unacceptably flawed in three fundamental respects. First, in too many critical areas the plan fails to achieve "like-for-like" remediation, meaning the proposed mitigation measure does not address the impact. For example, to offset loss of striped bass and shortnosed sturgeon habitat, the SHEP proposes a fish ladder around New Savannah Bluff Lock & Dam (to help sturgeon regain access to supposedly favored spawning grounds), and a striped bass stocking program. Neither remedy serves to ameliorate the SHEP's actual impact to habitat.

The hope seems to be that the benefit from mitigation may outweigh the harm from the project impact; however, hope is not a sufficient strategy in the case of the endangered shortnosed sturgeon, and a challenged striped bass fishery.

Similarly, the Corps proposes to offset the predicted loss of critical tidal freshwater wetlands with wetlands of different functions and values, depending largely upon what is for sale at a given point in the SHEP process. Especially in the case of tidal freshwater wetlands loss, acquiring dissimilar wetlands types as mitigation (even those within the designated Savannah National Wildlife Refuge Acquisition Area) is the biological equivalent of replacing oases with desert. True acre-for-acre wetland mitigation may require a longer term commitment to land acquisition; however, "doing the best we could at the time" is plainly inadequate.

Second, what happens if key mitigation elements, such as the oxygenation system, do not work as expected? What if shortnosed sturgeon don't use the fish ladder? Both represent groundbreaking applications even as valid questions have been raised about the likelihood of success. It does not take a pessimist to ask about contingencies—and there appear to be none for either of these elements.

Third, any change to the SHEP mitigation plan will need to be approved by at least four federal natural resource agencies (the Corps, U.S. Environmental Protection Agency (EPA), USF&WS, and the National Oceanographic and Atmospheric Administration (NOAA)). Not only are we concerned that this shared oversight will bog down, but also we think state and local resource agencies need to be integral partners. For mitigation, a time-sensitive, enumerated consultative process is vital; for adaptive management, it is essential.

Mitigation & Adaptive Management

There is an important distinction between a realistic adaptive management proposal and a comprehensive mitigation plan. To be sure, the more complicated a mitigation plan, the more critical the need for adaptive management due to the greater potential points for deviation. But support for adaptive management does not relieve the requirement to incorporate realistic, effective remedial actions. Simply put, adaptive management should not be the catch-all remedy that legitimizes incorporating dubious mitigation elements.

Inadequate SHEP Adaptive Management

The SHEP Adaptive Management (AM) proposal is inadequate in several fundamental respects. First, the proposed five-year monitoring period is an arbitrary deadline, reflecting neither the timeframe for biological processes nor the permanent alteration to the estuary posed by the SHEP and its mitigation measures. Moreover, a central purpose of AM is to watch for, and react to, unintended or secondary impacts. Especially as the Corps proposes an even more highly-engineered system for the Savannah estuary, it needs to create a system that perpetually monitors project impacts.

Second, adaptive management needs to be funded during the construction phase, not relegated to a wish-list congressional earmark request, as at present. At one point in the project development, AM was slated to be funded at 10 percent of project construction cost; now, it appears to be only 10 percent of mitigation costs. Such drastic changes in (theoretical) funding levels do not inspire confidence in the Corps commitment to AM.

Third, as part of the SHEP AM, the Corps should fund a long-term land acquisition effort that would replace – acre-for-acre – any tidal freshwater wetlands lost to the deepening as suitable property becomes available in the future.

Fourth, the Corps needs to demonstrate its dedication to the SHEP project by differentiating AM from the rest of Corps water resources project management structure. The Corps already studies, designs and builds projects. In the case of the Savannah deepening, the Corps would also be responsible for post-construction monitoring and deciding whether any corrective action is warranted.

This is simply too much power to give any single agency. The Corps actions in the SHEP directly affect two states, at least four federal agencies and various local governments, all of which should be genuine partners. Specifically, the Corps should create a "Savannah Harbor Resources Adaptive Management Council" to oversee the AM program. Under the circumstances, we think the USF&WS ought to chair this new Council.

Over the course of the SHEP process, various evaluative criteria, tools and approaches have changed. These include programmatic changes such as incorporating independent technical review. It is the Georgia Conservancy's hope that the current lack of Corps Headquarter guidance on AM will allow the Savannah District to incorporate these principles into its AM proposal. We would welcome the opportunity to work with the Corps on such a ground-breaking AM program.

Extended Comments

As the State of South Carolina has told the Corps, completing a review of the body of work that comprises the SHEP proposal is nearly impossible in 45-60 days. Certainly, this task is even more daunting to a conservation organization than a state natural resource agency. All the more so in the case of organizations with freedom of information requests that could not be filled by the January 25, 2011 public comment deadline.

It is our understanding that the Corps may allow comments to be submitted beyond the deadline. We not only encourage this course, but we also urge the Corps to publicly announce their intentions as soon as possible.

Thank you for your attention to these comments.

Sincerely,

Geene Howard

Pierre Howard President

The Georgia Conservancy

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770-JK-15-EC01

Comment: These comments are directed to the recommended SHEP navigation project depth of 47 feet, MLW. The Georgia Conservancy is aware that the Georgia Department of Transportation and their partner, the Georgia Ports Authority, have indicated their Locally Preferred Plan (LPP) is 48 feet MLW; however, there has been no indication by the U.S. Army Corps of Engineers (the Corps) as to how, whether or when the LPP might be accepted.

Response: In light of subsequent discussions with the non-Federal sponsor, the Corps decided not to identify the LPP as the Selected Plan.

770-JK-15-EV01

Comment: Savannah District Commander Hall's predecessor, Colonel Edward Kertis used to say, "All models are wrong; some models are useful." With this in mind, these comments will not address many of the technical analyses and modeling except to note that --however advanced-- it is only realistic to expect that neither the environmental impacts nor the mitigation measures will perform as predicted. Savannah District Commander Hall's predecessor, Colonel Edward Kertis used to say, "All models are wrong; some models are useful." With this in mind, these comments will not address many of the technical analyses and modeling except to note that --however advanced-- it is only realistic to expect that neither the environmental impacts nor the mitigation measures will perform as predicted.

Response: Much effort was spent developing hydrodynamic and water quality models that could reliably replicate existing conditions. Being able to use such models reduces the uncertainty surrounding predictions of how the system would behave if physical modifications, such as deepening or closing a channel were implemented. Without such tools, decision-makers would be forced to rely entirely on professional judgment. In brief, the model developer (Tetra Tech) had an uncertainty analysis performed by a separate independent modeler to assess the models' performance. The Corps conducted an independent technical review of the models to determine if they were adequate. The Corps also obtained concurrence from the natural resource agencies that these models were acceptable to evaluate environmental impacts from this project. An interagency team oversaw development of the hydrodynamic and water quality models intended to be used on this project. Those independent reviews and agency concurrences reduce the risk that the models were inappropriate and/or inaccurate.

The reliability of the hydrodynamic and water quality models is also dependent on how well they are applied. The Corps used Interagency Coordination Teams to define how the models should be used to predict physical changes from changes proposed in the harbor. The use of experts from several organizations reduced the risk of error from the limited perspective of just one or a few individuals. The Interagency Coordination Teams recommended that the models be applied over a range of conditions. Using the aforementioned approach reduced the risk of evaluating impacts based on just one set of conditions that may not be a good representation of conditions which are encountered in the future.

In addition, the project includes an extensive Monitoring and Adaptive Management Plan (Appendix D) to evaluate the performance of the project and implement adaptive management measures should the monitoring indicate that impacts exceed what was predicted.

Page 2

770-JK-15-EV02

Comment: The Georgia Conservancy believes the SHEP mitigation plan is unacceptably flawed in three fundamental respects. First, in too many critical areas the plan fails to achieve "like-for-like" remediation, meaning the proposed mitigation measure does not address the impact. For example, to offset loss of striped bass and shortnosed sturgeon habitat, the SHEP proposes a fish ladder around New Savannah Bluff Lock & Dam (to help sturgeon regain access to supposedly favored spawning grounds), and a striped bass stocking program. Neither remedy serves to ameliorate the SHEP's actual impact to habitat.

Response: The District agrees that in-kind or "like-for-like" mitigation should be and was the goal of its mitigation efforts. However, despite years of deliberation [DEIS-Section 5.03.2], the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures [structural/nonstructural] within the estuary that would adequately restore Shortnose sturgeon winter habitat or Striped bass spawning and larval habitat that would be lost to the SHEP's construction/operation. As a result, the Team agreed [2007] that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing 20 additional miles of upstream spawning/foraging habitat. Similarly, the Team agreed that paying the State of Georgia to stock fingerling Striped bass would be suitable compensation for impacts to spawning and larval habitats.

770-JK-15-EV03

Comment: Similarly, the Corps proposes to offset the predicted loss of critical tidal freshwater wetlands with wetlands of different functions and values, depending largely upon what is for sale at a given point in the SHEP process. Especially in the case of tidal freshwater wetlands loss, acquiring dissimilar wetlands types as mitigation (even those within the designated Savannah National Wildlife Refuge Acquisition Area) is the biological equivalent of replacing oases with desert. True acre-for-acre wetland mitigation may require a longer term commitment to land acquisition; however, "doing the best we could at the time" is plainly inadequate.

Response: The conversion of 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47 feet. It is important to reiterate that the ecological values of the impacted freshwater wetlands would not be completely lost. Instead, those acres would convert to brackish marsh. The District's calculation of the freshwater wetlands with the potential for conversion to brackish marsh is based on a shift in 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater and brackish marsh. However, data reported in the literature for Savannah Harbor suggest that a shift in vegetation [from freshwater marsh to brackish marsh] in this estuary does not occur until salinity concentrations approach 2.5 ppt [Latham et al., 1994]. Even at oligohaline marsh sites [average salinity concentration of 2.1 ppt]], a discriminate function [DF] analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same

oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification [Latham et al., 1994].

The District's salinity value that denotes a defined shift from freshwater to brackish marsh [i.e., 0.5 ppt] is approximately five times lower than traditional observations of 100% vegetative shifts *in situ* within the Lower Savannah Watershed [Latham et al., 1994] and other coastal marsh systems in the southeastern United States [NOAA, 2010]. Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, will likely continue to occur in areas predicted to experience salinity concentrations in the range of 0 - <2.5 ppt. Those areas that do transition to more brackish characteristics would still continue to provide the traditional ecological functions associated with all emergent wetland systems. Thus, the preservation of 2,245 acres [consisting of bottomland hardwoods and upland buffer] is more than sufficient to offset the conversion in freshwater wetland vegetation that may occur. Using the higher salinity value observed in the Savannah basin for conversion to brackish marsh [2.5 ppt], less conversion would be expected, resulting in a mitigation-to-impacts ratio of roughly 8:1. Using the DF analysis reported by Latham et al [1994] which aligned 37% of freshwater species with oligohaline sites, the 223 acres of freshwater to brackish marsh conversion is reduced further such that the mitigation-to-impacts ratio is increased to 12:1.

A comparison of potential changes in elements of wetland function for both conversion scenarios is provided in Table 1.

Elements of	Freshwater to Brackish Marsh	Saltmarsh to Brackish Marsh
Wetland Function	(Approximately 223 acres)	(Approximately 740 acres)
Water Purification	Negligible	Negligible
Flood Protection	Negligible	Negligible
Shoreline Stabilization	Negligible	Negligible
Groundwater Recharge	Negligible	Negligible
Streamflow Maintenance	Negligible	Negligible
Retention of Particles	Negligible	Negligible
Surface Water Storage	Negligible	Negligible
Subsurface Storage	Negligible	Negligible
Nutrient Cycling	Negligible	Negligible
Values to Society	Negligible	Negligible
Fish and Wildlife Habitat	Minor	Negligible

Table 1. Changes in Wetland Function as a Result of Wetland Conversion

As illustrated above, the only indirect effect the 47-foot project would have on the function of these wetlands systems would be associated with fish and wildlife habitat values. All other elements of wetland function associated with predicted shifts in wetlands categorization would be negligible as a result of the anticipated increase in salinity. Previous studies have noted that areas of the Savannah Harbor identified as saltmarsh or brackish marsh often support similar fish and wildlife assemblages. Any anticipated conversion of saltmarsh to a brackish marsh system is expected to have a negligible impact on the overall wetland functioning from a long-term perspective. The District recognizes that a

comparison of fish and wildlife habitat between freshwater and brackish marsh systems yields fewer similarities, but this difference would still be quantitatively minor [and ecologically unimportant].

A Wetland Interagency Coordination Team (ICT) [technical expert representatives from USACE and federal/state natural resource agencies] was assembled to identify acceptable mitigation for SHEP. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The District then consulted with the Stakeholder Evaluation Group, including its Non-governmental Organizations (NGOs) members such as the Georgia Conservancy, to see if they could identify any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with the identification of preservation sites.

The proposed preservation lands consist of various community types, viz., bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are categorized as palustrine, forested, broad-leaved deciduous systems that are both temporarily and/or seasonally flooded. Preserving these areas would ensure this wildlife habitat is preserved in perpetuity. Moreover, the additional lands would buffer the Savannah National Wildlife Refuge from future threats of development. Hence, changes in land use would not occur immediately adjacent to existing areas of the Refuge that contain emergent wetlands. The acquisition/preservation of wetland and upland buffer would provide a functional replacement for the minor conversion of the only wetland function [fish and wildlife habitat] that would be expected when freshwater marsh is converted to a brackish counterpart. Based on these determinations, the District's functional assessment concluded that the noted preservation satisfies the intent of the no-net-loss of function criterion.

The Wetland Interagency Coordination Team assigned a hierarchical value to wetlands as follows: freshwater, brackish, and saltmarsh. The District used this general ranking throughout its wetland impact and mitigation evaluations. However, in response to US EPA's comments on the DEIS, the District developed a functional approach that details the anticipated direct and indirect wetland impacts to each of these categories resulting from SHEP. The District agrees that each wetland type is important to the Lower Savannah Watershed. The conclusion from our functional assessment confirms that a minor shift [freshwater to brackish marsh] in the percent composition of vegetation could impact fish and wildlife habitat [one of multiple facets of wetland function]. However, this change in fish and wildlife use should not be construed as constituting a loss in this wetland functional category. To verify that position, the magnitude of impact was considered when evaluating mitigation options to ensure compliance with the 2008 Mitigation Rule. Ultimately, the District concluded that preservation of 2,245 acres of bottomland hardwood wetlands and upland buffer around the SNWR would sufficiently compensate for the noted changes to fish and wildlife habitat - the single element of wetland function that would be affected as a result of the vegetation shift. USFWS and the Savannah National Wildlife Refuge (SNWR) have identified properties within the estuary with a high priority for acquisition because the Service believes they are ecologically valuable and provide positive contributions to the goals of the Refuge and enhance the area's fish and wildlife resources.

Through the functional assessment, the District determined that the mitigation for the freshwater wetland impacts satisfies the no-net-loss of function criterion. For additional information, please see Appendix C – Mitigation Planning, Section VII Consideration of 2008 Mitigation Rule.

770-JK-15-EV04, 770-JK-15-EV05

Comment: Second, what happens if key mitigation elements, such as the oxygenation system, do not work as expected? What if shortnosed sturgeon don't use the fish ladder? Both represent ground-breaking applications even as valid questions have been raised about the likelihood of success. It does not take a pessimist to ask about contingencies—and there appear to be none for either of these elements.

Response: The risks and uncertainties of the proposed dissolved oxygen system for Savannah Harbor are carefully examined in the Risk and Uncertainty Analysis. Specifically, a risk analysis of the water quality model was prepared to predict post-project dissolved oxygen levels. An oxygen demonstration trial verified the efficacy of the Speece Cones to add oxygen to the river and its distribution in the tidally-dominated river system. Extensive post-construction monitoring will allow the Corps and others to assess whether initial predictions regarding oxygen levels are correct. Given the depth of analysis of this matter, there is minimal risk to decision-making regarding the dissolved oxygen issue. Post-construction monitoring will allow similar determinations to be made about the success of Shortnose sturgeon passage around the New Savannah Bluff Lock and Dam. The adaptive management plan provides a means to make any required changes to the mitigation features, including the two identified in this comment. For the D.O. systems, this could range from increasing the amount of injected oxygen, modifying the oxygen injection equipment, or adding injection sites.

In the adaptive management plan (Appendix D), contingencies are discussed for the oxygenation and fish passage systems. For example, "The Corps would prepare a report describing the findings of the monitoring of fish passage at New Savannah Bluff Lock and Dam. That report would identify whether any modifications to the fish bypass structure are recommended for the mitigation feature to function as intended. ... Adjustments could be required to the entrance or exits of the structure to establish flow conditions that encourage fish passage."

770-JK-15-EV06

Comment: Third, any change to the SHEP mitigation plan will need to be approved by at least four federal natural resource agencies (the Corps, U.S. Environmental Protection Agency (EPA), USF&WS, and the National Oceanographic and Atmospheric Administration (NOAA)). Not only are we concerned that this shared oversight will bog down, but also we think state and local resource agencies need to be integral partners. For mitigation, a time-sensitive, enumerated consultative process is vital; for adaptive management, it is essential.

Response: The decision process in regards to the adaptive management plan is provided in Appendix D. State resource agency participation is an integral part of the Monitoring and the Adaptive Management Plans.

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770-JK-15-EV07

Comment: There is an important distinction between a realistic adaptive management proposal and a comprehensive mitigation plan. To be sure, the more complicated a mitigation plan, the more critical the need for adaptive management due to the greater potential points for deviation. But support for adaptive management does not relieve the requirement to incorporate realistic, effective remedial actions. Simply put, adaptive management should not be the catch-all remedy that legitimizes incorporating dubious mitigation elements.

Response: All aspects of the mitigation plan are designed and included to provide mitigation for expected project impacts. No feature was included unless a need for it exists and the design would meet the need. The effectiveness of the SHEP mitigation features (flow diversion, oxygen injection, etc.) was evaluated using the experience of technical experts from state/federal resource agencies along with the best models available.

770-JK-15-EV08

Comment: The SHEP Adaptive Management (AM) proposal is inadequate in several fundamental respects. First, the proposed five-year monitoring period is an arbitrary deadline, reflecting neither the timeframe for biological processes nor the permanent alteration to the estuary posed by the SHEP and its mitigation measures. Moreover, a central purpose of AM is to watch for, and react to, unintended or secondary impacts. Especially as the Corps proposes an even more highly-engineered system for the Savannah estuary, it needs to create a system that perpetually monitors project impacts.

Response: The FEIS describes post-construction monitoring over a 10-year period and focuses on critical natural resources. It was developed using the experience of technical experts from state/federal resource agencies, with input from the public. The water quality monitoring would produce sufficient data to define the impacts of SHEP on the environmental regime in Savannah Harbor and allow determinations of whether any additional adaptive management measures [flow diversion, oxygen injection, etc.] are required. The monitoring will includes updates to the hydrodynamic and water quality models to increase their accuracy. This would permit better assessments of project performance under the actual post-construction conditions.

The project also includes long-term monitoring, i.e., operation and maintenance of four continuous water monitors, annual bathymetric surveys in the areas of the flow diversion structures, and data collection from groundwater wells.

770-JK-15-EV09

Comment: Second, adaptive management needs to be funded during the construction phase, not relegated to a wish-list congressional earmark request, as at present. At one point in the project development, AM was slated to be funded at 10 percent of project construction cost; now, it appears to be only 10 percent of mitigation costs. Such drastic changes in (theoretical) funding levels do not inspire confidence in the Corps commitment to AM.

Response: The District intends to obtain adaptive management funds when dredging starts in the inner harbor so that they would be available, if needed, as the construction progresses. Additional adaptive management funds would be obtained each year the new work dredging occurs. The project cannot be considered complete and moved from the construction to the operation and maintenance phase until

the construction is complete and all mitigation measures are in place and operating properly. The Corps does not have any hard criteria (i.e. percentage of construction costs or mitigation costs) for determining sufficient adaptive management funding levels.

770-JK-15-EV10

Comment: Third, as part of the SHEP AM, the Corps should fund a long-term land acquisition effort that would replace – acre-for-acre – any tidal freshwater wetlands lost to the deepening as suitable property becomes available in the future.

Response: A Wetland Interagency Coordination Team (ICT) [technical expert representatives from USACE and federal/state natural resource agencies] was assembled to identify acceptable mitigation for SHEP. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The District then consulted with the Stakeholder Evaluation Group, including its non-governmental members (such as the Georgia Conservancy), to see if they could identify any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with the identification of preservation sites.

The proposed preservation lands consist of various community types, viz., bottomland hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are categorized as palustrine, forested, broad-leaved deciduous systems that are both temporarily and/or seasonally flooded. The sites contain some high ground so they are at risk of development. Preserving these areas would ensure this wildlife habitat is preserved in perpetuity. Moreover, the additional lands would buffer the Savannah National Wildlife Refuge from future threats of development. Hence, changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain emergent wetlands. The acquisition/preservation of wetland and upland buffer would provide a functional replacement for the conversion of the only wetland function [fish and wildlife habitat] that would be expected when freshwater marsh is converted to a brackish counterpart. Based on these determinations, the District's functional assessment concluded that the noted preservation satisfies the intent of the no-net-loss of function criterion.

The most appropriate and practicable means of mitigating the minor shift in vegetation that would occur is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. The USFWS and the Savannah National Wildlife Refuge (SNWR) identified properties within the estuary having a high priority for acquisition. The Service believes this acreage is ecologically valuable and would provide positive contributions to the goals of the Refuge via enhancement of the region's fish and wildlife resources (Please see Watershed Assessment and Functional Assessment provided in Appendix C-Mitigation Planning).

Adaptive management cost estimates [in the EIS] include funding of additional preservation lands, if determined to be necessary. Additional lands could be acquired and preserved as part of the adaptive management, if such actions are warranted.

770-JK-15-EV11

Comment: Fourth, the Corps needs to demonstrate its dedication to the SHEP project by differentiating AM from the rest of Corps water resources project management structure. The Corps already studies, designs and builds projects. In the case of the Savannah deepening, the Corps would also be responsible for post-construction monitoring and deciding whether any corrective action is warranted.

Response: The Monitoring and Adaptive Management Plan (Appendix D) is an important part of the Savannah Harbor deepening project. The District is on record as being fully committed to its implementation [notwithstanding cost or difficulty]. Importantly, modifications would not be implemented without coordination/concurrence of the federal cooperating agencies. However, the District does not have the procedural option to differentiate adaptive management from the rest of the Corps' water resources management structure. If project modifications become necessary, but are larger in scope and/or require greater funding than specified in EIS-Appendix D, the District would submit the appropriate documents to its Headquarters for approval. If additional Federal funding is required, Congressional action would be needed to obtain the money. The Record of Decision (ROD) for the project will constitute a binding legal commitment for implementation of the Adaptive Management Plan. See also other responses to comments on this issue.

The District would not be the only entity involved reviewing the monitoring data and making decisions regarding implementing adaptive management measures. State/federal resource agency agencies would also be involved in the post-construction monitoring, data review, and in the decision-making process. [see the Monitoring Plan and Adaptive Management Plan for details]

770-JK-15-EV12

Comment: This is simply too much power to give any single agency. The Corps actions in the SHEP directly affect two states, at least four federal agencies and various local governments, all of which should be genuine partners. Specifically, the Corps should create a "Savannah Harbor Resources Adaptive Management Council" to oversee the AM program. Under the circumstances, we think the USF&WS ought to chair this new Council.

Response: Appendix D describes the decision-making process relative to adaptive management measures. As described in the DEIS and the FEIS, the Cooperating Agencies and the state natural resource agencies are part of the decision-making process. However, since the Corps of Engineers would be responsible to Congress, the public, and the State of Georgia (as the cost-sharing non-Federal sponsor) for SHEP's implementation/completion, it cannot delegate the responsibility for the decision-making to another entity.

770-JK-15-EV13

Comment: Over the course of the SHEP process, various evaluative criteria, tools and approaches have changed. These include programmatic changes such as incorporating independent technical review. It is the Georgia Conservancy's hope that the current lack of Corps Headquarter guidance on AM will allow the Savannah District to incorporate these principles into its AM proposal. We would welcome the opportunity to work with the Corps on such a ground-breaking AM program.

Response: The Adaptive Management Plan was developed in coordination with the Cooperating Agencies and the state natural resource agencies, and it provides for their full participation throughout the process [including technical review of data].

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770-JK-15-EV14

Comment: It is our understanding that the Corps may allow comments to be submitted beyond the deadline. We not only encourage this course, but we also urge the Corps to publicly announce their intentions as soon as possible.

Response: While the official public comment period closed on January 25, 2011, the District accepted comments that were received after that date until the final reports were being drafted.

Georgia Chapter Sierra Club

January 25, 2011

Colonel Jeffrey Hall, District Commander

U. S. Army Engineer District, Savannah, GA

Please consider these comments and concerns on natural resource issues contained in the November, 2010, Draft Environmental Impact Statement and General Reevaluation and Review on the Savannah Harbor Expansion Project as you develop the Final document, and any supplemental materials you might publish subsequent to the draft documents.

Sincerely,

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Comments on Environmental Fluid Dynamics Code (EFDC) and Water Quality Analysis Simulation Program (WASP)

In order to understand our position and concerns about the hydrodynamic and water quality modeling, a reference to the past is required.

In a May 18, 2004, Information Paper from CESAS-PD-E, the U.S. Environmental Protection Agency {EPA}, U.S. Fish and Wildlife Service {USFWS}, National Marine Fisheries Service {NMFS}), Georgia Department of Natural Resources Environmental Protection Division (GADNR-EPD), South Carolina Department of Health and Environmental Control (SCDHEC), and City of Savannah, Georgia, expressed technical concerns about the ability of the hydrodynamic models (based on the Boundary Fitted Hydrodynamic code – BFHYDRO) developed by Applied Technology & Management (ATM) to be sufficiently defensible and accurate to be used to identify potential impacts from proposed harbor deepening alternatives.

The ATM BFHYDRO model was already underway when the Stakeholders Evaluation Group (SEG) started meeting in January, 1999. Four and one half years of effort, including data collection, many meetings of agency personnel and contractors, reports, correspondence, and analyses had occurred before the BFHYDRO model was rejected. Data collection was done during historically lowflow periods (summers of 1997-1999) and there were concerns about difficulties with the vertical mixing scheme. While the BFHYDRO rejection decision is history to the current SHEP DEIS and GRR, we think it is relevant since many objections to the model's development had been expressed during the 4 ½ years, yet its development continued with pressure to stay on schedule and make the BFHYDRO work. The effort clearly shows that time-spent and even good intentions do not yield a defensible work product.

The decision was then made to perform the hydrodynamic simulations using an enhanced Environmental Fluid Dynamics Code (EFDC) model from EPA's TMDL (Total Maximum Daily Load) Toolbox. It is hard to overestimate the importance of the enhanced EFDC model to SHEP since other project models and predictions are based on it, including the very important Water Quality Analysis Simulation Program (WASP), also from the EPA TMDL Toolbox.

Seven years of USGS long-term data, from January 1, 1997 through December 31, 2003, were available to the EFDC modeling effort. Also available were data collected by ATM from the summer months of 1997-1999.

The EFDC and WASP together were used to evaluate the impacts to SHEP's primary environmental and infrastructure components, including fishery habitat, water quality and dissolved oxygen, wetlands and chlorides. So, the importance of having a defensible model proven to be capable to the tasks required of it cannot be overstated. Misjudgments in the development of the highly complex mathematical models are not merely academic arguments, if misjudgments exist and are allowed to stand as SHEP moves forward, they will become magnified linchpins in gross environmental damage and the misuse and/or loss of hundreds of millions of tax dollars in potentially misguided mitigation attempts.

On a macro-level, because of the timing of the decisions to use the enhanced EFDC, there is reason to believe that political considerations could have been playing greater roles in decisions about modeling choices than they should have. At the time, EPA was facing a courtordered deadline to set TMDLs in the Savannah River Harbor and they needed a predictive tool. Time was important to EPA and the agencies which had concurrence responsibilities on TMDLs. Also, participation in SEG and SEG-related meetings leads us to believe that USACOE leadership during the time of the models' development might have been more focused on complying with scheduling than scientific accuracy. While it is fiscally responsible to use similar tools for somewhat similar uses when they have been adequately evaluated for all tasks, it can be disastrous when time and politics become greater drivers than science and appropriately applied accurate observation.

On a micro-level, we don't have use of all the knowledge we'd like to have to assess the models. The model calibration report prepared by Tetra Tech, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project." is included in the GRR's Engineering Investigations Supplemental Materials via an enclosed CD. The Engineering Investigations Section of the GRR lists four pages of document titles contained within the Supplement, many of which seem much more suited for Ph.D.s in mathematics and physics, and well beyond the general public's ability to discern with only the 60 days allotted to them to comment on the entire and extremely lengthy DEIS and GRR.

However, some presentations were made by the Corps and contractors to the SEG during 2005 and some digestible material is included in Section 7 of the Engineering Investigations.

A primary concern is whether or not the models are able to deal with the twice daily tidal cycles in our valuable wetlands and whether or not the model was ever adequately evaluated to be predictive. An error in either or both could render the work in the SHEP DEIS and GRR virtually worthless. There is expert opinion from hired consultants that gives us concern and we'll try and lay that out for you here. We have made every effort to quote from the actual transcripts and not take comments out of context. We do apologize for the lengthy nature of the quotations, but it has been our experience that scientists can have genuine disagreements, and that they are best represented by their own words.

At the July 12, 2005, SEG meeting Mr. Steve Davie of Tetra Tech gave some explanations that address the issues of tidal cycles, spatial differences and risk analysis. His remarks also introduce for further discussion, Mr. Chuck Watson of Kinetic Analysis Corp, who subcontracted to do the Risk Analysis.

From transcript of SEG meeting on July 12, 2005:

Steve Davie: **QUOTE** "Most estuaries are real wide and flat. If you look at Charleston and some of the other ports on the eastern coast, they're usually a wider system with a navigation channel that cuts through it. Savannah is the navigation system. It's very narrow and very long, and the tides complicate it even more. Our spring tides are 10 to 12 feet in range which is pretty significant."

"Pretty straightforward, EPA took the lead on the TMDL. The Corps has taken the lead on the harbor expansion, but with the Corps also the Port Authority through their funding. And the ultimate goal for both of these, the TMDL and the harbor expansion is to have one model used for the harbor. This kind of gives you an idea that there are multiple efforts going on in the harbor, as you know.

There's, of course, all kinds of other studies outside of this, but with regard to water quality, and specifically dissolved oxygen, all of these efforts are going to impact each other.

We don't know what those impacts are yet. That's the purpose of having the models.

We hired, as a subcontractor to us, we hired Chuck Watson, who I think comes to the SEG meetings. Chuck did the uncertainty analysis of the model. We learned a lot with Chuck, a lot of back and forth a lot of emails, a lot of phone calls, and Chuck did great work in improving the model in the enhanced grid. I'll give you a summary of what Chuck told us and the recommendations he gave us.

One of Chuck Watson's recommendations to us, in the uncertain analysis, is don't over-calibrate your model. Don't over-calibrate to this period of low flow critical conditions. You do really well in that period, but you don't do well overall.

Chuck Watson did the uncertainty analysis. He did the uncertainty analysis with the TMDL grid, which was a coarser grid used last year. He did it with this new enhanced grid. He made several recommendations to us. Don't over calibrate for the summer. Do not smooth for the bathymetry. Us modellers like to make things smooth so they're stable. We went back and just used the actual numbers and other things here. Chuck had a lot of comments. And I think we addressed all of Chuck's comments. Chuck basically said, in the end, that the enhanced grid was a significant improvement. That's what we were looking for. We were wanting that uncertainty, in the model, to decrease. That was a very positive note from Chuck's work. Chuck also wanted to do a lot of other things. He wanted to run the model for multiple periods. He didn't have time to do it, and it wasn't part of his scope. And so Chuck has a full report that's included in our report that you guys are welcome to read." UNQUOTE

After the July, 2005, SEG meeting, questions arose about Tetra Tech's handling of a data-set related event in December, 2000, that caused the EFDC model run to crash. The SEG members were concerned about statements the model could not correctly handle the dry cycles in the wetlands. SEG members had also asked to hear directly from Mr. Watson about his concerns of instability in the EFDC model and that it could not run the entire 7-year period of data without artificial manipulation of the data. Mr. Joe Hoke, USACOE; Mr. Steve Davie, Tetra Tech; and Mr. Chuck Watson, Kinetic Analysis Corporation (KAC), are quoted below.

From transcript of SEG meeting on October 4, 2005:

Joe Hoke: QUOTE "So I'm back now to present what's been going on in the last month. So just to review the basic problem, this is from the Kinetic Analysis Corporation, which is Chuck Watson, the executive summary from his report that's in the -- it's the appendix for the May 2005 Tetra Tech modeling report. It says, even with stability problems, the enhanced grid model appears to present a significant improvement over the TMDL model, has the potential to become an extremely useful tool in studying the Lower Savannah River. However, the inability to conduct seven year test runs is a source of serious concern, with respect to the suitability of the models for predictive purposes. Therefore, Kinetic Analysis Corporation does not recommend the operational use of the enhanced grid model for predictive modeling of bathymetric changes, means deepening, until the stability issues can be resolved." UNQUOTE

Steve Davie: **QUOTE** "It appears to not to be a stability issue with the model. It's actual reality. There are, somewhere in the back or little

back river, one of the cells in the model goes dry during the run. The model is not designed to run without the water everywhere, so it does what you then expect it to, it ceases to run at that point. That's what occurred in December of 2000. There are some models that do wetting and drying, where they would actually let the cells go dry, and EFDC has the ability to do it, but we don't have it configured. It takes a -- it would be an exponential amount of time to run that. It takes the model a lot longer to run that, the calculations through it, so we've elected not to do that." **UNQUOTE**

Joe Hoke: **QUOTE** "One of the other things is because it's paired with the WASP model, the WASP is not able to dry either, so that is over the riding. So to come back through the EFDC model here, the model failed to run through the full seven years because there's not enough water in the little back river." **UNQUOTE**

Steve Davie: **QUOTE** "If there's no water there, we don't have salinity and we don't have DO. So we're not modeling dry marsh. We're not modeling dry riverbeds. We're modeling water."

UNQUOTE

The fact that they were modeling water is apparent in the GRR's Engineering Investigations Section 7. Figure 7.1-1 shows the 1997-1999 data collection station locations. The stations are all along the Savannah River's water channels. Also instructive is Figure 7.3-1 showing the enhanced model grip with 931 cells that extend upstream to Clyo, Georgia, (~61 miles from Fort Pulaski) and downstream to the Atlantic Ocean (~17 miles offshore from Fort Pulaski). Including the marsh cells adjacent to the Savannah River system, there are 947 total cells. Simple arithmetic shows how overwhelmingly the model grid cells were concentrated in the river.

Chuck Watson: **QUOTE** "The problem was when we tried some of the other runs, one of the things we do is called a perturbation analysis, where we take the grid and randomly make very small changes to the bathymetry to see how that changes the model. We were unable to successfully complete a lot of those runs. Those crashed or aborted at times other than December 2000." **UNQUOTE**

As the October 4, 2005, SEG meeting continued, the dialog among the scientists become more and more complex as to specific instances and even computer languages. So, citing quotes would be cumbersome. However, we are confident that it is fair to say that, while Mr. Watson maintained that the enhanced EFDC model was an improvement over the BFHYDRO, that the SHEP EFDC still needed more data, and that there were serious unresolved issues as to its stability and ability to be predictive of changes in a dynamic tidal system. We emphasize that Mr. Watson was not a regular SEG attendee, but a subcontractor to evaluate a product for use by the USACOE.

We realize that the modeling work is, in a sense, old news. But that is one of the reasons we single this out for particular concern. Its completion was necessary for other aspects of SHEP to begin and proceed and, as we've previously mentioned, any wrong judgments are amplified in subsequent work and decision making.

Appendix Q of the DEIS, "Risk and Uncertainty Analysis in Environmental Evaluation Approach," informs that, "All the agencies agree that these models are more accurate when used to identify the differences between two scenarios than when used to identify values at a given location at a point in time in a given scenario." Doesn't that defy the objective of the models? The environment is not a laboratory in which two scenarios are compared. It is a natural world, in which a measurement is distinct and precise.

In several Sections, it is noted that, "the hydrodynamic model has roughly 80 percent chance of over-predicting salinity levels at low salinity levels, thus leading to an over-prediction of salinity induced impacts to wetlands."

Simplify that sentence, and it says the model has an 80% chance of error. That is huge. No one would accept that. It is also very risky to assume that the impacts of the error can be explained by the most obvious conclusion. A case in point exists in the previous harbor deepening, when assumptions about salinity were made using apparently sound and consensus-oriented logic. But, when subsequent experiences with spring and neap tides and the concurrent mixing were evaluated, the exact opposite of the "obvious" proved to be fact.

Section Q contains quotes from agencies that reiterate concerns about uncertainty.

Mr. Watson of KAC discussed model errors at four locations. We believe the Corps' conclusions about the errors were capricious, bowing to a schedule-driven impetus to implement the model at any cost.

Questions:

Is the data collection adequate?

If not, what other data would help make the models more predictive?

Was the December 2000 data-set event and the model's reaction to it an anomaly, or was it indicative of more pervasive concerns of the model's development?

Was the model calibrated using the most scientifically defensible data sets?

Is there instability in the model?

Why do the model runs crash during perturbation analysis?

Are the models defensibly able to predict water flows and dissolved oxygen contents in all the marsh areas of concern to SHEP?

Conclusions:

So, before the project moves any further, we ask that the EFDC and WASP models be revisited, divested of political and timing considerations.

Most importantly, we need to be sure the predictive ability of the model has been adequately evaluated. This cannot be over-

emphasized since almost every other decision in the DEIS and GRR flows from it.

Judy Jennings, Savannah Harbor Issue Leader, January 25, 2011

Comments on Impacts to Tidal Freshwater Wetlands at the Savannah National Wildlife Refuge (SNWR)

Modeling Concerns:

DEIS Section 5.1.2 addresses indirect impacts to wetlands which includes impacts to tidal freshwater wetlands, considered by USFWS to be the most critical natural resource in the harbor. These tidal freshwater wetlands were the original impetus for this organization's interest in harbor deepening. They are more ecologically diverse than saltwater wetlands and their acreage along the east coast and SNWR in particular has been in steady decline over recent decades. It is imperative that we preserve what we have and take measures to restore what has been lost in the SNWR.

The enhanced EFCD and WASP models, addressed in Section 1 of these comments, were used to evaluate the impacts to wetlands from proposed depths of harbor deepening. A reference back to our Section 1 indicates our grave concerns about the lack of adequate evaluation of the models for predictive purposes in the tidal wetlands. Even though the Corps had an Independent Technical Review (ITR) performed of the model by ERDC, the ITR did not include analysis of the model programming.

Our concerns about the EFCD model are heightened by results from the attempts to develop and use Marsh Succession Models (MSM) which were intended to use salinity information from the EFDC to predict wetland species at a given location. ATM and the USGA Fish and Wildlife Cooperative Research Unit in Gainesville, Florida (USGS Coop Unit) attempted to develop MSMs. External Peer Reviewers generally found both models to be acceptable. However, problems appeared when the Corps applied the MSMs to some of the mitigation plans. From DEIS 5.1.2.2 states, "The models produced unreliable results when they were used to evaluate mitigation plans that substantially altered flows in the tidal creeks." And further, "Salinity changes predicted to occur in the river produced no corresponding changes in salinity levels in adjacent marshes." Ultimately, "the Federal Cooperating Agencies decided to abandon the planned use of the Marsh Succession Models to evaluate the mitigation proposals." Yet, the Agencies decided "MSMs could still be used to check the prediction of wetland vegetation distribution resulting from the use of the hydrodynamic model."

We fail to follow the logic of the last conclusion since previous reviewers had been wrong about approving applications stemming from the use of the EFDC.

Implication of Sea Level Rise:

We also object to the conclusion of a sensitivity analysis that that indicated sea level rise would help ameliorate the impacts to tidal freshwater marshes from a harbor deepening project. While we fully agree that sea level rise is a real phenomenon that is currently producing environmental impacts and will produce significant environmental impacts within the 50-year planning range of the project, we reject the claim that it should be a significant factor in very near-term harbor deepening decisions. 50years has consistently been proven to be a woefully unrealistic planning period for harbor deepening planning. Impacts to the tidal freshwater system from harbor deepening must be attributed to
deepening. Indeed, the Economics Analysis of the GRR supports this conclusion with contentions that changes within the shipping industry are moving so fast that the Tier I EIS was obsolete within only a few years of its publication.

In addition to these complications, predictions of changes to tidal freshwater wetlands are compounded by the use of marsh salinity contour lines extrapolated from river data from the EFDC; effects of prolonged drought, and increased surface water withdrawals as a result of growing populations and caps on withdrawals from the Floridan Aquifer.

Mitigation:

Regardless of these concerns, we will proceed with comments about the proposed mitigation for the loss of tidal freshwater wetlands since, regardless of the inadequacy of predictive tools, it is intellectually and intuitively obvious that harbor deepening will result in the loss of tidal freshwater wetlands.

We will defer comments on flow rerouting plans suggested for altering adverse impacts to the wetlands until USFWS has made official comments on such.

As for compensatory mitigation, Section 5.1.2.5 informs that the Corps can use the Standard Operating Procedures (SOP) which has been adopted by the natural resource agencies in Georgia to evaluate impacts and calculate compensatory mitigation on projects requiring Section 404 permits. The Corps used impact data from the EFDC as the starting point for SOP, and then calculated the minimum number of acres that need to be acquired and preserved to acceptably mitigate for wetland impacts.

In identifying lands that need to be acquired, the Corps has turned to the USFWS's July, 2007, "Final Environmental Assessment Plan: Proposed Expansion of the Savannah National Wildlife Refuge."

Questions:

Are any of the properties tidal freshwater wetlands?

If so, are there enough of such wetlands to be sufficient to meet mitigation needs?

Are the properties only available from a willing seller? Is condemnation an option?

Since authorization for SHEP requires that mitigation occur before or concurrent with the project construction, what will happen if sufficient properties cannot be acquired during such time?

If properties acquired are not contiguous with the current SNWR boundaries, what funding mechanisms are available if their management is disproportion in the Department of Interior's normal budgeting process?

Is there any commitment to replace "like" with "like"?

Conclusions:

We strongly believe that impacts to the SNWR should be avoided or mitigated with like-to-like and that restoration of tidal freshwater wetlands lost from previous deepening activities are a responsibility of moving forward with SHEP. Until this happens, SHEP in any form should not move forward. We recognize that there are ways to quantitatively evaluate impacts to natural resources from infrastructure projects and include them in the costs of the project. We do not believe that these quantitative techniques could adequately evaluate the environmental and economic losses that are predicted to the SNWR. If the SNWR cannot be protected and previously lost wetlands restored, then SHEP should be held without funding until such measures for the SNRW are identified and funding to implement are secured.

Judy Jennings, Georgia Chapter Sierra Club, Savannah River Harbor Issue Leader, January 25, 2011

Comments on Endangered Species Shortnose sturgeon:

Appendix B, "Biological Assessment of Threatened and Endangered Species for the Proposed Savannah Harbor Expansion Project: Under the Endangered Species Act of 1973, As Amended," does a good job of reviewing species listed in Jasper County, SC; Chatham County, GA; and Federally Listed Threatened and Endangered Species. While we value all of these diverse species, time limits our comments now to the federally endangered Shortnose sturgeon.

Dangers to the Shortnose sturgeon:

There is good scientific consensus that the construction of dams throughout the Shortnose stugeon's range probably reduces their reproductive success by reducing the volume of suitable spawning habitat. Dredging activities have been been known to take individual sturgeon and can reduce the quality of their feeding, rearing, and wintering habitat. Juveniles and larvae are vulnerable to intake structures.

The summary of hydrodynamic-related impacts to the Shortnose sturgeon habitat are enumerated in DEIS Appendix B, Table 8-12 (without mitigation) and Table 8-13 (depth alternatives with mitigation). These numbers are based on outputs from the EFDC model, and we continue to express our lack of confidence in its predictive ability.

Page 179 of Appendix B states, "Since no means of increasing the volume of acceptable habitat within the estuary could be identified," the Corps suggested a fishway that would allow shortnose sturgeon to move by the lowest dam on the river, the New Savannah Bluff Lock and Dam (NSBL&D) at Augusta. Such a structure is speculated to also benefit other anadromous fish species.

Appendix C, Mitigation Planning, reads that after addressing dissolved oxygen mitigation measures based on data from the EFDC, "Neither the Corps nor the agencies could identify any measure that could be implemented in the estuary that would restore sturgeon habitat or enhance existing habitats." Again, the Corps identifies a fishway by the NSBL&D.

Additionally, the Corps proposes to construct a sill in the Middle River to protect nursery habitat for the juvenile Shortnose sturgeon. The sill would require construction, maintenance, monitoring, and possible occasional reconstruction.

Questions:

We understand that several years of telemetry day gathered by the South Carolina and Georgia Departments of Natural Resources, NOAA, and The Nature Conservancy does not match modeled existing habitat for the Shortnose sturgeon. Is any effort being made to reconcile this newly acquired real data with modeled data?

Does newly collected data suggest that modeled data for Shortnose sturgeon habitat is underestimated?

What science is being used to indicate that Shortnose sturgeon would successfully relocate among available habitats?

Is the fishway a proven method for sturgeon passage?

Is the temperature of water from the Strom Thurmond Dam appropriate for attracting Shortnose sturgeon?

Has the land or rights to the land to build the fishway been acquired?

What is the mechanism for ensuring that proper water flow is available for the fishway?

Is the proposed sill a proven mitigation technology?

How will maintenance of the sill be funded?

Conclusions:

Examples of proven success should be a requirement in the EIS for the fishway ladder and sill to be considered viable mitigation options. All of the above questions should have demonstrated answers with available funding before they are considered mitigation for SHEP.

Additionally, we request that the Atlantic sturgeon, currently being recommended for listing as endangered species, be considered when assessing environmental impacts from SHEP.

Judy Jennings, Georgia Chapter Sierra Club, Savannah River Harbor Issue Leader, January 25, 2011

Comments on Striped Bass

Striped bass fishing in the Savannah River is a popular recreational sport, but the Striped bass has a checkered past with Port and Corps activities. It is possible that a viable population no longer exists in the lower Savannah River. However, the hydrodynamic and salinity models we repeatedly question still predict adverse impacts to spawning, eggs, and larvae.

Appendix C, Mitigation Planning, page 102, states, "The natural resource agencies could not identify any physical measures that could be implemented in the estuary to restore or enhance Striped bass habitat." Agencies concluded that a stocking program would be the only means to provide additional fish to the population to compensate for reduced spawning and early development habitats. It was considered that stocking young-of-the-year fish would be sufficient to get the population past the higher salinity caused by harbor deepening.

The Corps considers that deepening would not impact 100% of the existing spawning or early life stage habitat in the estuary. It uses percentage estimates from habitat loss and calculates annual program funding for stocking.

Conclusions:

We don't see any end to this artificial life support system. It seems more appropriate to study changes to river flow conditions that would positively impact habitat for spawning, eggs, and larvae. Stocking could be used until such time changes in river flows allowed for healthy spawning that produced healthy adult Striped bass. A study of river flow changes for the benefit of the Striped bass should be part of the mitigation, along with a funding mechanism to restore the fishery.

Judy Jennings, Georgia Chapter Sierra Club, Savannah River Harbor Issue Leader, January 25, 2011

Georgia Chapter Sierra Club

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766-JK-53-EN01

Comment: Misjudgments in the development of the highly complex mathematical models are not merely academic arguments, if misjudgments exist and are allowed to stand as SHEP moves forward, they will become magnified linchpins in gross environmental damage and the misuse and/or loss of hundreds of millions of tax dollars in potentially misguided mitigation attempts.

Response: The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. Together the hydrodynamic and water quality models simulate the complex estuarine dynamics including hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to oversee the development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

The District does not concur that insufficient information was presented to allow for meaningful evaluation of the modeling efforts. The tools employed in the various studies were developed by subject matter experts from federal/state agencies and private industry over a number of years as summarized in Section 7.4 of the GRR-Engineering Appendix. The models were used to predict future impacts resulting from the various depth alternatives. Their use employed state-of-the-art techniques that were independently reviewed and verified. These tools were just part of a comprehensive study approach which was refined over a 13-year study period to ensure all impacts were adequately assessed. The analyses performed and data presented in various reports were coordinated with the principals [interagency teams, non-federal sponsor, and stakeholders] and adequately evaluate the impacts of the noted project alternatives. The detailed information summarized in the subject reports, combined with the technical reports included as appendices and supplemental data, provide the reader with sufficient information to make meaningful comment. The sheer volume of data [appendices and supplemental materials, independent verification, organizational certification, and the extensive record

of public and interagency coordination] are evidence to that fact that the modeling tools employed and results presented are more than adequate for reasonable decision-making.

766-JK-53-EN02

Comment: On a macro-level, because of the timing of the decisions to use the enhanced EFDC, there is reason to believe that political considerations could have been playing greater roles in decisions about modeling choices than they should have. At the time, EPA was facing a court-ordered deadline to set TMDLs in the Savannah River Harbor and they needed a predictive tool. Time was important to EPA and the agencies which had concurrence responsibilities on TMDLs. Also, participation in SEG and SEG-related meetings leads us to believe that USACOE leadership during the time of the models' development might have been more focused on complying with scheduling than scientific accuracy. While it is fiscally responsible to use similar tools for somewhat similar uses when they have been adequately evaluated for all tasks, it can be disastrous when time and politics become greater drivers than science and appropriately applied accurate observation.

Response: Political consideration played no role in the District's decisions regarding modeling choices nor was technical accuracy sacrificed to meet tight scheduling requirements. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [January 2006]; it is included in the Supplemental Materials to the Engineering Appendix. This report includes a discussion detailing the model's accuracy for various parameters [including salinity and dissolved oxygen] throughout the Savannah River estuary [including Middle and Back Rivers]. The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the model which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts [under contract to develop and refine the SHEP model]. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was state-of-the-art with its 3-dimensional capabilities. After three years of intense work, the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

766-JK-53-EN03

Comment: On a micro-level, we don't have use of all the knowledge we'd like to have to assess the models. The model calibration report prepared by Tetra Tech, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project." is included in the GRR's Engineering Investigations Supplemental Materials via an enclosed CD. The Engineering Investigations Section of the GRR lists four pages of document titles contained within the Supplement, many of which seem much more suited for Ph.D.s in mathematics and physics, and well beyond the general public's ability to discern with only the 60 days allotted to them to comment on the entire and extremely lengthy DEIS and GRR.

Response: Summaries of the technical reports and documents can be found in the main body of the Engineering Appendix. These summaries were carefully written [manner and language] to convey an understanding of the detailed, highly technical documents found in the supplemental materials. Elaborate efforts were made by the District to make the complex technical information available to the general public in a fashion that it could be easily understood and digested. Many of the technical professionals [including members of Tetra Tech's modeling staff that developed and calibrated the SHEP model grid] have made themselves available to answer questions and discuss their findings with members of the general public through the SEG. In addition to the SEG presentations, District staff with direct knowledge of the model's use and application as well as those who were instrumental in the impact assessment and mitigation development attended the public workshop [December, 2010]. These SHEP team members circulated throughout the course of the meeting to discuss the model's intricacies with the general public in attendance.

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766-JK-53-EN04

Comment: A primary concern is whether or not the models are able to deal with the twice daily tidal cycles in our valuable wetlands and whether or not the model was ever adequately evaluated to be predictive. An error in either or both could render the work in the SHEP DEIS and GRR virtually worthless. There is expert opinion from hired consultants that gives us concern and we'll try and lay that out for you here. We have made every effort to quote from the actual transcripts and not take comments out of context. We do apologize for the lengthy nature of the quotations, but it has been our experience that scientists can have genuine disagreements, and that they are best represented by their own words.

Response: The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SH Water Quality Interagency Coordination Team, which followed in the footsteps of the modeling technical review group that was established in the late 1990s to oversee development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding

Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

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766-JK-53-EN05

Comment: Pretty straightforward, EPA took the lead on the TMDL. The Corps has taken the lead on the harbor expansion, but with the Corps also the Port Authority through their funding. And the ultimate goal for both of these, the TMDL and the harbor expansion is to have one model used for the harbor. This kind of gives you an idea that there are multiple efforts going on in the harbor, as you know.

Response: Since this comment was made at a SEG meeting [over 5 years ago] the hydrodynamic and water quality models have been developed, calibrated, validated, and approved for use by the principals [federal/state] through their representatives on the modeling review team. The expected impacts due to harbor deepening and the proposed mitigation are well researched and documented in the GRR and EIS. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [January 2006]; it is included in the Supplemental Materials to the Engineering Appendix. This report includes a discussion detailing the model's accuracy for various parameters [including salinity and dissolved oxygen] throughout the Savannah River estuary [including Middle and Back Rivers]. The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the model which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts [under contract to develop and refine the SHEP model]. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was state-of-the-art with its 3-dimensional capabilities. After three years of intense work, the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

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766-JK-53-EN06

Comment: One of Chuck Watson's recommendations to us, in the uncertain analysis, is don't overcalibrate your model. Don't over-calibrate to this period of low flow critical conditions. You do really well in that period, but you don't do well overall.

Response: As reported in Section 7.3 of the Engineering Appendix, the hydrodynamic and water quality model improvements included grid resolution, tidal-marsh interaction, and boundary delineation. All were necessary elements to secure the model review team's approval. Enhancement and calibration of the models was essential to have a means to (1) predict and quantify impacts to the estuary and (2) to

develop mitigation features and plans that are scientifically sound and acceptable to all of the federal agencies involved in SHEP. The model development and calibration report includes both the hydrodynamic and water quality modeling results along with calibration and confirmation periods. The calibration of the models was performed to the summer of 1999 data [period with the most comprehensive dataset]. The confirmation of the model was performed to the summer of 1997 data and the USGS long-term data from January 1, 1997 through December 31, 2003. The model calibration report prepared by Tetra Tech is titled "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project". It is included in the Supplemental Materials to the Engineering Appendix. The model applications have been designed to meet the demands of the model review team. The model code, modeling results [in both time series and statistical formats], and a database containing model comparison data were made available for peer review. Ultimately, the goals of the hydrodynamic and water quality models were to produce defensible, accurate, and transferable tools that the federal and state agencies could use to make management decisions for the Savannah Harbor and Savannah River Estuary. Letters of acceptance from agencies involved in the model review group can be found in the document titled "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability". It is included in the Supplemental Materials to the Engineering Appendix.

766-JK-53-EN07

Comment: Chuck Watson did the uncertainty analysis. He did the uncertainty analysis with the TMDL grid, which was a coarser grid used last year. He did it with this new enhanced grid. He made several recommendations to us. Don't over calibrate for the summer. Do not smooth for the bathymetry. Us modellers like to make things smooth so they're stable. We went back and just used the actual numbers and other things here. Chuck had a lot of comments. And I think we addressed all of Chuck's comments. Chuck basically said, in the end, that the enhanced grid was a significant improvement. That's what we were looking for. We were wanting that uncertainty, in the model, to decrease. That was a very positive note from Chuck's work. Chuck also wanted to do a lot of other things. He wanted to run the model for multiple periods. He didn't have time to do it, and it wasn't part of his scope. And so Chuck has a full report that's included in our report that you guys are welcome to read." UNQUOTE

Response: The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [included in the Supplemental Materials to the Engineering Appendix] addresses model interactions. Specifically, the report states: Tetra Tech included KAC's (Kinetic Analysis Corporation) recommendations by paying close attention to the bathymetry incorporation and interpolation into the model grid and the bottom roughness (friction) coefficients in the EFDC model. [See Section 4.2 on the model grid bathymetry and Section 4.3.1 on the bottom roughness coefficient]. A constant (global) bottom roughness was used in the enhanced grid to calibrate the hydrodynamics. Also, the bathymetry was not averaged or smoothed in the navigational channel. This approach took into account the perturbations in its longitudinal axis rather than through compensation in the bottom roughness term.

766-JK-53-EN08

Comment: Joe Hoke: QUOTE "So I'm back now to present what's been going on in the last month. So just to review the basic problem, this is from the Kinetic Analysis Corporation, which is Chuck Watson, the executive summary from his report that's in the -- it's the appendix for the May 2005 Tetra Tech modeling report. It says, even with stability problems, the enhanced grid model appears to present a significant improvement over the TMDL model, has the potential to become an extremely useful tool in studying the Lower Savannah River. However, the inability to conduct seven year test runs is a source of serious concern, with respect to the suitability of the models for predictive purposes. Therefore, Kinetic Analysis Corporation does not recommend the operational use of the enhanced grid model for predictive modeling of bathymetric changes, means deepening, until the stability issues can be resolved." UNQUOTE

Response: The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [included in the Supplemental Materials to the Engineering Appendix] addresses model uncertainty/stability. Specifically, the report states: "Tetra Tech agrees with the conclusions of the uncertainty analysis report that the enhanced grid is a significant improvement over the TMDL grid. However, even though the KAC report met expectations and was helpful in the calibration process, Tetra Tech does not agree with the conclusion that the model could be unstable.

Tetra Tech was not able to the run the model for the full 7-year confirmation period due to one set of conditions measured by the Fort Pulaski tide station. On December 31, 2000, the Fort Pulaski tide data was at variance to the remaining seven year period. Namely, the high tide and low tide appeared to be affected by frontal passage [wind shifts] which resulted in a much lower high tide than normal and, more importantly, a much lower low tide. However, the model was run through this one-day period by "smoothing" its tide data and the EFDC model at a 5-second time step. Overall, it appeared that the summer low-flow conditions were stable at a 10-second time step, but the longer, more dynamic flow, runs needed a 5-second time step. The calibration and confirmation periods of the summer of 1999 and 1997 used a 10-second time step. Typically, complex estuarine models are not calibrated, validated, or confirmed to longer datasets than 1-3 years. Most of the time, it is less than 1 year and focused on a summer critical conditions. Therefore, for ease of confirmation runs, the EFDC model was run in two parts: 1997-1999 and 2001-2003, both are three-year periods. Seven years of validation in Savannah is unusual for complex models such as this one, so we believe the emphasis on both summer periods and validation to 3 and 4-yr periods is appropriate. Appendices L and M were shown for the full seven-year period. The resultant figures were created with two model runs. One ended at the end of December 2000 and the other started in early December 2000. Tetra Tech does not agree that 7 years is a requirement for confirmation and that by not having 7 years prevents the model from being used to evaluate scenarios for the harbor."

766-JK-53-EN09

Comment: Steve Davie: QUOTE "It appears to not to be a stability issue with the model. It's actual reality. There are, somewhere in the back or little back river, one of the cells in the model goes dry during the run. The model is not designed to run without the water everywhere, so it does what you then expect it to, it ceases to run at that point. That's what occurred in December of 2000. There are some models that do wetting and drying, where they would actually let the cells go dry, and EFDC has the ability to do it, but we don't have it configured. It takes a -- it would be an exponential amount of time to run that. It

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takes the model a lot longer to run that, the calculations through it, so we've elected not to do that." UNQUOTE"

Response: The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the models which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts under contract to develop and refine the SHEP models. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was state-of-the-art with its 3-dimensional capabilities. After three years of intense work, the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

Subsequent investigations found the problem to stem from synthetic data that the modelers had developed to bridge a datagap between two important days in December. When that synthetic data was adjusted, the model was able to run for the desired duration.

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766-JK-53-EN10

Comment: Joe Hoke: QUOTE "One of the other things is because it's paired with the WASP model, the WASP is not able to dry either, so that is over the riding. So to come back through the EFDC model here, the model failed to run through the full seven years because there's not enough water in the little back river." UNQUOTE

Response: The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the model which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts under contract to develop and refine the SHEP model. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was state-of-the-art with its 3-dimensional capabilities. After three years of intense work the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

Subsequent investigations found the problem to stem from synthetic data that the modelers had developed to bridge a datagap between two important days in December. When that synthetic data was adjusted, the model was able to run for the desired duration.

766-JK-53-EN11

Comment: Steve Davie: QUOTE "If there's no water there, we don't have salinity and we don't have DO. So we're not modeling dry marsh. We're not modeling dry riverbeds. We're modeling water."

Response: Subsequent investigations found the problem to stem from synthetic data that the modelers had developed to bridge a datagap between two important days in December. When that synthetic data was adjusted, the model was able to run for the desired duration.

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766-JK-53-EN12

Comment: Chuck Watson: QUOTE "The problem was when we tried some of the other runs, one of the things we do is called a perturbation analysis, where we take the grid and randomly make very small changes to the bathymetry to see how that changes the model. We were unable to successfully complete a lot of those runs. Those crashed or aborted at times other than December 2000." UNQUOTE

Response: The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [included in the Supplemental Materials to the Engineering Appendix] addresses model stability. Specifically, Section 12.0 discusses a sensitivity analysis, i.e., the process of varying model input parameters over a reasonable [but small] range and observing how the model responses. The purpose of the sensitivity analysis is to demonstrate how responsive a particular model simulation is to uncertainties in its input data or calibration parameters. The sensitivity of one model parameter relative to other parameters can also be demonstrated. A sensitivity analysis was performed on the following model parameters and boundary inputs: turbulence scheme coefficients, offshore salinity concentration, freshwater inflow rate and timing, bottom friction, horizontal eddy viscosity, selected water-quality rate kinetics, dissolved oxygen boundary conditions, and BOD loads from point sources and marshes. Results from the sensitivity analysis can be found [over several pages] within Section 12.0. As shown by the output from this analysis the model did not crash while varying these parameters. This technique is similar to the perturbation analysis conducted by Chuck Watson [Kinetic Analysis Corporation].

766-JK-53-EN13

Comment: As the October 4, 2005, SEG meeting continued, the dialog among the scientists become more and more complex as to specific instances and even computer languages. So, citing quotes would be cumbersome. However, we are confident that it is fair to say that, while Mr. Watson maintained that the enhanced EFDC model was an improvement over the BFHYDRO, that the SHEP EFDC still needed more data, and that there were serious unresolved issues as to its stability and ability to be predictive of changes in a dynamic tidal system. We emphasize that Mr. Watson was not a regular SEG attendee, but a subcontractor to evaluate a product for use by the USACOE.

Response: The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen

dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow. The model grid incorporates surveyed bathymetry and includes point and non-point pollution sources in the watershed. The grid extends from Clyo, Georgia (river mile 61, USGS stream gage 02198500) downstream through the harbor to Fort Pulaski (river mile 0), and out to 17 miles offshore [Atlantic Ocean]. The model was calibrated and validated using observed data from 1997 to 2006 and has been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to oversee the development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

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766-JK-53-EN14

Comment: Appendix Q of the DEIS, "Risk and Uncertainty Analysis in Environmental Evaluation Approach," informs that, "All the agencies agree that these models are more accurate when used to identify the differences between two scenarios than when used to identify values at a given location at a point in time in a given scenario." Doesn't that defy the objective of the models? The environment is not a laboratory in which two scenarios are compared. It is a natural world, in which a measurement is distinct and precise.

Response: Section 7.2-Engineering Appendix describes the process and reasoning behind the model selection and outlines the guidelines which were used to evaluate the performance of the hydrodynamic and water quality models. Post-processing routines used to predict impacts associated with the SHEP are also discussed. The EPA, USFWS, USGS, NMFS (National Marine Fisheries) and the Corps of Engineers prepared an expectations document [Savannah Harbor Data Analysis & Modeling Expectations of Federal Agencies, 2003] that described: (1) the resources of primary concern in the estuary, (2) the locations and conditions under which project impacts should be evaluated for those resources, (3) the modeling approach to be taken, (4) the statistical analyses to be performed to document the model's performance, and (5) the evaluation criteria. The expectations were to be viewed as performance goals to which model predictions would be compared and evaluated for strengths and weaknesses and by which an understanding of their uncertainties would be developed. However, the stated expectations would not be used individually (by station and parameter) for a "pass/fail" evaluation of the model calibration and/or any post-processing routine. The noted report is included in the Engineering Investigations Supplemental Materials.

766-JK-53-EN15

Comment: In several Sections, it is noted that, "the hydrodynamic model has roughly 80 percent chance of over-predicting salinity levels at low salinity levels, thus leading to an over-prediction of salinity induced impacts to wetlands."

Response: EIS-Appendix Q discusses the risks and uncertainties associated with modeling the project's environmental impacts. This section describes the difficulties associated with developing hydrodynamic and water quality models that can reliably replicate existing conditions. Assessments from SC DHEC state: "The EFDC model continues to under-predict salinity on Middle River; however, we agree with Tetra Tech that the model achieves a reasonable balance between Middle River, Front River (where the model does well), and Little Back River (where the model tends to over-predict salinity)." The USFWS provided the following in their final assessment of the model development: "...we believe that salinity prediction performance is adequate to use in project planning." The District recognizes that there are legitimate reservations about some of the hydrodynamic model's salinity predictions, but believes that those uncertainties are within reasonable limits and do not pose any unacceptable risks to prudent decision-making.

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766-JK-53-EN16

Comment: *Mr. Watson of KAC discussed model errors at four locations. We believe the Corps' conclusions about the errors were capricious, bowing to a schedule-driven impetus to implement the model at any cost.*

Response: Political consideration played no role in the District's decisions regarding modeling choices nor was technical accuracy sacrificed to meet tight scheduling requirements. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [January 2006]; it is included in the Supplemental Materials to the Engineering Appendix. This report includes a discussion detailing the model's accuracy for various parameters [including salinity and dissolved oxygen] throughout the Savannah River estuary [including Middle and Back Rivers]. The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the model which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts under contract to develop and refine the SHEP model. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was state-of-the-art with its 3-dimensional capabilities. After three years of intense work the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

The models employed and the criteria established were developed through an iterative process with the model review and the water quality interagency coordination teams. The model selection, development, and refinement process literally took years [1999 to 2005] and the WASP and enhanced EFDC models were both certified for use in accordance with EC 1105-2-407. The considerable changes that were made over the course of this period and elaborate certification process are an indication of the thorough and deliberative process the District employed to ensure the models met the performance goals prior to conducting runs to predict impacts associated with the proposed project.

766-JK-53-EN17

Comment: *Is the data collection adequate?*

Response: The data collection effort for SHEP model development is more than adequate. Section 2.0 of the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [Supplemental Materials to the Engineering Appendix] outlines the extensive data collection effort used to develop, calibrate, and confirm the hydrodynamic and water quality models. According to the report, the majority of the data used in the calibration and confirmation process were taken from studies conducted in 1997 and 1999. Information was collected on salinity, temperature, water level, dissolved oxygen, currents, and flow data at 19 stations around the harbor. Specifically, the data collection stations were located on Front, Middle, Back, Little Back Rivers and the South Channel and acquired the noted information from surface, bottom and mid-depth in the water column. In addition to these sites, there were eight stations operated and maintained by the USGS which collected water level, salinity, and flow at mid-depth at various locations in the estuary [Front and Little Back River] for use in model development.

766-JK-53-EN18

Comment: If not, what other data would help make the models more predictive?

Response: The natural resource agencies reviewed and approved the data collection effort for the SHEP model development before the work was started and agreed that the SOW would be sufficient for model development purposes. Later, those agencies agreed that the hydrodynamic and water quality models were sufficient for impact evaluation purposes for SHEP. Any further widespread collection efforts would not likely add material value to the overall assessments of the project.

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766-JK-53-EN19

Comment: Was the December 2000 data-set event and the model's reaction to it an anomaly, or was it indicative of more pervasive concerns of the model's development?

Response: The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [included in the Supplemental Materials to the Engineering Appendix] discusses model interactions. Specifically, Appendix V, comment 12 from the Agency Technical Review Group and response by Tetra Tech states: The group concluded that the inability to run the models over a 7-year duration was the result of synthetic data that was developed to fill in a data gap around December 2000. The group concluded that the inability of the model to run over the entire 7-year period of data does not reflect on the structure of the model or its performance, and should not be a consideration of the model's usefulness for its intended purposes of predicting impacts of the Savannah

Harbor Expansion Project, developing a dissolved oxygen TMDL, or permitting point source discharges. Tetra Tech agrees the 7-year run is important but in no way reflects on the stability of the model. In Section 11 of the report, Tetra Tech comments on the results of the Uncertainty Analysis. Tetra Tech performed stability and mass balance tests with the model. The model was crashing during mid-December because there was not enough water in the Little Back River during this event. The high tide on Dec 17, 2000 was only 4 feet (compared to usual 6 to 8 feet) and the low tide on Dec 19, 2000 was -2 feet (compared to usual 0 to -1 feet). The event was a real phenomenon and later USGS reported that the Fort Pulaski data during this time period have been checked and are real data, not synthetic data as previously discussed. The TMDL grid ran through this period because the Back and Little Back Rivers were deeper (Tetra Tech updated the bathymetry based on the 2004 USGS survey data). Therefore, Tetra Tech believes it is not a stability issue, but rather a reality issue. The model will not run when the river bed is dry, and it is believed that parts of the upper system were very shallow (or dry) during this time period.

Some reaches of the Back and Little Back Rivers appeared to go dry during extremely low flows and low tide range (documented in December, 2000). Subsequent investigations found the problem to stem from synthetic data that the modelers had developed to bridge a datagap between two important days in December. When that synthetic data was adjusted, the model was able to run for the desired duration. Tetra Tech modified the PSER.inp (time series water level boundary file) by adjusting 10 data points out of 245,280 (0.004%). Duration-wise this only accounted for five hours out of a seven-year record, but it allowed the model to run for the entire period without going dry. Since December 2000 is not a critical period for the modeling scenarios, altering the water level boundary for these limited data points was deemed acceptable.

In summary, the data during the noted December 2000 time frame proved to be indicative of a real phenomenon, i.e., a strong offshore wind or pressure system which severely depressed water levels. Since the seven-year model run became a critical issue among the Stakeholder Evaluation Group, Tetra Tech modified the water level boundary file to receive a continuous model run [over this period].

766-JK-53-EN20

Comment: Was the model calibrated using the most scientifically defensible data sets?

Response: The SHEP model calibration was completed using scientifically defensible datasets. Section 2.0 of the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" outlines the extensive data collection effort used to develop, calibrate, and confirm the hydrodynamic and water quality models. It is included in the Supplemental Materials to the Engineering Appendix. Continuous datasets collected by ATM, Inc. for GPA [1999] were used extensively in the calibration. They were further analyzed by USGS for additional quality assurance/quality control at the request of EPA Region 4. USGS worked with the raw data files collected in the summer of 1999 for water levels, specific conductance, temperature, and dissolved oxygen.

Details of the calibration of the EFDC and WASP models can be found in Sections 5.0 and 9.0. For EFDC calibration the methodology was parameter specific starting with the following order: water surface elevation, currents, flow, temperature, and salinity. Each one of these parameters has its importance in the success determination for the model calibration and confirmation. The order in which the hydrodynamic model is calibrated is also important to address issues such as bathymetry, friction, tidal volume, cross-sectional area, and heat budget which must be accomplished before salinity is calibrated.

Salinity is the model's principal signal which ensures that mass is being moved horizontally and vertically with the appropriate timing and direction.

766-JK-53-EN21

Comment: *Is there instability in the model?*

Response: No. The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" addresses model stability. It is included in the Supplemental Materials to the Engineering Appendix. Specifically, the report states: "Tetra Tech agrees with the conclusions of the uncertainty analysis report that the enhanced grid is a significant improvement over the TMDL grid. However, even though the KAC report met expectations and was helpful in the calibration process, Tetra Tech does not agree with the conclusion that the model could be unstable. Tetra Tech was not able to the run the model for the full 7-year confirmation period due to one set of conditions measured by the Fort Pulaski tide station. On December 31, 2000, the Fort Pulaski tide data was lower than any other period in the 7 years and the high tide and low tide appeared to be shifted down causing a much lower high tide than normal and, more importantly, a much lower low tide. However, we were able to run the model through this period by smoothing the tide data for that one day and the EFDC model at a 5-second time step. Overall, it appeared that the summer low-flow conditions were stable at a 10-second time step, but the longer, more dynamic flow, runs needed a 5second time step. The calibration and confirmation periods of the summer of 1999 and 1997 used a 10second time step. Typically, complex estuarine models are not calibrated, validated, or confirmed to longer datasets than 1-3 years. Most of the time, it is less than 1 year and focused on a summer critical conditions. Therefore, for ease of confirmation runs, the EFDC model was run in two parts: 1997-1999 and 2001-2003, both are three-year periods. Seven years of validation in Savannah is unusual for complex models such as this one so we believe the emphasis on both summer periods and validation to 3 and 4-yr periods is appropriate. Appendices L and M were shown for the full seven year period. The resultant figures were created with two model runs. One ended at the end of December 2000 and the other started in early December 2000. Tetra Tech does not agree that 7 years is a requirement for confirmation and that by not having 7 years prevents the model from being used to evaluate scenarios for the harbor."

766-JK-53-EN22

Comment: Why do the model runs crash during perturbation analysis?

Response: The specifics of the perturbation analysis on the model mentioned by Mr. Chuck Watson of KAC are not referenced in his account. It is included as an Appendix to the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project"; therefore, it is difficult to discern why the model runs he performed crashed during the noted perturbation analysis [discussion in SEG meeting-2005]. However, Section 11.0 of the report states: "Tetra Tech incorporated KAC's recommendations by paying close attention to the bathymetry incorporation and interpolation into the model grid and the bottom roughness (friction) coefficients in the EFDC model. Also, the bathymetry was not averaged or smoothed in the navigational channel to allow for the perturbations in the longitudinal direction to be accounted for and not compensated through the bottom roughness term."

The report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [included in the Supplemental Materials to the Engineering Appendix] addresses

model stability. Specifically, Section 12.0 discusses a sensitivity analysis, i.e., the process of varying model input parameters over a reasonable [but small] range and observing how the model responses. The purpose of the sensitivity analysis is to demonstrate how responsive a particular model simulation is to uncertainties in its input data or calibration parameters. The sensitivity of one model parameter relative to other parameters can also be demonstrated. A sensitivity analysis was performed on the following model parameters and boundary inputs: turbulence scheme coefficients, offshore salinity concentration, freshwater inflow rate and timing, bottom friction, horizontal eddy viscosity, selected water-quality rate kinetics, dissolved oxygen boundary conditions, and BOD loads from point sources and marshes. Results from the sensitivity analysis can be found [over several pages] within Section 12.0. As shown by the output from this analysis the model did not crash while varying these parameters. This technique is similar to the perturbation analysis conducted by Chuck Watson [Kinetic Analysis Corporation].

766-JK-53-EN23

Comment: Are the models defensibly able to predict water flows and dissolved oxygen contents in all the marsh areas of concern to SHEP?

Response: The hydrodynamic and water quality models [impact determination and mitigation development] do not predict water flows and dissolved oxygen content within the estuary's marshes. The unique nature of tidally-influenced marshes requires a modeling framework that allows areas of the model's numerical architecture to become wet during incoming tides and to dry out as the tide recedes. Similarly, the EFDC and WASP models [developed for SHEP] do not have the capacity for alternating wet and dry cells within the models' domain. For calibration purposes the storage capacity of the marshes are represented volumetrically within the model grid, but also have to be prevented from drying. This method improved the calibration for Little Back and Middle Rivers, but output from these cells was deemed unreliable for wetland impact determination.

766-JK-53-EN24

Comment: So, before the project moves any further, we ask that the EFDC and WASP models be revisited, divested of political and timing considerations.

Response: Political consideration played no role in the District's decisions regarding modeling choices nor was technical accuracy sacrificed to meet tight scheduling requirements. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [January 2006]; it is included in the Supplemental Materials to the Engineering Appendix. This report includes a discussion detailing the model's accuracy for various parameters [including salinity and dissolved oxygen] throughout the Savannah River estuary [including Middle and Back Rivers]. The hydrodynamic and water quality models employed for SHEP were developed through an iterative process closely coordinated with the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to review the model which would be developed for the deepening project and determine its viability for use with SHEP impact evaluations and mitigation development. The group consisted of technical modelers from the Corps, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and technical modeling experts [under contract to develop and refine the SHEP model]. The group ultimately decided to adopt a model [originally developed for the TMDL] for evaluating the effects of harbor deepening because it allowed simulation of the harbor's salinity stratification and was

state-of-the-art with its 3-dimensional capabilities. After three years of intense work the original TMDL model was sufficiently enhanced/modified [specifically as regards the calibration of the existing harbor conditions] to receive final acceptance letters from federal, state, and industry reviewers. These letters of acceptance can be found in the Supplemental Materials to the Engineering Appendix (Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability).

Both the EFDC and WASP models have been certified "Approved for Use" under the Corps' Technical Excellence Network which provides uniform science and engineering tools/practices. Care must be taken not to confuse review of a model's programming with review of its application. The model programming review (certification) is to assure that accepted scientific principles have been used and that the computer programming is accurate. Review of model applications determines if the data for the specific application was properly input and the calibration and verification process was accomplished. EFDC and WASP have been reviewed and approved, both for the model program development and for the Savannah Harbor application.

766-JK-53-EN25

Comment: Most importantly, we need to be sure the predictive ability of the model has been adequately evaluated. This cannot be over-emphasized since almost every other decision in the DEIS and GRR flows from it.

Response: The predictive ability of the model has been adequately evaluated. The Risk and Uncertainty Section of the EIS (Appendix Q) discusses development and use of the various predictive tools. It specifically states: "The Corps used Interagency Coordination Teams to define how the models should be used to predict physical changes from changes proposed in the harbor. The use of experts from several organizations reduces the risk of error from the limited perspective of just one or a few individuals. The Interagency Coordination Teams recommended that the models be applied over a range of conditions." This approach is specifically verified in the letters of acceptance from the agencies represented in the modeling technical review group. Their approval for the models used for SHEP can be found the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

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766-JK-53-EV01

Comment: DEIS Section 5.1.2 addresses indirect impacts to wetlands which includes impacts to tidal freshwater wetlands, considered by USFWS to be the most critical natural resource in the harbor. These tidal freshwater wetlands were the original impetus for this organization's interest in harbor deepening. They are more ecologically diverse than saltwater wetlands and their acreage along the east coast and SNWR in particular has been in steady decline over recent decades. It is imperative that we preserve what we have and take measures to restore what has been lost in the SNWR.

Response: The SHEP was designed in a manner to avoid and minimize impacts to the maximum extent practicable while still achieving its basic purpose and need. For unavoidable impacts, sufficient compensatory mitigation was provided as a means to preserve and sustain aquatic resources within the Lower Savannah River Watershed.

Congress has established procedures that allow the Corps to modify existing federal water resource projects to provide additional mitigation, when warranted. However, these procedures are separate from those Congress set up to mitigate for environmental impacts from proposed new projects. In this instance, Congress's 1999 authorization of the Savannah Harbor Expansion Project did not include wording that would allow the District to include mitigation for impacts from the existing Savannah Harbor Navigation Project.

766-JK-53-EN26

Comment: The enhanced EFCD and WASP models, addressed in Section 1 of these comments, were used to evaluate the impacts to wetlands from proposed depths of harbor deepening. A reference back to our Section 1 indicates our grave concerns about the lack of adequate evaluation of the models for predictive purposes in the tidal wetlands. Even though the Corps had an Independent Technical Review (ITR) performed of the model by ERDC, the ITR did not include analysis of the model programming.

Response: As stated in the GRR-Engineering Appendix^{*}, "All components of the EFDC model have been extensively validated over the course of the model's 15-year existence with more than 80 applications. The model has been extensively peer reviewed, as evidenced by 12 peer reviewed journal articles and 17 peer reviewed conference proceedings articles. There were no code modifications required for the Savannah Harbor application." Additionally, the EFDC model is a part of the US EPA *TMDL Modeling Toolbox*. Notably, its code has been peer reviewed, tested, and distributed for public use. EFDC has demonstrated its capability to capture the complex hydrodynamics in systems similar to Savannah Harbor, e.g., Mobile Bay, AL, Neuse River and Estuary, NC, Brunswick Harbor, GA, Cape Fear River, NC, St. Johns River, FL, and Charleston Harbor, SC. [*"Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" [Supplemental Materials to the Engineering Appendix].

The water quality model used for the project [WASP] is also part of US EPA's *TMDL Modeling Toolbox*. This program is proprietary to EPA and has been in circulation since 2005. WASP has been used extensively to examine eutrophication of Tampa Bay, FL; phosphorus loading to Lake Okeechobee, FL; eutrophication of the Neuse River Estuary, NC; eutrophication Coosa River and Reservoirs, AL; PCB pollution of the Great Lakes, eutrophication of the Potomac Estuary, kepone pollution of the James River Estuary, volatile organic pollution of the Delaware Estuary, and heavy metal pollution of the Deep River, North Carolina, and mercury in the Savannah River, GA.

Both the EFDC and WASP models have been certified "Approved for Use" under the Corps' Technical Excellence Network which provides uniform science and engineering tools/practices. Care must be taken not to confuse review of a model's programming with review of its application. The model programming review (certification) is to assure that accepted scientific principles have been used and that the computer programming is accurate. Review of model applications determines if the data for the specific application was properly input and the calibration and verification process was accomplished. EFDC and WASP have been reviewed and approved, both for the model program development and for the Savannah Harbor application.

766-JK-53-EN27

Comment: Our concerns about the EFCD model are heightened by results from the attempts to develop and use Marsh Succession Models (MSM) which were intended to use salinity information from the EFDC to predict wetland species at a given location. ATM and the USGA Fish and Wildlife Cooperative Research

Unit in Gainesville, Florida (USGS Coop Unit) attempted to develop MSMs. External Peer Reviewers generally found both models to be acceptable. However, problems appeared when the Corps applied the MSMs to some of the mitigation plans. From DEIS 5.1.2.2 states, "The models produced unreliable results when they were used to evaluate mitigation plans that substantially altered flows in the tidal creeks." And further, "Salinity changes predicted to occur in the river produced no corresponding changes in salinity levels in adjacent marshes." Ultimately, "the Federal Cooperating Agencies decided to abandon the planned use of the Marsh Succession Models to evaluate the mitigation proposals." Yet, the Agencies decided "MSMs could still be used to check the prediction of wetland vegetation distribution resulting from the use of the hydrodynamic model."

Response: EIS-Section 5.01.2 speaks to the usefulness of MSM and the problems which were encountered during development of certain aspects of the mitigation plan. Specifically, "In March 2007, the Federal Cooperating Agencies discussed a USGS proposal to revise the linkage to increase its usefulness for evaluating potential mitigation measures. The agencies did not believe the effort to satisfactorily revise the linkage would necessarily be successful or that the predicted improvements would be sufficient for the needs of the project. Therefore, the Federal Cooperating Agencies decided to abandon the planned use of the Marsh Succession Models to evaluate the mitigation proposals. The Marsh Succession Models (MSM) could still to be used to check the predictions of wetland vegetation distribution resulting from use of the hydrodynamic model."

MSM was reviewed and found to have been accurately programmed. Its application to existing conditions in Savannah Harbor was also reviewed and determined to be appropriate for use [subsequently approved]. However, the model's application to deepened conditions was found to be unacceptable [too inaccurate]. This demonstrates the technical review process worked, i. e., as soon as it was determined the model application was not accurately portraying marsh conditions [when mitigation features were included] it was not used in further analysis. While MSM did not prove to be a useful tool for mitigation plan development, it was used to compare wetland impacts under scenarios of deepening only. Significantly, it showed that wetland impacts identified by using the EFDC hydrodynamic model are of greater magnitude than those shown by the Marsh Succession Model [at all proposed project depths]. Hence, the District's use of the EFDC-derived impacts provides a more conservative estimate than would have been the case using the more technically-advanced Marsh Succession Model.

766-JK-52-EN28, 766-JK-53-EV02, 766-JK-53-EC01

Comment: We also object to the conclusion of a sensitivity analysis that that indicated sea level rise would help ameliorate the impacts to tidal freshwater marshes from a harbor deepening project. While we fully agree that sea level rise is a real phenomenon that is currently producing environmental impacts and will produce significant environmental impacts within the 50-year planning range of the project, we reject the claim that it should be a significant factor in very near-term harbor deepening decisions. 50-years has consistently been proven to be a woefully unrealistic planning period for harbor deepening planning. Impacts to the tidal freshwater system from harbor deepening must be attributed to deepening. Indeed, the Economics Analysis of the GRR supports this conclusion with contentions that changes within the shipping industry are moving so fast that the Tier I EIS was obsolete within only a few years of its publication.

Response: The District requested and received a waiver from Section 5, paragraph E-36.c. (1) of ER 1105-2-100 regarding use of the average annual basis to compute the degree/kind of environmental impacts. This waiver request was based on the rationale that (1) a project should mitigate for the environmental impacts it would produce at implementation, and (2) the fact these impacts are more certain than those that may occur toward the end of the 50-year project life.

Mitigation is included in the project for impacts that would occur at project implementation. The original 50-year period of analysis that considered sea level rise (that complies with Corps policy) has been rescinded.

The Corps disagrees with the commenter's opinion that changes in the shipping industry moved so fast that the Tier I EIS was quickly rendered obsolete. The Corps' economic analysis acknowledges that the container shipping industry continues its rapid evolution, which makes projections of future conditions difficult. However, a 50-year period of analysis is required by Congress and Corps policy.

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766-JK-53-EN29

Comment: In addition to these complications, predictions of changes to tidal freshwater wetlands are compounded by the use of marsh salinity contour lines extrapolated from river data from the EFDC; effects of prolonged drought, and increased surface water withdrawals as a result of growing populations and caps on withdrawals from the Floridan Aquifer.

Response: Georgia DNR's current efforts to reduce groundwater pumping from the Floridan aquifer will undoubtedly result in increased utilization of surface water supplies. Water withdrawals at the Abercorn Creek facility average about 30 mgd. However, its permit would allow for treatment of an additional 20 mgd [total of 50 mgd]. Even at the maximum permitted withdrawal rate, only about 1-1/2% of the Savannah's low flow rate [measured by the USGS near the Clyo gage] would be affected [removed]. It was, therefore, concluded that even at the maximum withdrawal rate there would only be a negligible effect on the river's overall flow.

The modeling periods used in the analysis covered multiple periods of severe drought, most notably the drought-of-record for the Savannah River basin in 2007-2008. During the modeling process, the District had similar concerns to those referenced in this comment, but is confident that they [risk/uncertainty issues] have been addressed.

766-JK-53-EV03

Comment: Regardless of these concerns, we will proceed with comments about the proposed mitigation for the loss of tidal freshwater wetlands since, regardless of the inadequacy of predictive tools, it is intellectually and intuitively obvious that harbor deepening will result in the loss of tidal freshwater wetlands.

Response: The conversion of up to 223 acres of freshwater wetland to brackish marsh represents the only significant wetland conversion that is likely to be noticeable if the harbor is deepened to 47-feet [LPP]. Again, it is important to reiterate that the ecological values of the impacted freshwater wetlands would not be completely lost. Instead, those acres would just be converted to brackish marsh. The District's calculation of the freshwater wetlands with the potential for conversion to brackish marsh is based on a shift in 0.5 ppt salinity, a traditional rule-of-thumb for differentiating between freshwater

and brackish marsh. Data reported in the literature for Savannah Harbor suggest that a shift in vegetation [from freshwater marsh to brackish marsh] in this estuary does not occur until salinity concentrations approach 2.5 ppt [Latham et al., 1994]. Even at oligohaline marsh sites [average salinity concentration of 2.1 ppt]], a discriminate function [DF] analysis revealed that only 47% of cases resulted in the correct pairing of environmental variables with vegetative species composition and dominance. At those same oligohaline sites, 37% of the vegetative species composition and dominance were more closely aligned with a freshwater classification [Latham et al., 1994].

The District's salinity value that denotes a defined shift from freshwater to brackish marsh [i.e., 0.5 ppt] is approximately five times lower than traditional observations of 100% vegetative shifts *in situ* within the Lower Savannah Watershed [Latham et al., 1994] and other coastal marsh systems in the southeastern United States [NOAA, 2010]. Thus, many of the existing freshwater emergent plant species, and associated ecological parameters, may be sustained in areas predicted to experience salinity concentrations in the range of 0 - <2.5 ppt. For those areas that do transition to more brackish characteristics, they would still continue to provide the traditional ecological functions associated with all emergent wetland systems [see functional assessment response]. Thus, the preservation of up to 2,245 acres [consisting of bottom land hardwoods and upland buffer] is more than sufficient to offset any conversion in freshwater wetland vegetation that might occur. Using the higher salinity value observed in the Savannah basin for conversion to brackish marsh [2.5 ppt], less conversion would be expected, resulting in a mitigation-to-impacts ratio of roughly 8:1. Using the DF analysis reported by Latham et al [1994] which aligned 37% of freshwater species with oligohaline sites, the 223 acres of freshwater to brackish marsh conversion is reduced further such that the mitigation-to-impacts ratio is increased to 12:1.

A Wetland Interagency Coordination Team [technical expert representatives from USACE and federal/state natural resource agencies] was assembled to identify acceptable mitigation for SHEP. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The District then consulted with the Stakeholder Evaluation Group, including its non-governmental organizations members, to see if they had identified any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with the identification of preservation sites.

The Corps' Agency Technical Review (ATR) assessed the use of Savannah District's SOP to develop a mitigation plan for SHEP. The ATR was lead by the National Deep-Draft Navigation Planning Center of Expertise; technical work was performed by Corps experts at the Engineering Research and Development Center in Vicksburg, MS. The ATR evaluated the SOP to determine if it was an appropriate method of ascertaining the preservation acreage needed to compensate for SHEP impacts. The ATR also commented on the underlying assumptions used in the application of the SOP for the SHEP. It should be emphasized that the SOP was only used to determine the amount of preservation acreage necessary to offset the remaining impacts after development of avoidance, minimization, and restoration features. The ATR concurred with use of the SOP to determine the amount of preservation acreage needed and considered Savannah District's application of the SOP to be reasonable in quantifying impacts and required mitigation.

The properties of interest to the USFWS are described in the latest version of the Refuge's Acquisition Plan and are included in the document titled "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". Land Acquisition would be concentrated in areas identified as "Mill Creek Acquisition Lands" and "Abercorn Island Acquisition Lands". The project would acquire properties from the Refuge's Acquisition Plan that best meet the needs of the Refuge, viz., fresh water wetlands. The District has consulted with the Refuge and intends to focus on freshwater wetland parcels that the Refuge identifies as priorities. The District always attempts to acquire property from willing sellers.

The most appropriate and practicable means of mitigating the minor shift in vegetation that would occur is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. The proposed preservation lands consist of various community types, viz., bottom land hardwoods, maritime forest, and uplands dominated by deciduous forest and re-growth. The bottomland hardwoods are categorized as palustrine, forested, broad-leaved deciduous systems that are both temporarily and/or seasonally flooded. Preserving these areas would ensure this wildlife habitat is preserved in perpetuity. Moreover, the additional lands would buffer the Savannah National Wildlife Refuge from future threats of development. Hence, changes in land use would not occur immediately adjacent to existing areas of the Refuge that do contain emergent wetlands. The acquisition/preservation of wetland and upland buffer would provide a functional replacement for the minor conversion of the only wetland function [fish and wildlife habitat] that would be expected when freshwater marsh is converted to a brackish counterpart. Based on these determinations, the District's functional assessment concluded that the noted preservation satisfies the intent of the no-net-loss of function criterion. For additional information, please see other responses that include a functional assessment, watershed assessment and information on compliance with the 2008 Mitigation Rule. Appendix C – Mitigation Planning, Section VII Consideration of 2008 Mitigation Rule also includes relevant information.

766-JK-53-EV04, 766-JK-53-EV05

Comment: Are any of the properties tidal freshwater wetlands? If so, are there enough of such wetlands to be sufficient to meet mitigation needs?

Response: The properties of interest to the USFWS are described in the latest version of the Refuge's Acquisition Plan [July 2007] as well as the document, "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". Land acquisition would be concentrated in areas identified as "Mill Creek Acquisition Lands" and "Abercorn Island Acquisition Lands". The project would focus on acquiring properties that meet both the SHEP and the Refuge's needs, viz., fresh water wetlands. The District is in consultation the Refuge management and intends to focus on parcels identified as Refuge priorities. The District always attempts to acquire property from willing sellers.

766-JK-53-EV06

Comment: Are the properties only available from a willing seller? Is condemnation an option?

Response: As discussed in GRR-Appendix B, direct contact with all land owners [of proposed mitigation properties] has not taken place. Based on previous experience with Savannah Harbor projects, it is likely that the sponsor will encounter varying degrees of resistance from some landowners regarding acquisition. As a matter of policy, the project sponsor has the responsibility to acquire all required real

estate interests. Although the project sponsor has condemnation and quick take authority, these avenues of acquisition would not be exercised unless absolutely necessary. The project sponsor shall comply with applicable provisions [of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, and amended by Title IV of the Surface Transportation Uniform Relocation Assistance Act of 1987, Public Law 100-17] in acquiring these real estate interests, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act(s).

766-JK-53-EV07

Comment: Since authorization for SHEP requires that mitigation occur before or concurrent with the project construction, what will happen if sufficient properties cannot be acquired during such time?

Response: The District has allocated almost a year to purchase the properties [noted in the Refuge's Acquisition Plan-2007] to satisfy the required preservation mitigation. This action would occur at the beginning of the project and should be completed before dredging occurs in the Inner Harbor (see Figure, "Timing of Construction" in Appendix C). Thus, sufficient properties will be acquired before or concurrent with project construction.

766-JK-53-EV08

Comment: If properties acquired are not contiguous with the current SNWR boundaries, what funding mechanisms are available if their management is disproportion in the Department of Interior's normal budgeting process?

Response: The properties proposed for acquisition are already approved for inclusion in the Refuge's Acquisition Plan [2007]. This indicates USFWS is committed to managing those lands appropriately and would pursue the necessary funds required to meet that goal.

766-JK-53-EV09, 766-JK-53-EV10, 766-JK-53-EV11

Comment: Is there any commitment to replace "like" with "like"?

We strongly believe that impacts to the SNWR should be avoided or mitigated with like-to-like and that restoration of tidal freshwater wetlands lost from previous deepening activities are a responsibility of moving forward with SHEP. Until this happens, SHEP in any form should not move forward. We recognize that there are ways to quantitatively evaluate impacts to natural resources from infrastructure projects and include them in the costs of the project. We do not believe that these quantitative techniques could adequately evaluate the environmental and economic losses that are predicted to the SNWR. If the SNWR cannot be protected and previously lost wetlands restored, then SHEP should be held without funding until such measures for the SNRW are identified and funding to implement are secured.

Response: All impacts to wetlands have been avoided and minimized to the maximum extent practicable while still achieving the overall purpose and need of the project. The USACE conducted a watershed assessment and reviewed the 2008 Mitigation Rule to ensure that the proposed preservation was appropriate to mitigate for the vegetative conversion of up to 223 acres of freshwater wetland (see previous responses for additional detail). The District conducted this watershed assessment in conjunction with the results of the functional assessment that concluded the only element of wetland function that would be impacted as a result of the conversion was fish and wildlife habitat (see previous responses for additional detail).

In brief, District reviewed the listing of approved mitigation banks in the Lower Savannah River Watershed. As of this response date, there are no established mitigation banks having tidal, freshwater wetland credits. Additionally, the In-Lieu Fee program has not been updated or approved by the District and Interagency Review Team (IRT) to provide this type of wetland compensation. The District also considered the creation of freshwater, tidal wetlands; however, experience has shown that when wetlands are derived from upland habitat, there is a very high risk of failure [long-term]. Ultimately, the District and its study partners decided that this tact was not a viable option, and for the duration of the project, another approach would be pursued.

The Corps assembled a Wetland Interagency Coordination Team (ICT) [technical expert representatives from USACE and federal/state natural resource agencies] to identify acceptable mitigation for SHEP. At that time, USFWS stated that mitigation actions must be performed within the basin for impacts to wetlands located within the SNWR. The Service suggested preservation of lands as a possible solution and recommended sites that are part of its long-term lands acquisition strategy to compliment the SNWR. The District then consulted with the Stakeholder Evaluation Group, including its non-governmental Organizations members, to see if they had identified any suitable mitigation options. Over the 10-year study period, no agency/organization could identify another feasible alternative as mitigation for impacts that would occur as a result of the wetland species shifts. Therefore, the District proceeded with the identification of preservation sites.

The most appropriate and practicable means of mitigating the shift in vegetation that would occur is the preservation of approximately 2,245 acres of bottomland hardwoods and upland buffer. The properties of interest to the USFWS are described in the latest version of the Refuge's Acquisition Plan [July 2007] and are included in the document, "Final Environmental Assessment and Land Protection Plan; Proposed Expansion of Savannah National Wildlife Refuge". Land Acquisition would be concentrated in areas identified as "Mill Creek Acquisition Lands" and "Abercorn Island Acquisition Lands". The project would focus on acquiring properties that meet both the SHEP and the Refuge's needs, viz., fresh water wetlands. The District is in consultation the Refuge management and intends to focus on parcels identified as Refuge priorities. The District always attempts to acquire property from willing sellers.

Congress has established procedures that allow the Corps to modify existing federal water resource projects, including providing additional mitigation, when warranted. These procedures are separate from those that Congress established to mitigate environmental impacts from proposed new federal projects. Notably, Congress's 1999 authorization of the Savannah Harbor Expansion Project did not include wording that would allow the District to include mitigation for impacts from the existing Savannah Harbor Navigation Project.

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766-JK-53-EN30

Comment: The summary of hydrodynamic-related impacts to the Shortnose sturgeon habitat are enumerated in DEIS Appendix B, Table 8-12 (without mitigation) and Table 8-13 (depth alternatives with mitigation). These numbers are based on outputs from the EFDC model, and we continue to express our lack of confidence in its predictive ability.

Response: The habitat suitability criteria used in the model runs were defined and agreed upon by the Cooperating Agencies and the Fisheries Interagency Coordination Team [of which NMFS was a participating member]. The criteria used in the model runs include data for the Shortnose sturgeon's summer and winter foraging habitat. The modeling outputs [to include the formulation criteria and raw data] were extensively coordinated with NMFS and the results and conclusion there from should be sufficient to evaluate the impacts of the deepening alternatives. For example, NOAA requested additional analyses of bottom substrates in the upper harbor and Main River up to I-95 [Dial Cordy, 2010]. This investigation found the bottom consisted predominantly of sands fractions which readily support benthic communities used as forage by sturgeon. As noted in EIS-Section 5.03.2, the Cooperating Agencies and the Fisheries Interagency Coordination Team could not identify measures within the estuary that could completely restore Shortnose sturgeon habitat. As a result, the FICT agreed [2007] that a fish bypass around the New Savannah Bluff Lock and Dam would compensate for losses within the estuary by providing 20 additional miles of upstream spawning/foraging habitat.

The models used to identify project impacts and develop mitigation plans were calibrated and validated [multiple times] prior to their approval. The approved, calibrated, and validated models are appropriate to identify project impacts and develop mitigation plans. The hydrodynamic and water quality models simulate the complex estuarine dynamics, viz., hourly, daily, and monthly tidal variations, salinity and dissolved oxygen dynamics together with their spatial distribution within the system. The models are applicable over a wide range of conditions including low and high freshwater flow were calibrated and validated using observed data from 1997 to 2006. Notably, they have been designed to meet the expectations of the SHEP Water Quality Interagency Coordination Team, which followed in the footsteps of the Modeling Technical Review Group that was established in the late 1990s to oversee the development of a technically valid model for determining SHEP's environmental impacts and attendant mitigation features. The group included representatives from the District, US EPA Region 4, USGS, Georgia DNR-EPD, South Carolina DHEC, and private sector technical modeling experts [tasked with actual model development]. An independent technical review and uncertainty analysis have been conducted on the models and the resulting comments/concerns were incorporated into the final version. Details regarding the hydrodynamic and water quality model development process, extensive reviews, and uncertainty analysis can be found in the report, "Development of the Hydrodynamic and Water Quality Models for the Savannah Harbor Expansion Project" dated January 2006 [included in the Supplemental Materials to the Engineering Appendix]. Acceptance letters from agencies involved in the modeling technical review group can be found in the document, "Correspondence Regarding Hydrodynamic & Water Quality Model Acceptability" [included the Supplemental Materials to the Engineering Appendix].

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766-JK-53-EN31

Comment: Does newly collected data suggest that modeled data for Shortnose sturgeon habitat is underestimated?

Response: The District is confident about the results of modeling which quantify project impacts to Shortnose sturgeon habitat. This notwithstanding, the District remains committed to working with technical staff of NOAA's National Marine Fisheries Service to ensure this conclusion remains valid over the long-term. In this regard, Shortnose surgeon habitat impacts continue to be evaluated for both winter and summer periods and for juvenile and adult life-stages. Additionally, the coordination efforts

between the District and the SHEP Fisheries Interagency Coordination Team will be maintained [at least] until the end of the post-project monitoring period.

766-JK-53-EV12

Comment: What science is being used to indicate that Shortnose sturgeon would successfully relocate among available habitats?

Response: The habitat suitability/availability criteria for the Shortnose sturgeon were developed by the Interagency Fisheries group. The ranking criteria were based on professional expertise/experience, a review of pertinent literature, and site specific data for the Savannah River. In the 20-mile study area [Augusta Shoals/Savannah Rapids upstream of the New Savannah Bluff Lock and Dam] substrate data were collected at 57 sites. Forty percent of the sites had a substrate type[s] considered suitable for sturgeon spawning (NMFS 2007) whereas the combined frequency of marginally suitable sites was 37%. The remaining sites [33%] had unsuitable substrates.

Class	Benthic substrate	SI ¹	Number of Sites	Frequency (%)
1	Mud, soft clay/fines	0.0	0	0
2	Silt, sand (diameter < 2.0 mm)	0.0	7	12
3	Sand, gravel (diameter > 2.0 mm to < 64 mm)	0.5	0	0
4	Cobble/gravel (diameter > 64 mm to < 250 mm)	1.0	3	5
5	Boulder (diameter 250 mm to 4,000 mm)	0.8	20	35
6	Bedrock w/ fissures w/ gravel/cobble mixtures	0.6	21	37
7	Bedrock smooth w/ few fissures or gravel	0.2	6	11

Benthic substrate frequency in Augusta Shoals study area

¹1.0 indicates highest suitability; 0.0 the lowest.

The following link contains the full report of the investigation of Shortnose sturgeon spawning habitat in the Savannah River [Georgia and South Carolina]: <u>http://www.sas.usace.army.mil/plnew.html</u>

766-JK-53-EV13

Comment: Is the fishway a proven method for sturgeon passage?

Response: Fish ways have a long/successful history. For example, Lake sturgeon have been observed negotiating both constructed/natural rapids [entire river width] in the upper mid-west [US]. Some of these observations were made at more shallow water depths than will be the case [3.5 to 5.5 feet] for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). Since the Lake sturgeon is a larger species than the Shortnose, the latter should have little difficulty passing the constructed fish way.

An interagency workshop was held [April 2011] which was attended by the National Marine Fisheries Service [the agency with statutory responsibility for the Shortnose sturgeon], the US Fish and Wildlife Service, and the state natural resource agencies. The main focus of the workshop was to address agency concerns over the effectiveness of the proposed fish bypass [horse shoe]. Based on input from the workshop attendees, the District prepared preliminary designs for three structural alternatives: (1) Full River Rock Ramp, (2) Off-Channel Rock Ramp, and (3) Hybrid Rock Ramp. All three structures would utilize approximately the same volume of water to allow the sturgeon to transit up/down the river. Their designs differ by how they are positioned within the channel's cross-section. The alternatives were ranked by the technical staff in attendance based their anticipated success in allowing easy passage of the sturgeon up- and downstream. Because of the criteria the District established, all three designs would accommodate the larger Atlantic sturgeon. The structures should also readily pass other anadromous species such as American shad and Striped bass.

Based on an evaluation of various factors (cost, effectiveness in both upstream and downstream fish passage, etc.) the District recommended construction of the off-channel rock ramp option to provide access to traditional spawning areas at the Augusta Shoals. Initial estimates suggest a 75% success rate in upstream passage coupled with an 85% effectiveness for downstream passage.

766-JK-53-EV14

Comment: *Is the temperature of water from the Strom Thurmond Dam appropriate for attracting Shortnose sturgeon?*

Response: There is no intent for releases from Thurmond Dam to attract Shortnose sturgeon. Hypolimnetic discharges from the Strom Thurmond Dam will not be an issue related to dissolved oxygen in the late winter and early spring when the sturgeon spawn since the reservoir waters are well mixed. Hypolimnetic discharges from the Strom Thurmond Dam during the late winter and early spring can depress water temperatures and affect spawning during drought conditions, but there is no realistic method to avoid this situation without major adverse impacts to hydropower (e.g. spilling surface water).

766-JK-53-EV-15

Comment: Has the land or rights to the land to build the fishway been acquired?

Response: The fish passage would be constructed on property that is primarily already owned by the federal government. The remaining land necessary to access the fish passage structure would be acquired after the project is approved.

766-JK-53-EV16

Comment: What is the mechanism for ensuring that proper water flow is available for the fishway?

Response: As indicated in Appendix C, the fish bypass would be designed to operate continuously and pass about 8,000 CFS. The 8,000 CFS flow would be the entire river flow for 64% of the time between February and June. The fish bypass would pass a slightly greater volume when river flows are of greater magnitude. Flows in the fish way are designed to be self-regulating over a two-foot headwater variation. The Off-Channel Rock Ramp would employ boulder weirs at 25' intervals. There would be roughly a 9-inch drop per weir along the length of the bypass. The water depth would range between 3.5 and 5.5 feet in the fish way.

766-JK-53-EV17

Comment: Is the proposed sill a proven mitigation technology?

Response: No. The sill in Middle River has been dropped from the project. An assessment of the costeffectiveness of the sill revealed that it would provide substantially less habitat benefit for Shortnose sturgeon than would the upriver bypass. The reduction in salinity at the deep hole in Middle River would have been minimal, while the cost would have been substantial.

766-JK-53-EV18

Comment: How will maintenance of the sill be funded?

Response: The sill in Middle River has been dropped from the project. An assessment of the costeffectiveness of the sill revealed that it would provide substantially less habitat benefit for Shortnose sturgeon than would the upriver bypass. The reduction in salinity at the deep hole in Middle River would have been minimal, while the cost would have been substantial.

766-JK-53-EV19

Comment: Examples of proven success should be a requirement in the EIS for the fishway ladder and sill to be considered viable mitigation options. All of the above questions should have demonstrated answers with available funding before they are considered mitigation for SHEP.

Response: Fish ways have a long/successful history. For example, Lake sturgeon have been observed negotiating both constructed/natural rapids [entire river width] in the upper mid-west [US]. Some of these observations were made at more shallow water depths than will be the case [3.5 to 5.5 feet] for the fish passage at the New Savannah Bluff Lock and Dam (Aadland 2010). Since the Lake sturgeon is a larger species than the Shortnose, the latter should have little difficulty passing the constructed fish way.

The effectiveness of the subject sill has been predicted via hydrodynamic modeling, but there are empirical examples where similar structures have blocked salt water intrusion. For example, a sill was constructed in the Mississippi River [based on a modeling design] to protect the New Orleans' water supply from salt water contamination. (http://chl.erdc.usace.army.mil/Media/8/1/0/HL-MP-94-1.pdf). The effort was successful and the predictions from a similar model proved accurate. Even though this system is much bigger than the Savannah River, the modeling results and principles remain applicable.

766-JK-53-EV20

Comment: Additionally, we request that the Atlantic sturgeon, currently being recommended for listing as endangered species, be considered when assessing environmental impacts from SHEP.

Response: The Atlantic Sturgeon is discussed in Appendix B, Biological Assessment of Threatened and Endangered Species for the Proposed Savannah Harbor Extension Project. The Corps has received the BO from the NMFS which includes reasonable and prudent measures to protect the Atlantic sturgeon. The BO is included in Appendix Z.

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766-JK-53-EV21

Comment: We don't see any end to this artificial life support system. It seems more appropriate to study changes to river flow conditions that would positively impact habitat for spawning, eggs, and larvae. Stocking could be used until such time changes in river flows allowed for healthy spawning that produced healthy adult Striped bass. A study of river flow changes for the benefit of the Striped bass should be part of the mitigation, along with a funding mechanism to restore the fishery.

Response: Additional studies of river flow changes to benefit the Striped bass fishery would not add any material value to the original investigation. Recently, the District contacted the GA DNR-WRD and reconfirmed that the proposed expansion of their stocking program would adequately compensate for the impacts to Striped bass identified in the EIS. Please see Appendix C – Mitigation Planning for additional details concerning the stocking program.

Some Thoughts on Economics Analysis of SHEP

Judy Jennings

January 25, 2011

This writer has previously been identified as the Savannah Harbor Issue Leader for the Georgia Chapter Sierra Club. However, time deadlines loom and the ability to understand and cogently respond to complex cost and benefit analyses is therefore limited. So, these are the comments of the writer and not necessarily those of an organization.

This writer considers that, even if time had allowed for detailed analyses of the Economics report, it is highly unlikely comments would sway the Corps in their 2 ½ year-long Economics Analysis, However, past experience with Congressional authorization for SHEP, the creation of the Stakeholders Evaluation Group (SEG) and full participation in it, and advocacy for and chairmanship of the SEG's Economics Working Group (EWG) does inform and provide some insights. The Economics Analysis will continue to be a valued source of the Corps' guiding principles and of Savannah, regional, and national data on ships, commodities, and shipping trends. There is a tremendous amount of valuable information in the systems of accounts analysis that the GRR used to identify and compare the impacts of no action and of each alternative plan.

This opportunity, though, is probably best spent on observation and a few questions.

Depth and public policy:

One is the oft-repeated phrase in the GRR that Savannah is currently the second largest port on the U.S. east coast (by TEU volume). It also frequently repeats that Savannah has the shallowest controlling depth of a major port. Logic doesn't seem to tie those two sentences together, but history does. Since GPA started deepening studies in 1996 under Section 203 of WRDA 1986 until now, GPA has had an impressive list of press releases about recording breaking growth rates. This could be explained by many ways, all of which would be flattering to GPA's management, but they would not be attributable to a deeper channel. Ports in Baltimore and Norfolk currently exist at 50', and Savannah has still excelled.

One factor in Savannah was a carefully cultivated increase in liners using an all-water route, ostensibly to avoid the delays and congestion of using the land-bridge from west coast ports.

But, in 2006, Panama, a country with about the same population as the City of Houston, Texas, held a referendum to enlarge the Panama Canal to accommodate the world's bigger ships. Voter turnout was low, just over 40%. Yet about three quarters of those voting said yes to a self-financed, larger Panama Canal that could float 50 ft sailing drafts. This blip of fate from a comparatively small handful of people changed the world.

Savannah changed too, of course. The mantra for SHEP was no longer merely about keeping the port upto- date. It was about being ready for the new Panama. Port executives who had been shrill telling groups of businessmen that the Savannah port had to be deepened just "because," now had a new mantra – being ready for the new Panama. And, that is fine for port executives. It is their job.

It put the Corps, though, in the position of not just providing channels for the world's fleet of bigger ships, but of being an arbiter of international commerce and a gatekeeper for competition among U. S. ports, especially those along the east and gulf coasts, but also along the west coast.

For instance, Section 4.1 in the beginning of the GRR recounts an instance of a Mediterranean Shipping Company service that called on Savannah, left for Charleston and came back to Savannah. The identified culprit was tidal delays. But, isn't the Corps getting just a little too close to port business in thinking that one such story is relevant?

Trying to stay on a larger scale can fail too. One erroneous interpretation of the NED is that it directs federal dollars to where they'll do the most good and avoid duplication of services using national resources, both monetary and natural. But, it doesn't really do that. Most times an NED number will not fail to justify a project unless the project can be proven (before construction) to have horrendously negative consequences.

So, if Savannah is deepened to 48', it will be practically impossible for the Corps to deny other port deepenings to prepare for big ships through the Panama. We are constantly told that the Corps is directed by Congress and does not, in and of itself, set public policy. But, the approval of consecutive deepenings all with the same set of data and analyses clearly shows that the Corps is setting public policy on. The same thing can be said if, in some way, the Corps does not approve SHEP. It would still, in effect, be setting public policy.

There likely will be some small, citizen-lead effort of advocacy to Congress for their members to take control of the matter, and be responsible for accommodating the biggest change in the shipping industry in 100 years. But, it is likely Congress will let the Corps remain in the hot-seat since it is easier to watch a large federal agency sweat than take the heat for pushing earmarks in times of fiscal austerity.

Beneficial Tides:

The concept of unit efficiency from the reduction and elimination of tidal delays is more easily appreciated than even a very sincere effort to predict the efficiencies by quantifying future fleet movement.

A basic assumption is that the efficiency would, in fact, be a net change from current assumptions. And, a non-project condition assumes that all ships that draft over 38 ft are tidally constrained. Even though your summary of assumptions says that pilots are assumed to use tide to their advantage, you don't seem to use that assumption in your calculations. At an average of 7 feet twice/day, it is quite a nice benefit. So, when the calculations give credit for the elimination of tidal delays, it double-dips for the

larger ships that would use tide to their advantage. We'd ridicule taking away a benefit from a ship arrival if it encountered bad weather, mechanical failure, or pirate attacks. We do not use such unpredictable occurrences in calculations. But, tides are highly predictable and it seems we all agree they are useful.

World fleets, their deployments and appropriate load factor analyses:

No one can deny that the world fleet is growing in larger ships. But, the distribution of the world fleet to regions and ports seems to be based more on linear extrapolation and unswerving application of the cascading effect. The same is true of LFA. The potential for error is even greater with LFAs because of rapidly changing world manufacturing and consumption patterns and, again, over-reliance on past trends well into new decades. If there is opportunity for further comment on this DEIS, there are many questions (many of which might be covered in the DEIS, but time does prohibit further discussion here).

Sensitivity Analyses:

This writer and other SEG members have long called for a substantial analysis of the proposed port in Jasper County, SC.

Section 12.1.1 of the GRR states, "the proposed future Jasper County Terminal is not included as a without or with-project conditions due to the high level of uncertainty concerned the proposed terminal." While there is a level of uncertainty that can't be denied, there is a question about where uncertainty becomes overriding to analysis.

Case-in-point that was hard to miss was the inclusion of the 800,000 TEU-capacity Dames Point Hangin Terminal in Jacksonville, Florida, in Table 5-2: New, Planned, or Proposed Container Terminals in the U.S. East and Gulf. The referenced table lists the channel depth in the St. John's River as 45' though a footnote explains the study to go from 40' to 45' is still in the feasibility stage with the Corps. On January 25, 2011 (just yesterday), Hanjin announced a 2 to 2 ½ year delay in design because they want river deepening and construction to happen simultaneously. This writer had recently researched the Hanjin Terminal and could find no records of permits.

Both ports exist only in computer renderings. Why does one seem so credible, and the other so "uncertain?" After all, SHEP has existed in one form or another for over 14 years, and it is still a draft document. Risk can be a political perception.

LNG, for example:

Section 4.4 in the front of the GRR describes the Liquified Natural Gas (LNG) facility on Elba Island in the Savannah River. LNG vessels are unrestricted at the current depth, but the Coast Guard enforces a one mile "regulated navigation area" around inbound LNG tankers

Despite good efforts to coordinate, the LNG traffic does cause delays, yet the traffic is counted as a benefit because of the need for LNG vessels to arrive at high slack tide meaning that a deeper channel

would allow waiting containerships to enter the channel more quickly. It seems that such a small benefit to the project would be insignificant compared to the time spent waiting on them regardless of the tide.

The irony is that the whole issue could be academic since LNG has experienced a decline in popularity since the 2003 permit to expand LNG on Elba Island and the traffic might be less, not more.

Irony not-withstanding, the example of risks in predictions, probably outweighed by the discount factor for long planning periods, and misplaced benefits remains appropriate.
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From:	judvjennings
To:	judyjennings; Bailey, William G SAS; Bailey, William G SAS; CESAS-PD, SAS
Subject:	Re: Comments on SHEP Economics Analysis
Date:	Wednesday, January 26, 2011 12:18:48 AM

Bill, I can't believe this - I quickly added another short paragraph to my little econ paper and now the darn thing won't send the attachment...anyway, my question was - has anybody evaluated the Distribution Industry as to what stage of business it is in. For years, it clearly was a growth industry for Savannah. Is it in a growth phase still? Or, are there signs of maturation of the DC industry here?

I mentioned this in an NGO meeting last week....you may have already seen the comment other places. Or not. I can't believe I was in such a hurry I didn't put it in my own paper.

Thanks lots, Judy

Georgia Chapter Sierra Club

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780-JK-09-EC01

Comment: One is the oft-repeated phrase in the GRR that Savannah is currently the second largest port on the U.S. east coast (by TEU volume). It also frequently repeats that Savannah has the shallowest controlling depth of a major port. Logic doesn't seem to tie those two sentences together, but history does. Since GPA started deepening studies in 1996 under Section 203 of WRDA 1986 until now, GPA has had an impressive list of press releases about recording breaking growth rates. This could be explained by many ways, all of which would be flattering to GPA's management, but they would not be attributable to a deeper channel. Ports in Baltimore and Norfolk currently exist at 50', and Savannah has still excelled.

Response: Savannah Harbor has experienced significant growth in spite of the noted depth restrictions. There are a number of factors which played significant roles in that growth, viz., building additional distribution centers for imported goods, availability of affordable land in the vicinity of the terminal area, economic incentives offered by local governments, congestion [shipping and otherwise] at West Coast ports, expansion of the hinterland market, population growth in the Southeast, and the types of commodities being serviced. Recent forecasts predict this growth will continue over the period of analysis. Given the present depth restrictions in the channel, many vessels will have to light load, making them operate less efficiently than otherwise would be the case. With time, the problem will be exacerbated as cargo volumes increase and larger Post-Panamax vessels become more commonplace.

As noted in the EISI, each port is relatively unique with its growth attributable to factors besides water depth, e.g., types of calling vessels, cargo types in delivery, and port rotations. For example, the Port of Baltimore has a controlling depth of 50-feet, but its landside infrastructure is primarily designed to serve large bulk carriers [which have declined in importance in recent years as the container trade has flourished].

780-JK-09-EC02

Comment: But, in 2006, Panama, a country with about the same population as the City of Houston, Texas, held a referendum to enlarge the Panama Canal to accommodate the world's bigger ships. Voter turnout was low, just over 40%. Yet about three quarters of those voting said yes to a self-financed, larger Panama Canal that could float 50 ft sailing drafts. This blip of fate from a comparatively small handful of people changed the world.

Response: GPA is working to prepare its facilities and operations to the changes that they expect to occur in the shipping business as a result of the expansion of the Panama Canal. There are also other operative factors in play, e.g., the rapid rise in globalization, years of congestion in the main Panama Canal channel, and the increased use of Post-Panamax vessels. The following graphics [prepared by the Corps' Institute for Water Resources] illustrates the trends leading up to the GPT decision. Over the past six years, Post-Panamax containership calls on U.S. ports have increased by over 270 percent. By 2012, the world's Post-Panamax containership fleet capacity is expected to increase by nearly 80 percent, as more than 400 new Post-Panamax vessels enter service.



Historic Growth in Vessel Sizes² (Prior to Expansion Plans)

Source: ACP Expansion Report



A sizable portion of today's containerships are too large for the Canal. The following table shows the existing fleet and new orders of Post-Panamax vessels.

² PCMUS is an acronym for Panama Canal Universal Measurement System. A PCMUS is used by the Canal to establish tolls and measures volumetric capacity. A PCUMS is equivalent to approx. 100 ft³ of cargo space; a 20 ft long container is equivalent to 13 PCUMS tons.

Post-Panamax Container Vessel Fleet								
	Existing Post-Panamax Vessel Fleet (Feb. 2006)			New Orders forPost-Panamax Container Vessels			Total Fleet in 2011	
Shipping Company	Total Capacity of existing Post-Panamax Vessels	TEU Range	Total Existing Post-Panamax Vessels	Total Capacity of New Orders	TEU Range	Total Post-Panamax Vessels on order	Number of Post-Panamax Vessels	TEU Capacity
Maersk Line*	409,066	3,700 - 9,200	62	388,108	12,000 - 6,500	42	104	797,174
Mediterranean Shipping (MSC)	146,525	9,200 - 5,500	20	95,000	9,200 - 5,500	13	33	241,525
CMA-CMG	107,074	9,160 - 5,700	16	42,920	9,160 - 8,200	5	21	149,994
Evergreen Mar. Co.	151,310	5,364 - 7024	27	57,241	7,024	8	35	208,551
Hapag Lloyd Cont.	45,916	8,600 - 7,180	6	50,600	8,600 - 8,100	6	12	96,516
China Shipping	81,712	8,468 - 5,618	14	52,230	9,580 - 8,530	6	20	133,942
Hanjin Shipping Co.	37,126	5,308	7	52,000	6,500	8	15	89,126
APL	92,030	5,500 - 4,300	20				20	92,030
Coscon	84,978	5,270 - 5,576	16	80,000	10,000	8	24	164,978
Nippon Yusen Kaisha (NYK)	79,179	6,492 - 4,743	13	123,600	8,200 - 6,500	16	29	202,779
Mitsui O.S.K.	71,537	4,708 - 6,350	13	80,350	8,100 - 6350	11	24	151,887
OOCL	115,632	8,063 - 4,960	20	32,252	8,063	4	24	147,884
K"Line"	78,220	5,500 - 5,624	14	87,546	8,120 - 5,624	12	26	165,766
Yang Ming	55,132	5,512	10	73,000	8,000	9	19	128,132
Hamburg Sud	33,312	5,552	6	55,560	5,500	10	16	88,872
Hyundai	32,315	4,411 - 5,700	6	116,400	8,600 - 6,800	15	21	148,715
Others	895,884	4,330 - 9,449	135	680,083	9,580 - 5,527	89	224	1,575,967
Total	2,516,948		405	2,066,890		262	667	4,583,838
*Includes vessels from P&O Nedlloyd, now Maersk Line. Source: Shipping Intelligence Network, 1 February 2006, Clarkson Research Services								

This table shows that the changing composition of vessels calling at US ports and Savannah is no exception.

Containers	nip	Com	position	at	U.S. Ports

Vessel Size (TEUs)	2001	2002	2003	2004	2005	2006
<1,000	675	566	626	443	394	330
1,000-1,999 (Panamax)	4,975	4,097	3,492	3,463	3,600	3,800
2,000-2,999 (Panamax)	4,434	4,032	4,032	4,470	4,330	3,881
3,000-3,999 (Panamax)	3,464	4,129	4,050	3,959	3,704	3,404
4,000-4,999 (Panamax)	2,574	3,186	3,945	4,210	4,226	4,782
>5,000	972	1,128	1,142	1,734	2,288	3,312
(Post-Panamax)						
Total	17,076	17,138	17,287	18,279	18,542	19,509
TEUs per call	2,801	3,020	3,144	3,241	3,321	3,505

<u>Source</u>: American Association of Port Authorities and Terminal Operators

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780-JK-09-EC03

Comment: For instance, Section 4.1 in the beginning of the GRR recounts an instance of a Mediterranean Shipping Company service that called on Savannah, left for Charleston and came back to Savannah. The identified culprit was tidal delays. But, isn't the Corps getting just a little too close to port business in thinking that one such story is relevant?

Response: The GRR provides a discussion of how shippers respond to tidal delays, e.g., some opt to wait for adequate tide whereas, in extreme cases, some choose to call at a nearby port [which can result in transportation inefficiencies]. The landside costs, time-sensitivity, and/or value of cargo can also play a role in their decision whether to wait.

780-JK-09-EC04

Comment: Trying to stay on a larger scale can fail too. One erroneous interpretation of the NED is that it directs federal dollars to where they'll do the most good and avoid duplication of services using national resources, both monetary and natural. But, it doesn't really do that. Most times an NED number will not fail to justify a project unless the project can be proven (before construction) to have horrendously negative consequences.

Response: The Corps' Principles & Guidelines defines the Federal objective as "contributing to National Economic Development (NED) consistent with protecting the environment". The NED plan is the alternative that reasonably maximizes a project's NED benefits to the nation over its associated economic costs. The NEPA process is a separate, concurrent process intended to consider/resolve the environmental [and certain socio-economic] concerns associated with implementing a major federal action. All costs, including mitigation, are taken into account in the economic analysis.

In the case of Savannah Harbor, the 47-foot deepening alternative resulted in the highest difference in benefits over costs; thus, it is the NED plan. The transportation savings to the nation are approximately \$180 million on an average annual equivalent basis. Non-federal sponsors have the option of recommending another alternative, which is designated the Locally-Preferred Plan. Departures from the NED have cost-sharing implications and need to be approved by the Assistant Secretary of the Army for Civil Works.

780-JK-09-EC05

Comment: So, if Savannah is deepened to 48', it will be practically impossible for the Corps to deny other port deepenings to prepare for big ships through the Panama. We are constantly told that the Corps is directed by Congress and does not, in and of itself, set public policy. But, the approval of consecutive deepenings all with the same set of data and analyses clearly shows that the Corps is setting public policy on. The same thing can be said if, in some way, the Corps does not approve SHEP. It would still, in effect, be setting public policy.

Response: Every port is examined individually and the deepening of one port in no way signals that all competing ports will be deepened. All studies must follow the same rigorous process detailed in Engineering Regulation (ER) 1105-2-100 [as well as other guidance and regulations]. All analyses and documents are subject to iterative review, including an evaluation by an independent party.

As explained in the Economic Appendix, there are many variables that influence a channel's optimal depth. Examples include vessel composition, cargo weight, container slot utilization, port rotations along with the channel bathymetry. Experience demonstrates that each of these factors can vary from one port to another. Furthermore, a multiport analysis, a systematic analysis of alternate routing possibilities [including depths at other ports as well as implications for the study port], was performed in 2006. The analysis concluded that no traffic (containers) would be diverted from other ports under the With project conditions based on a least total delivered transportation cost analysis.

780-JK-09-EC06

Comment: A basic assumption is that the efficiency would, in fact, be a net change from current assumptions. And, a non-project condition assumes that all ships that draft over 38 ft are tidally constrained. Even though your summary of assumptions says that pilots are assumed to use tide to their advantage, you don't seem to use that assumption in your calculations. At an average of 7 feet twice/day, it is quite a nice benefit. So, when the calculations give credit for the elimination of tidal delays, it double-dips for the larger ships that would use tide to their advantage. We'd ridicule taking away a benefit from a ship arrival if it encountered bad weather, mechanical failure, or pirate attacks. We do not use such unpredictable occurrences in calculations. But, tides are highly predictable and it seems we all agree they are useful.

Response: The District considered the use of tides in both the "without" and "with project" conditions; therefore, there was no double counting of benefits as suggested. In the HarborSym analysis of tidal delays, vessels are assumed to arrive on a random basis. Their time (if any) is calculated from that arrival to when the tide would provide them sufficient depth to transit the navigation channel (at their arrival draft). Tidal delay benefits would occur if a deeper channel allowed that vessel to spend less time waiting for sufficient depth to transit the harbor.

Shippers adhere to "just in time delivery" practices; this makes it more difficult for a vessel to arrive precisely at the 7-foot maximum high tide. The actual tidal assistance at port call is likely to be less than optimal. Recall, there are two types of transportation savings: (1) those derived from larger vessels or from more fully loaded vessels (which include tide and underkeel clearance); and (2) the reduction in tidal delays brought about by reduced waiting and congestion. The former savings are derived by a reduced cost per ton (made possible via larger vessels or fuller loads); the latter savings are defined as the reduced congestion (calculated as the reduction in idling costs). These savings were computed through two separate models, the Transportation Cost Savings and the HarborSym. The tidal delay savings represent a much lower percentage of the overall project's benefits. For the SHEP project, the savings in transportation costs are over 90 percent of the benefits of deepening the harbor. The tidal delay benefits are much smaller.

780-JK-09-EC07

Comment: No one can deny that the world fleet is growing in larger ships. But, the distribution of the world fleet to regions and ports seems to be based more on linear extrapolation and unswerving application of the cascading effect. The same is true of LFA. The potential for error is even greater with LFAs because of rapidly changing world manufacturing and consumption patterns and, again, over-reliance on past trends well into new decades. If there is opportunity for further comment on this DEIS, there are many questions (many of which might be covered in the DEIS, but time does prohibit further discussion here).

Response: The Corps' guidance on deep-draft navigation projects emphasizes using empirical field data whenever possible together with making forecasts over a 50-year period of analysis. Data on the past and present problems help to shape the future without-project condition scenario, which serves as a baseline for project formulation and evaluation. As would be expected, a 50-year forecast contains uncertainty; therefore, several sensitivity analyses are performed using lower growth rates, no growth, and increased packaging densities. The vast majority of the sensitivity analyses show the deepening improvements are economically justified.

780-JK-09-EC08

Comment: Section 12.1.1 of the GRR states, "the proposed future Jasper County Terminal is not included as a without or with-project conditions due to the high level of uncertainty concerned the proposed terminal." While there is a level of uncertainty that can't be denied, there is a question about where uncertainty becomes overriding to analysis.

Response: As part of the incremental analyses conducted in accordance with NEPA and the language of Section 203, WRDA [1999], deepening to other sites in lieu of Garden City Terminal was considered. The site presently identified for a Jasper terminal (sometimes referred to as Sites 14A/14B) was examined as an alternative port site, as described in GRR-Sections 6 and 12, GRR-Appendix D, EIS-Section 3, and EIS-Appendix O. The analyses showed that the combined costs of developing the infrastructure to and for the terminal plus deepening to the site would exceed the costs of deepening to the existing Garden City Terminal (mitigation costs included in both scenarios). As a result, that site was dropped from further consideration as an alternative in this study. Recent events have not changed the major factors in that decision.

Although studies are underway, the developers of the site have not yet applied for a Section 404 permit. That application would provide the proposed development plan (proposed function, size, timing, equipment, etc) and allow the regulatory agencies and the public an opportunity to evaluate the environmental sustainability of whatever design is being proposed. Continued uncertainty in construction of a terminal is evidenced by the lack of ratification of a bi-state compact by the two state legislatures since signing the term sheet in 2007.

The Corps also performed a sensitivity analysis of the effects on the economic justification of deepening to the Garden City Terminal if a container terminal in Jasper County were subsequently constructed and became operational. The analysis found that deepening to the Garden City Terminal would still have been justified under most every scenario examined if, at a later time, a Jasper County terminal is

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developed. In addition, the analysis found that if a Jasper terminal was already operational, deepening the channel segment to Garden City Terminal would be economically justified.

780-JK-09-EC09

Comment: Despite good efforts to coordinate, the LNG traffic does cause delays, yet the traffic is counted as a benefit because of the need for LNG vessels to arrive at high slack tide meaning that a deeper channel would allow waiting containerships to enter the channel more quickly. It seems that such a small benefit to the project would be insignificant compared to the time spent waiting on them regardless of the tide.

Response: LNG traffic was included in the *HarborSym* analysis to model [more accurately] future vessel calls at Savannah throughout the period of analysis. These vessels were similarly considered for the "without project" and "with project" conditions. By necessity, deep-draft vessels calling on Savannah must interact with LNG vessel traffic. Restrictions placed on the LNG class in the form of safety zones and tide restrictions have an associated effect on the transit times/costs of all other deep-draft vessels. All deep-draft vessels (e.g., container, LNG, general cargo) contribute to [and by extension are subject to] harbor congestion. Therefore, the District evaluated (and included in the project) meeting areas to help alleviate the situation. Savings in LNG vessel operating costs (tidal delays) were included in the benefit/cost analysis [even though they are relatively small].

1110-MR-01-EC01

Comment: Bill, I can't believe this - I quickly added another short paragraph to my little econ paper and now the darn thing won't send the attachment....anyway, my question was - has anybody evaluated the Distribution Industry as to what stage of business it is in. For years, it clearly was a growth industry for Savannah. Is it in a growth phase still? Or, are there signs of maturation of the DC industry here?

Response: While a complete analysis of distribution centers was not performed, anecdotal evidence and cargo patterns suggest the industry is still in a growth phase. It appears the availability of affordable land and other economic incentives will continue to drive GPA's rate of container expansion [as well as the associated need for the DC industry].