GENERAL RE-EVALUATION REPORT
APPENDIX A: ECONOMICS

SAVANNAH HARBOR EXPANSION PROJECT

Chatham County, Georgia and Jasper County, South Carolina

January 2012

ATTACHMENT 6

GEC Regional Port Analysis

US Army Corps
of Engineers
Savannah District
South Atlantic Division

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Final Report

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS

US Army Corps of Engineers
Savannah District
Savannah, Georgia

Final Report

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS

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U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
SAVANNAH, GEORGIA

July 2007

EXECUTIVE SUMMARY

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The Savannah Harbor Expansion Project (SHEP) Regional Port Analysis (RPA) is an attempt to develop a regional systems approach to assessing capacity and related environmental and institutional issues for the U. S. South Atlantic container ports, including Norfolk. The focus was to identify regional locations that should be improved rather than treat port capacity and expansion on a case-by-case basis. The regional port concept reflected a view that fewer ports might need to be developed and this would be less costly and more environmentally favorable.

A detailed scope of work envisioned extensive discussions with ports and shipping lines as well as with environmental interests in order to present a balanced view of this regional port concept. The scope included a port capacity analysis for the existing, proposed, and prospective marine container terminals in the South Atlantic (Jacksonville to Norfolk) region. The scope for the environmental survey would compile secondary information and evaluation of each port and site under consideration for improvement. Finally, the institutional analysis scope would identify any show stoppers affecting capacity expansion and development particular to each port and site.

Although the scope was ambitious, the execution was constrained by subsequent delays and developments that ultimately precluded contact with the ports and necessitated the exclusive use of existing secondary information about the general conditions in the vicinity of the ports. Consequently, much of the execution of the scope of the RPA has been desktop in orientation.

Although there are specific results for the capacity analysis, environmental issues survey, and institutional analysis, these are general findings rather than specific assessments of particular marine terminals and sites. From a capacity perspective, the existing and proposed facilities are described. In general, although there is abundant marine container port capacity at present among the major ports (Norfolk, Wilmington, Charleston, Savannah, and Jacksonville), continued rapid growth will necessitate expansion and/or new developments at multiple sites.

The environmental issues survey evaluated the following resources: geology and soils; air quality; water quality; sediment quality; Coastal Zone Management Act (CZMA) resources; noise environment; wetlands; wildlife resources (including invasive species, threatened and endangered species, unique or unusual habitats, and Essential Fish Habitat [EFH]); cultural resources; hazardous, toxic, and radioactive waste (HTRW); socioeconomic profile (including environmental justice); transportation; and recreation. Data on these environmental resources were collected for each Region of Interest from environmental agencies as well as through independent research of public information. The level of constraint posed by each environmental resource and anticipated degree of impact resulting from port expansion were assessed.

The institutional analysis of particular circumstances affecting capacity utilization and expansion at each port was also general in nature. It is noted that existing port capacity is affected by various practices among the parties who own, operate, and commercially utilize these facilities. Many of these practices have been inherited from a different set of perspectives similar to when public ports were often seen as an important contributor to local urban economies. The institutional emphasis on public ports is now shifting away from public ownership adjacent to urban areas toward private sector participation and more rural locations.

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REGIONAL PORT ANALYSIS: SUMMARY

I. INTRODUCTION

A. OBJECTIVES

The Savannah Harbor Expansion Project (SHEP) Regional Port Analysis (RPA) technical scope was designed to address public review comments and items of litigation interest resulting from the 1998 Feasibility Study by The Georgia Ports Authority (GPA). At that time, some project stakeholders expressed that there should be a study of allocating Federal improvement funds at one regional port in the South Atlantic range, rather than deepening several ports. They seemed to believe that this would make sense economically (since fewer funds would be expended) and environmentally (since the impact of dredging would only occur at one port rather than at several). The regional port concept was envisioned as a separate task in the overall economic analysis, with an approach that would likely require extensive discussion with port authorities and shipping lines, as well as with environmental interests, in order to present a balanced view of the concept. It was also presumed that it might also be necessary to include economic development specialists and other local government authorities in these discussions.

The RPA scope of work developed in 2004 identified five tasks as follows: (1) Port Capacity Analysis; (2) Port Infrastructure Survey; (3) Hub and Spoke Analysis; (4) Environmental Survey; and (5) Institutional Analysis.[1] The port capacity analysis would pertain to the various container ports and existing and developing marine container terminals in the South Atlantic (Jacksonville to Norfolk). The port infrastructure survey would be an inventory of port capacity inputs and the ability to increase throughput volumes of container traffic. The hub and spoke analysis would evaluate the feasibility of regional load center ports that would feed container traffic to other ports.

The RPA scope for the environmental survey would compile existing secondary information on environmental resources and would require evaluation for each port and related site under consideration for expansion or development. Also, landside potentials for intermodal operations would be inventoried and arrayed. Finally, an assessment would be made of the secondary environmental impacts.

The RPA included an institutional analysis component that would focus on other "critical factors" (in addition to the capacity analysis and the environmental survey) enabling or inhibiting a port to expand, including such things as legal authority, non-federal sponsorship, and community acceptance. The institutional analysis was intended to concentrate on "deal makers and breakers" for particular ports and sites, such as intermodal access, dredge disposal, and bridge clearances. It was also envisioned that the institutional analysis would address whether the states under consideration would be both able and willing to fund a regional port. Similarly, the institutional analysis presumed that the shipping industry would need to be persuaded that designation of regional port improvements would better serve their needs.

[1] *Economic Analysis Work Plan Savannah Harbor Expansion Project Deep-Draft Channel Improvements, Final Report* (February 2004), prepared for the Savannah District, Corps of Engineers.

The scope of work for the RPA provided for three interim reports that would pertain to: (1) Port Capacity Analysis; (2) Environmental Issues Survey and Institutional Analysis; and (3) Summary Report.

B. EXECUTION

Data collection on marine container terminal infrastructure for the South Atlantic ports, including Norfolk, commenced through website searches in June 2005 in preparation for subsequent port site visits for confirming capacity inputs and documenting secondary data related to the survey of environmental resources. In preparation for meetings with the ports and site visits, letters were sent in late August 2005 from the Savannah District to the senior executives, including port directors, assistant directors, and executives related to operations, engineering and planning, etc., at adjacent public ports (Norfolk, Wilmington, Charleston, and Jacksonville) explaining the purpose of the RPA and advising that G.E.C., Inc. (GEC) would be contacting them concerning matters related to port capacity and expansion.

In September, all further work on the RPA was put on hold until further notice, with no outside contacts to be made pending Corps resolution of issues raised about the scope with regard to inclusion of ports other than Savannah Harbor. Late November communications were sent from the Savannah District Commander to the respective Commanders of districts covered by the RPA ports, including Norfolk, Wilmington, Charleston, and Jacksonville, requesting district assistance with the RPA in lieu of direct contact with the ports. The status of the execution of the moribund RPA was discussed at the Mobile District at a December 7 progress report meeting and presentation. As of late December 2005, there was still no closure on how to begin the execution of the RPA in terms of direct interaction with different Corps Districts and possible local port participation through districts to document the capacity and related environmental secondary information available or otherwise sought for these tasks.

At the request of the Savannah District, a description of the secondary information sought for the RPA tasks was prepared January 6, 2006. A January 10 conference call among the Corps resulted in agreement that the Planning Chiefs in the various districts would be the initial points of contact for any possible interaction with the ports. In a followup conference call on January 12, members of the GEC team for capacity analysis and the environmental survey were introduced to the district points of contact. The districts were requested to assist GEC to compile existing secondary data and perform port liaison to the extent that this was possible with the resources available. Subsequently, GEC met with the districts as follows: (1) Jacksonville – February 28; (2) Charleston – March 1; and (3) Wilmington – May 16. No meetings or communications were held with the public ports other than GPA on February 27. Some port capacity information other than website related was received (from the Jacksonville District). No further meetings or contacts were held with the districts related to port capacity information. The affected districts and ports have not received or reviewed the information in this report.

Based on initial port capacity assessments, a geographic Region of Interest (ROI) was defined for each port with regard to capacity expansion. This allowed the environmental survey to be initiated March 2006. A draft letter for the District to sign for GEC to send to Federal and state

agencies for secondary data collection was developed for District approval. The letter was reviewed, but no further action was taken pending response from the District. During April, GEC independently initiated environmental agency contacts and pursued related secondary data collection. Subsequently, the institutional analysis was initiated. Similar to the port capacity analysis and environmental survey, the institutional analysis was performed with no contacts with the public ports.

The First Interim Report, Port Capacity Analysis, was delivered July 2006. Internal Technical Review (ITR) comments were received on August 20, 2006, and responded to on September 20, 2006. The Second Interim Report, Environmental Issues Survey and Institutional Analysis, was delivered August 24 in two volumes. ITR comments on Volume II, Attachment containing the detailed environmental issues surveys were received November 1, 2006. An ITR conference call was held December 15, 2006. GEC formal responses to the ITR were submitted January 4, 2007. The second Interim Report was revised in response to the ITR comments and resubmitted on March 20, 2007.

The Third Interim Report, Summary, containing a summary of the previous two interim reports, was submitted May 10, 2007. ITR comments were received June 14 and responded to on June 25. This summary covers the major scope of the RPA with regard to analyses of South Atlantic (including Norfolk) container port capacity, environmental issues associated with container port capacity expansions, and institutional constraints and issues affecting container port capacity and related to expansion. The port capacity analysis, environmental issues survey, and institutional analysis are abstracted from the previous two interim reports in the following sections. Thereafter the next two sections will contain the full reports from capacity analysis and environmental issues survey and institutional analysis (Volume 1). An extensive appendix to the environmental issues survey will not be included in this Final Report but will remain available as resubmitted as a Second Interim Report, revised March 8, 2007.

II. PORT CAPACITY ANALYSIS

A. PORT CAPACITY INPUTS

A port capacity analysis was conducted as the first task of the RPA. Marine container terminal capacities were developed from secondary data for the major ports between Norfolk and Jacksonville, including Wilmington, Charleston, and Savannah. Marine container terminal capacity is expressed in millions of 20-foot equivalent units (TEUs) that can be moved through each terminal during a year. Marine terminal annual TEUs of capacity were developed for existing, developing, and prospective terminals at each port (tables 1, 2, and 3). The first two categories are reasonably robust based on current and planned facilities. The prospective terminals are more conceptual in nature and are not viewed as exhaustive of possible expansion capability at the different ports.

The structure of tables 1, 2 and 3 is similar in that the major physical elements that describe each port terminal are presented, including distance from sea buoy, a proxy for sailing time and other harbor related variables such as pilotage and tug assistance, number of container berths, berth

length, total terminal site space (acres), developed yard space for container storage (loads and empties) channel depth (MLLW) in feet, and rail accessibility to the container yard.

Table 1. Existing South Atlantic Marine Container Terminals – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access Container
Jacksonville							
Talleyrand	21	6	4800	173	47	38	ND
Blount Island	9	8	6600	754	167	40	ND
Total container storage					214		
Savannah							
Garden City	13	8	9693	1208	407	500x42	ND
Ocean Terminal	13	na	na	208	na	500x42	
Charleston							
Wando Welch	16.4	4	3800	na	194	400-600x45	No
North Charleston	15	3	3500	na	123	400-600x45	ND
Columbus Street	6	2	na	na	78	400-600x45	ND
Total container storage					456		
Wilmington							
Cape Fear River	26	na	6768	na	na	500x42	No
Norfolk							
Norfolk International		5	5730	811	na	50	ND
Portsmouth Marine		3	3540	219	46.8	50	ND
Newport News Marine		na	na	140	43	45	ND
Total build out					664		
Ports/Terminals							

Notes: Rail Access for containers "ND" = "near dock"; na = not available.

Source: G.E.C., Inc.

Table 2. Developing/Proposed South Atlantic Marine Containers Terminals – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access Container
Jacksonville							
Dames Point	12	2	2,400	158		40	No
Savannah							
Ocean Terminal						500x42	
Charleston							
Charleston Navy		3	3,510	238.7	201.4	400-600x45	No
Wilmington							
Norfolk							
Maersk-SeaLand			4,000	570	291	50	ND
Craney Island			8,400	580		50	ND
Ports/Terminals							

Notes: Rail Access for containers "ND" = "near dock."

Source: G.E.C., Inc.

Table 3. Other Potential South Atlantic Marine Container Terminal Sites – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access Container
Jacksonville							
Other	21			120		38	ND
Savannah							
Site 1	?				212	42	?
Site 2	?				200	42	?
Charleston							
Jasper County	7			1,776	?	42	?
Other						400-600x45	
Wilmington							
NCIP	9.5		4,000	600	?	42	?
Norfolk							
Other							
Ports/Terminals							

Notes: Rail Access for containers "ND" = "near dock," "?" indicates that rail near dock access unknown and/or non-existent at present but could be planned.

Source: G.E.C., Inc.

B. PORT DEMAND PROJECTIONS

The projected loaded containers for each port developed in 2004 for the period 2004 - 2050 were adjusted to reflect 2005 total reported TEUs of throughput, loaded and empty containers, at each port. The 2005 total TEU volumes were forecasted out to 2050 using the 2004 - 2050 projections of loaded containers (Table 4).[2]

Table 4 reports the import and export containers (loaded), empty containers and total containers for the ports. Savannah, Charleston and Norfolk, the major container ports based on total TEUs, are each near 2.0 million TEUs at the base year, 2005, and each will be nearly 2.5 million total TEUs by 2010. During the each of the three five year periods from 2005 through 2020 these major ports will each grow by a total TEU volume of about 0.5 million TEUs.

[2] The container projections for each port were based on South Atlantic Region Waterborne Trade Forecast and Savannah Harbor Waterborne Trade Forecast as contained in *Savannah Harbor Expansion Project Deep-Draft Channel Improvements Economic Analysis: Commodity Projections, Final Report* (November 2004).

Table 4. Projected TEUs for South Atlantic Ports, 2005-2050
(000,000)

Port		2003	2005	2010	2015	2020	2030	2040	2050
Jacksonville	Imports	39,632	207,389	285,008	360,091	453,996	722,891	1,093,184	1,540,227
	Exports	94,269	99,299	112,183	122,307	135,491	181,511	285,999	500,993
	Loaded	133,901	306,688	397,191	482,398	589,487	904,402	1,379,183	2,041,220
	Empty		470,630	609,512	740,267	904,601	1,387,856	2,116,434	3,132,367
	Total		**777,318**	1,006,703	1,222,665	1,494,088	2,292,258	3,495,617	5,173,587
Savannah	Imports	602,107	664,876	916,546	1,105,626	1,310,895	1,848,206	2,585,808	3,527,589
	Exports	388,361	408,991	420,447	442,855	488,149	637,739	945,571	1,543,369
	Loaded	990,468	1,073,867	1,336,993	1,548,481	1,799,044	2,485,945	3,531,379	5,070,958
	Empty		827,653	1,030,450	1,193,448	1,386,563	1,915,973	2,721,712	3,908,299
	Total		**1,901,520**	2,367,443	2,741,929	3,185,607	4,401,918	6,253,091	8,979,257
Charleston	Imports	756,533	766,376	1,053,532	1,282,451	1,522,373	2,125,422	2,917,229	3,905,324
	Exports	427,016	449,301	505,916	567,983	648,299	895,918	1,364,276	2,196,283
	Loaded	1,183,549	1,215,677	1,559,448	1,850,434	2,170,672	3,021,340	4,281,505	6,101,607
	Empty		770,909	988,908	1,173,434	1,376,509	1,915,952	2,715,072	3,869,271
	Total		**1,986,586**	2,548,356	3,023,868	3,547,181	4,937,292	6,996,577	9,970,878
Wilmington	Imports	45,717	92,810	139,503	182,438	230,356	357,183	533,105	770,210
	Exports	19,557	21,143	24,479	28,956	36,222	71,517	178,500	435,375
	Loaded	65,274	113,953	163,982	211,394	266,578	428,700	711,605	1,205,585
	Empty		34,831	50,123	64,615	81,483	131,037	217,510	368,500
	Total		**148,784**	214,105	276,009	348,061	559,737	929,115	1,574,085
Norfolk	Imports	631,842	747,670	986,995	1,137,987	1,297,150	1,719,736	2,294,811	3,028,714
	Exports	320,265	391,428	419,754	447,059	488,878	640,788	993,433	1,720,759
	Loaded	952,107	1,139,098	1,406,749	1,585,046	1,786,028	2,360,524	3,288,244	4,749,473
	Empty		842,857	1,040,901	1,172,829	1,321,542	1,746,631	2,433,083	3,514,295
	Total		**1,981,955**	2,447,650	2,757,875	3,107,570	4,107,155	5,721,327	8,263,768
Grand Total			6,796,163	8,584,257	10,022,346	11,682,507	16,298,359	23,395,726	33,961,576

Notes: Imports and Exports are loaded TEUs from SHEP Commodity Projections.
"Loaded" is the sum of Import and Export TEUs from SHEP Commodity Projections.
"Total" is the number of TEUs (loaded and empty) reported by American Association Port Authorities (May 8, 2006).
"Empty" is the difference between "Total" and "Loaded" TEUs.

Source: Savannah Harbor Expansion Project Deep-Draft Channel Improvements Economic Analysis: Commodity Projections (Final Report, November 2004).

C. PORT CAPACITY PROJECTIONS

The capacity at each port among the existing, developing, and proposed terminals was compared to current and projected annual throughput TEUs (Table 5). The results indicate that there is substantial current capacity (comparing 2005 TEUs with existing capacity), but demand is projected to grow significantly in the near term (2005 to 2020). For example, existing Savannah capacity is 2.652 million TEUs compared to 2005 throughput of 1.902 million TEUs. However, by 2010, the existing terminal capacity at most ports will be nearly fully utilized based on comparing projected 2010 TEUs with existing capacity. For example, 2010 projected TEUs for Savannah are 2.367 million compared to existing capacity of 2.652 million TEUs. Consequently, developing terminals coming on line will be needed to meet projected demand after 2010 at most ports.

Table 5. Estimated TEU Annual Capacity of South Atlantic Ports, Existing, Developing, and Other Terminals (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Developing	0.900							
	Other								
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
Savannah	Existing	2.652	1.902						
	Developing	2.421							
	Other	3.300							
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Charleston	Existing	2.646	1.987						
	Developing	1.430							
	Other	2.000							
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Norfolk	Existing	3.200	1.982						
	Developing	4.660							
	Other								
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
Total	Existing	10.176	6.797						
	Developing	9.411							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962

Source: G.E.C., Inc.

D. PORT DEMAND AND CAPACITY SHIFTS

A regional port concept that concentrates existing capacity and/or future growth in demand at a particular "port" in the region was examined by shifts in port throughput (Table 6) and shifts in growth of container volumes among adjacent ports (Table 7). The South Atlantic port region, including Norfolk, is dominated by three large container ports (Norfolk, Charleston, and Savannah). Shifts in port throughput for Jacksonville and Wilmington are relatively inconsequential to capacity utilization compared to Norfolk, Charleston, and Savannah. Similarly, shifts in future growth of container volume at Jacksonville and Wilmington can be more readily absorbed by existing and developing capacities at major ports compared to shifts of container volume growth away from the major ports.

In Table 6 the total existing capacity for all ports is 10.176 million TEUs compared to total throughput (2005) of 6.797 million TEUs. If Norfolk existing capacity was excluded (Total, ex Norfolk) the total existing capacity would be 6.976 million TEUs compared to total current throughput of 6.797 million TEUs. Similar results occur for excluding Charleston (Total, ex Charleston) and Savannah (Total, ex Savannah), suggesting that there are limited opportunities to

accommodate a load center port volume at one of the existing major ports without substantial new port capacity, tantamount to a new port at one or more locations for existing capacity and throughput.

A similar analysis with regard to shifting growth TEUs among the ports is contained in Table 7. For example, Jacksonville has 1.178 million TEUs of existing capacity and 0.777 million TEUs of current (2005) throughput. Shifting the growth TEUs projected for Savannah between 2005 and 2010, 0.465 million, to Jacksonville would result in a 2010 throughput of 1.472 million TEUs. Similarly, shifting Savannah growth TEUs to Charleston by 2010 would increase Charleston to 3.862 million TEUs requiring the use of nearly half of the developing capacity (1.430 million TEUs) projected to occur.

The analysis confirms that the major ports are growing rapidly relative to existing terminal capacities and in substantial volumes compared to the capability of planned marine container terminals. Such growth would not be able to be contained at one single load center port by concentrating new growth and capacity at one port. The sizes of the major ports, relative to throughput and projected growth, is such that future traffic could not be readily absorbed by one port in the region.

Table 8 compares the projected growth in TEUs at each port with existing, developing and other capacity, including total capacity. For example while Savannah has sufficient existing capacity (2.652 million TEUs) for current volumes (1.902 million TEUs) the growth in TEUs by 2010, 0.465 million, will increase total throughput to 2.367 million TEUs, thus necessitating new (developing) capacity to become available. Over a longer period of time the ports are even more stretched between growth TEUs and projected increases in total throughput as a result. For example, Charleston and Savannah together are projected to experience nearly one million TEU growth between 2005 and 2010 and nearly two million TEU growth between 2005 and 2015 (Table 8). This kind of very significant sustained growth relative to the thresholds of typical modern container port terminal capacities (about 1.0 million TEUs) suggests that all of the existing ports will be necessary to expand rather than creating a single hub port.[3] This kind of growth is indicative of multiple new Greenfield terminal sites at existing ports and terminals or Greenfield ports rather than employing a single load center hub port that would concentrate containers at existing terminals or accelerate the full utilization of developing terminals.

[3] For example the developing capacity at Charleston is based on a new container terminal on the Cooper River with a projected annual capacity of 1.430 million TEUs. The developing capacity at Savannah is based on two sites which would both have a total annual throughput capacity of about 2.421 million TEUs. These terminal capacities for multiple facilities and multiple ports appear to be required to accommodate the burgeoning container throughput demand for the region.

Table 6. Estimated TEU Annual Capacity of Total South Atlantic Ports, Existing, Developing, and Other Terminals, Excluding One Port (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
	Capacity								
Total	Existing	10.176	6.797						
	Developing	9.411							
	Subtotal	**19.587**							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962
Total, ex Norfolk	Existing	6.976	6.797						
	Developing	4.751							
	Subtotal	**11.727**							
	Other	7.300							
	Total	19.027		8.584	10.021	**11.682**	16.298	23.396	33.962
Total, ex Wilmington	Existing	9.676	6.797						
	Developing	9.411							
	Subtotal	**19.087**							
	Other	5.300							
	Total	24.387		8.584	10.021	11.682	**16.298**	23.396	33.962
Total, ex Charleston	Existing	7.530	6.797						
	Developing	7.981							
	Subtotal	**15.511**							
	Other	5.300							
	Total	20.811		8.584	10.021	11.682	**16.298**	23.396	33.962
Total, ex Savannah	Existing	7.524	6.797						
	Developing	6.990							
	Subtotal	**14.514**							
	Other	4.000							
	Total	18.514		8.584	10.021	**11.682**	16.298	23.396	33.962
Total, ex Jacksonville	Existing	8.998	6.797						
	Developing	8.511							
	Subtotal	**17.509**							
	Other	7.300							
	Total	24.809		8.584	10.021	11.682	**16.298**	23.396	33.962

Notes: Growth TEUs represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.
Bold entries for existing and developing capacity (subtotal) correspond to nearest projected throughput demand, 2010 to 2050, in bold.

Source: G.E.C., Inc.

Table 7. Estimated TEU Annual Capacity and Shifting Throughput Growth at South Atlantic Ports (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
	Growth TEUs			0.230	0.446	0.717	1.515	2.719	4.397
Savannah	Existing	2.652	1.902						
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Charleston	Existing	2.646	1.987						
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
	Growth TEUs			0.561	1.036	1.560	2.950	5.010	7.984
Wilmington	Existing	0.500	0.149						
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Norfolk	Existing	3.200	1.982						
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
	Growth TEUs			0.466	0.776	1.126	2.125	3.739	6.282
Total	Existing	10.176	6.797						
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962
	Growth TEUs			1.787	3.224	4.885	9.501	16.599	27.165

Notes: Growth TEUS represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.

Source: G.E.C., Inc.

Table 8. Estimated TEU Annual Capacity and Throughput Growth at South Atlantic Ports (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
Add Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				1.472	2.062	2.777	4.792	7.847	12.251
Savannah	Existing	2.652	1.902						
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Add Jacksonville	Growth TEUs			0.230	0.446	0.717	1.515	2.719	4.397
Subtotal				2.597	3.187	3.902	5.917	8.972	13.376
Savannah	Existing	2.652	1.902						
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Add Charleston	Growth TEUs			0.561	1.036	1.56	2.95	5.01	7.984
Subtotal				2.928	3.777	4.745	7.352	11.263	16.963
Charleston	Existing	2.646	1.987						
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Add Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				3.013	3.862	4.830	7.437	11.348	17.048
Charleston	Existing	2.646	1.987						
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Add Wilmington	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Subtotal				2.613	3.150	3.746	5.348	7.777	11.396
Wilmington	Existing	0.500	0.149						
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Add Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				0.679	1.115	1.631	3.060	5.280	8.651
Wilmington	Existing	0.500	0.149						
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Add Charleston	Growth TEUs			0.561	1.036	1.560	2.950	5.010	7.984
Subtotal				0.775	1.312	1.908	3.510	5.939	9.558
Wilmington	Existing	0.500	0.149						
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Add Norfolk	Growth TEUs			1.787	3.224	4.885	9.501	16.599	27.165
Subtotal				2.001	3.500	5.233	10.061	17.528	28.739
Norfolk	Existing	3.200	1.982						
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
Add Wilmington	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Subtotal				2.513	2.885	3.307	4.518	6.501	9.689
Total	Existing	10.176	6.797						
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962

Notes: Growth TEUS represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.

Source: G.E.C., Inc.

III. ENVIRONMENTAL ISSUES SURVEY

An Environmental Issues Survey was the second task under the RPA. In March 2007 an Environmental Issues Survey was submitted in accordance with the February 2004 scope of work and superseding guidance provided by the Savannah and Mobile districts. The work plan envisioned selection of discrete expansion alternative sites and associated intermodal access points and hinterland corridors for each candidate site, site reconnaissance and primary data collection, and interviews with personnel at pertinent ports. Concern was raised by the Mobile District that an environmental survey of discrete sites prior to a full National Environmental Policy Act (NEPA) analysis would constitute a "pre-decisional" action. Consequently, new guidelines were issued specifying that the survey would evaluate environmental resources that could potentially be impacted during any planned port or deep-draft channel expansion. The survey utilized publicly available information, and no new data were collected. The survey and its findings were presented in the Second Interim Report submitted in March 2007.[4]

The July 2006 Multiport Analysis identified five ports as candidates for the proposed Regional Port: Jacksonville, Savannah, Charleston, Wilmington, and Hampton Roads (Norfolk). To prevent concerns over pre-decisional expansion site selection(s), a Region of Interest (ROI) was selected for each port that was broad in extent and generally included both coastal and inland areas (in the case of Charleston, two ROIs were selected). Location maps for each ROI are presented in Appendix A. The following environmental resources were identified for evaluation: geology and soils; air quality; water quality; sediment quality; Coastal Zone Management Act (CZMA) resources; noise environment; wetlands; wildlife resources (including invasive species, threatened and endangered species, unique or unusual habitats, and Essential Fish Habitat [EFH]); cultural resources; hazardous, toxic, and radioactive waste (HTRW); socioeconomic profile (including environmental justice); transportation; and recreation. Data on these environmental resources were collected for each ROI from environmental agencies as well as through independent research of public information. The level of constraint posed by each environmental resource and the anticipated degree of impact resulting from port expansion were assessed. These data are presented in the Second Interim Report submitted in March 2007 and summarized in Table 9. A synopsis of determinations by environmental resource is presented below.

A. ENVIRONMENTAL RESOURCE CONSTRAINT DETERMINATIONS

1. Geology and Soils

Potential primary impacts to geology or soils that could result from port expansion within the selected ROIs include loss of rare or unique geology features or prime or unique farmland soils resulting from construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROIs include disturbance or degradation of these features from an increase in cargo vessel traffic and

[4] Savannah Harbor Expansion Project, Regional Port Analysis Environmental Issues Survey Institutional Analysis, Second Interim Report (revised March 8, 2007) Volume I and Volume II: Attachment.

Table 9. Constraint Determination and Anticipated Impact Levels for Regional Port Expansion ROIs

Parameter	Port Expansion Region of Interest																	
	Jacksonville			Savannah			Charleston						Wilmington			Norfolk		
							Berkeley-Charleston County			Jasper County								
	Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level	
		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary
Geology and Soils	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Air Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M1	M1	M2	M2	M1	M2	S	M1	S
Water Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M2	M1	M2	S	M1	S	S	M1	S
Sediment Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M2	M1	M2	M2	M1	M2	S	M1	S
Noise Environment	M2	M2	M2	M2	M2	M2	S	M2	S	N	N	N	M2	M2	M2	M2	M2	M2
Coastal Zone Management Act Resources	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2
Wetlands	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2
Wildlife Resources																		
Invasive Species	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2
Natural Areas	M2	M2	M2	M1	M1	M1	M1	M1	M1	M1	M1	M1	S	M2	S	M1	M1	M1
Threatened and Endangered Species	S	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
Critical Habitat	S	S	S	N	N	N	N	N	N	N	N	N	S	M1	S	N	N	N
Unique or Unusual Habitats	M1	M1	M1	M1	M1	M1	M2	M2	M2	M2	M2	M2	M2	M2	M2	M1	M1	M1
Essential Fish Habitat	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Cultural Resources	M2	M1	M2	M1	M1	M2	M2	M1	M2	N	N	N	S	M1	S	S	S	S
Hazardous, Toxic, and Radioactive Waste	M2	M1	S	M1	M1	S	M1	M1	S	N	M1	S	M1	M1	S	S	S	S
Socioeconomic Profile	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Environmental Justice	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N
Transportation	S	M1	S	S	M1	S	S	M1	S	S	M1	S	S	M1	S	S	M1	S
Recreation	M2	M1	M2	M1	M1	M1	M2	M1	M2	M1	M1	M1	S	M2	S	M1	M1	M1

Notes:
For Constraint Determination:
S = Substantial Constraint
M2 = Moderate Constraint
M1 = Minor Constraint
N = Not a Constraint at Present
For Anticipated Impact Level:
S = Substantial Adverse Impacts Anticipated
M2 = Moderate Adverse Impacts Anticipated
M1 = Minor Adverse Impacts Anticipated
N = No Appreciable Adverse Impacts Anticipated at Present

Source: G.E.C., Inc., 2006.

transportation vehicles at adjacent intermodal rail and surface road accesses. No rare or environmentally sensitive geologic features are present within any of the selected ROIs. No prime or unique farmland soils are present within the ROIs. Geology and soils are not believed to constitute a constraint to port expansion within any ROI. No appreciable primary or secondary impacts are anticipated to this resource as a result of port expansion activities or consequences.

2. Air Quality

Potential primary impacts to air quality that could result from port expansion within the selected ROIs include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. These impacts would be temporary in nature. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROIs include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Air quality has been assessed as a moderate constraint for all ROIs except Savannah and Norfolk, where it has been assessed as a substantial constraint. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville, Charleston, and Wilmington ROIs. Substantial secondary adverse impacts are anticipated for the Savannah and Norfolk ROIs.

3. Water Quality

Potential primary impacts to water quality within the selected ROIs that could result from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Actions or consequences associated with port expansion within the ROIs that could result in secondary adverse impacts to water quality include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a moderate constraint for all ROIs except Savannah, Wilmington, and Norfolk, where it has been assessed as a substantial constraint. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville and Charleston ROIs. Substantial secondary adverse impacts are anticipated for the Savannah, Wilmington, and Norfolk ROIs.

4. Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the selected ROIs that could result from potential port expansion activities include emissions and

discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts to water quality from port expansion activities include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal accesses. Sediment quality has been assessed as a substantial constraint for the Savannah, Wilmington, and Norfolk ROIs and a moderate constraint for the remaining ROIs. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville and Charleston ROIs. Substantial secondary adverse impacts are anticipated for the Savannah, Wilmington, and Norfolk ROIs.

5. Noise Environment

Actions associated with port expansion within the selected ROIs that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts to the noise environment associated with potential port expansion within the ROIs could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a moderate constraint for all ports except the Charleston ROIs. Noise environment has been assessed as a substantial constraint for the Berkeley-Charleston County ROI and is not believed to constitute a constraint for the Jasper County ROI. Moderate primary adverse impacts to noise are anticipated for all ROIs except the Jasper County ROI, where no appreciable primary adverse impacts are anticipated. Moderate secondary adverse impacts are anticipated for all ROIs except the Charleston ROIs, where substantial secondary adverse impacts are anticipated for the Berkeley-Charleston County ROI, and no appreciable secondary adverse impacts are anticipated for the Jasper County ROI.

6. Coastal Zone Management Act Resources

Potential primary adverse impacts to CZMA resources within the selected ROIs resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROI from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. CZMA resources have been assessed as a substantial constraint to port expansion within all ROIs. Moderate primary and secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

7. Wetlands

Wetlands comprise a significant percentage of land surfaces within all selected ROIs. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROIs. Potential secondary impacts to wetlands resulting from port expansion could include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion for all ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential port expansion actions or consequences.

8. Wildlife Resources

a. Invasive Species

Potential primary adverse impacts associated with invasive species resulting from port expansion activities within all selected ROIs include the introduction of new species to the ROIs from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROIs to new areas. Secondary impacts associated with invasive species within the ROIs resulting from port expansion activities could include the introduction of new species as a result of ballast water dumping from commercial vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROIs and disposing of any dredged material at locations within the ROIs, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of U.S. Coast Guard (USCG) ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion within all ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

b. Natural Areas

Potential primary adverse impacts to natural areas resulting from port expansion activities include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to natural areas resulting from potential port expansion within the selected ROIs include erosion of near shore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur within any designated preserves, the increase in cargo vessel traffic and surface transport vehicles associated with port expansion could result in adverse impacts to these resources. Additionally, because many state designated natural areas do not necessarily have any legal protection status , these natural areas

could be adversely impacted by the construction of new port facilities and adjacent intermodal rail and surface road accesses. Natural areas have been assessed as a minor constraint for all ROIs except the Jacksonville and Wilmington ROIs, where it has been assessed as a moderate and significant constraint, respectively. Minor primary adverse impacts are anticipated for all ROIs except the Jacksonville and Wilmington ROIs, where moderate primary adverse impacts are anticipated. Minor secondary adverse impacts are anticipated for all ROIs except Jacksonville and Wilmington, where moderate and significant secondary adverse impacts are anticipated, respectively.

c. Threatened and Endangered Species

Potential primary impacts to listed species that could result from port expansion within the selected ROIs include loss of terrestrial and near shore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses, disturbance of benthic habitat from dredging operations, and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses and disturbance of terrestrial, near shore, benthic, and pelagic habitat from increased cargo vessel traffic. Threatened and endangered species has been assessed as a substantial constraint to port expansion at all ROIs. Substantial primary and secondary adverse impacts are anticipated for this resource at all ROIs as a result of port expansion activities or consequences. The National Marine Fisheries Service (NMFS) Southeast Regional Office (SERO) has stated that the species of greatest concern with regard to port expansion in the South Atlantic region is the North Atlantic right whale (*Eubalaena glacialis*), which is particularly vulnerable to secondary impacts such as increased vessel traffic. The SERO indicated that in order for port expansion actions in or near right whale critical habitat to proceed, NMFS may impose reasonable and prudent alternatives on the federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation.

d. Critical Habitat

Critical habitat is present within the Jacksonville and Wilmington ROIs. Potential primary impacts to critical habitat resulting from port expansion within these ROIs include loss of critical habitat from construction of new port facilities and adjacent intermodal rail and surface road accesses and disturbance of near shore and aquatic critical habitat from dredging operations. Secondary impacts to critical habitat resulting from potential port expansion within the ROIs include erosion of near shore critical habitat from increased wake action resulting from an increase in cargo vessel traffic and disturbance of near shore, upland, and aquatic critical habitat caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. Although it is unlikely that the construction of new port facilities and adjacent intermodal accesses would occur within a designated critical habitat area, potential secondary impacts from wave erosion and noise disturbance associated with vessel traffic increases are possible. Critical habitat has been assessed as a substantial constraint to port expansion within the Jacksonville and Wilmington ROIs. Substantial primary adverse impacts to critical habitat are anticipated for the Jacksonville ROI, and minor primary adverse impacts to critical habitat are anticipated for the Wilmington ROI. Substantial secondary adverse impacts are anticipated

for both ROIs. No designated critical habitat exists in the other ROIs, and critical habitat is not believed to constitute a constraint to port expansion within these ROIs at this time. No appreciable primary or secondary adverse impacts are anticipated to this resource at the remaining ROIs as a result of port expansion actions or consequences.

e. Unique or Unusual Habitats

Primary adverse impacts to unique or unusual habitats that could result from port expansion within the selected ROIs include loss of terrestrial and near shore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and disturbance of benthic habitat from dredging operations. Potential secondary impacts to unique or unusual habitats associated with potential port expansion within the ROIs include disturbance of near shore and benthic habitat from increased cargo vessel traffic and habitat impairment from increased point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses. Unique or unusual habitat has been assessed as a minor constraint to port expansion within the Jacksonville, Savannah, and Norfolk ROIs and as a moderate constraint for the Charleston and Wilmington ROIs. Minor primary and secondary adverse impacts are anticipated as a result of port expansion within the Jacksonville, Savannah, and Norfolk ROIs, and moderate primary and secondary adverse impacts are anticipated for the Charleston and Wilmington ROIs.

f. Essential Fish Habitat

EFH is found throughout all selected ROIs for a large assemblage of managed marine fishes and invertebrates, including various shrimp species, red drum, members of the snapper-grouper complex, and highly migratory managed species. Potential primary adverse impacts to EFH that could result from port expansion activities within the ROIs include loss of near shore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of near shore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. EFH has been assessed as a substantial constraint to port expansion at all ROIs. Substantial primary and secondary adverse impacts are anticipated for EFH at all ROIs as a result of port expansion activities or consequences.

g. Cultural Resources

Potential primary adverse impacts to cultural resources from port expansion activities within the selected ROIs include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of near shore cultural resources from wave action associated with increased commercial vessel traffic. Significant areas with low densities of cultural resource sites are present within all ROIs except for Norfolk, indicating that construction of new facilities may not pose a significant threat to cultural resources within these ROIs; however, the loss of near shore sites from wave action remains a possibility. Cultural

resources have been assessed as a substantial constraint to port expansion within the Wilmington and Norfolk ROIs, a moderate constraint within the Jacksonville and Berkeley-Charleston County ROIs, and a minor constraint within the Savannah ROI. The resource is not believed to constitute a constraint within the Jasper County ROI at this time. Minor primary adverse impacts are anticipated for all ROIs except Jasper County (where no adverse impacts are anticipated) and Norfolk (where substantial impacts are anticipated). Moderate secondary adverse impacts are anticipated for all ROIs except Jasper County, where no such impacts are anticipated, and the Wilmington and Norfolk ROIs, where substantial secondary adverse impacts are anticipated.

h. Hazardous, Toxic, and Radioactive Waste

HTRW may pose a constraint to port expansion activities. The presence of significant REC sites in a given area may render the area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels. HTRW has been assessed as a substantial constraint to port expansion within the Norfolk ROI, a moderate constraint within the Jacksonville ROI, and a minor constraint within the Savannah, Berkeley-Charleston County, and Wilmington ROIs and is not believed to constitute a constraint within the Jasper County ROI at this time. Minor primary adverse impacts are anticipated as a result of port expansion for all ROIs except Norfolk, where substantial primary adverse impacts are anticipated. Substantial secondary adverse impacts are anticipated for all ROIs.

i. Socioeconomic Profile

Expansion of port facilities in any of the selected ROIs would likely result in the creation of new jobs and new infrastructure within the ROIs. Potential primary impacts to socioeconomic conditions within the ROIs include the acquisition of property from landowners or residents for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROIs. Socioeconomic conditions are not believed to constitute a constraint to port expansion within any ROI. Port expansion would likely constitute a net benefit to socioeconomic conditions within all ROIs, and no net primary or secondary adverse impacts are anticipated as a result of port expansion actions or consequences.

j. Environmental Justice

All selected ROIs except Jasper County contain areas with significant minority and/or poverty levels that are subject to Environmental Justice consideration. Construction of

new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, ample areas exist within the ROIs for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROIs. Environmental justice has been assessed as a minor constraint to port expansion within all ROIs. Minor primary adverse impacts are anticipated for all ROIs, and no net secondary adverse impacts are anticipated for any ROI as a result of port expansion actions or consequences.

k. Transportation

All ROIs except Jasper County contain extensive networks of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. Potential primary adverse impacts to transportation resulting from port expansion activities include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses, and temporary disruption of vessel traffic in areas selected for channel modification. Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROIs include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Transportation has been assessed as a substantial constraint to port expansion within all ROIs. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

l. Recreation

Common recreational activities within the selected ROIs include boating, fishing, birding, and touring historic sites and natural areas. Potential primary adverse impacts to recreation within the ROIs resulting from port expansion include loss of near shore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses; secondary adverse impacts include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic. Recreation has been assessed as a substantial constraint to port expansion within the Wilmington ROI, a moderate constraint within the Jacksonville and Berkeley-Charleston County ROIs, and a minor constraint within the remaining ROIs. Minor primary adverse impacts are anticipated as a result of port expansion for all ROIs except Wilmington, where moderate primary adverse impacts are anticipated. Substantial secondary adverse impacts are anticipated for the Wilmington ROI, moderate secondary adverse impacts are anticipated for the Jacksonville and Berkeley-Charleston County ROIs, and minor secondary adverse impacts are anticipated for the remaining ROIs.

IV. INSTITUTIONAL ANALYSIS

An Institutional Analysis (IA) was conducted as a third task of the RPA to identify other "critical factors" (in addition to the capacity analysis and the environmental survey) enabling or inhibiting development of a regional port. The IA was intended to concentrate on "deal makers and breakers" for particular ports and sites among other factors.

Because of a change in the way in which the scope of work was to be executed, the IA was developed from desktop materials and general familiarity with the ports as opposed to site visits and specific local assessments. Consequently, the focus of the IA is on general impediments to the efficient use of existing marine terminal capacity and the major considerations for new marine terminal development.

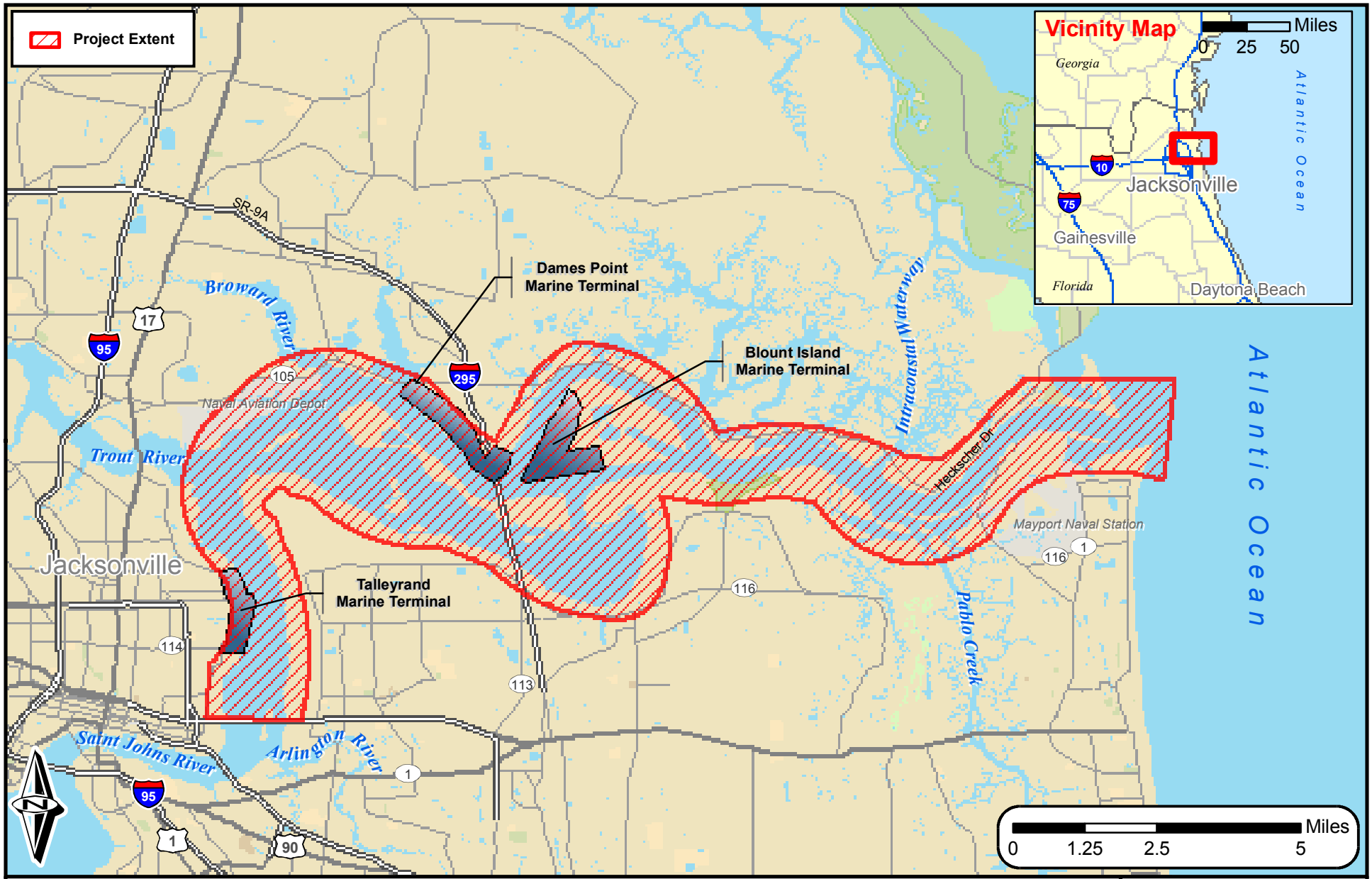
Among the general institutional impediments to efficient use of existing marine capacity are restricted hours and days of gate operations. Existing labor rules and practices require overtime payments for extended gate operations. This acts as a disincentive to expand marine terminal access to trucks, which handle over 80 percent of the U.S. east coast container port traffic. Also, many local businesses are not staffed to receive freight after an eight hour work day five days of the week, thus limiting the effectiveness of expanded marine terminal access hours.

Although much focus has been made on marine terminal storage of empty containers, the dwell times of loaded boxes are a more substantial determinant of throughput capabilities. Reductions in average dwell times of loaded boxes sitting in the terminal will have a proportional impact on increasing throughput. Consequently, it would appear that opportunity exists for a substantial increase in throughput for existing and proposed facilities, other things being equal.

Major new marine terminal capacity considerations include land, intermodal access, public/private partnerships, and community acceptance. Modern marine container terminal sites require a minimum of 200 acres preferably with room for expansion. Rail intermodal access is considered important, but a distinct minority of containers at South Atlantic ports currently move by rail (generally for niche markets with respect to longer distances, overweight and empty boxes). Truck and highway access continues to be predominant for ECUS ports because of the comparatively shorter distances and lower volumes served compared to West Coast U.S. ports.

There is evidence of a paradigm shift in financing and ownership of marine container terminals away from the traditional public port model and involving greater private sector investment and control. There is also a shift away from urban locations in favor of rural areas where the local economic impacts are likely to be greater and there is more community acceptance.

APPENDIX A



Jacksonville ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrolgy Dataset

GEC

Figure: 1
Date: April 2007
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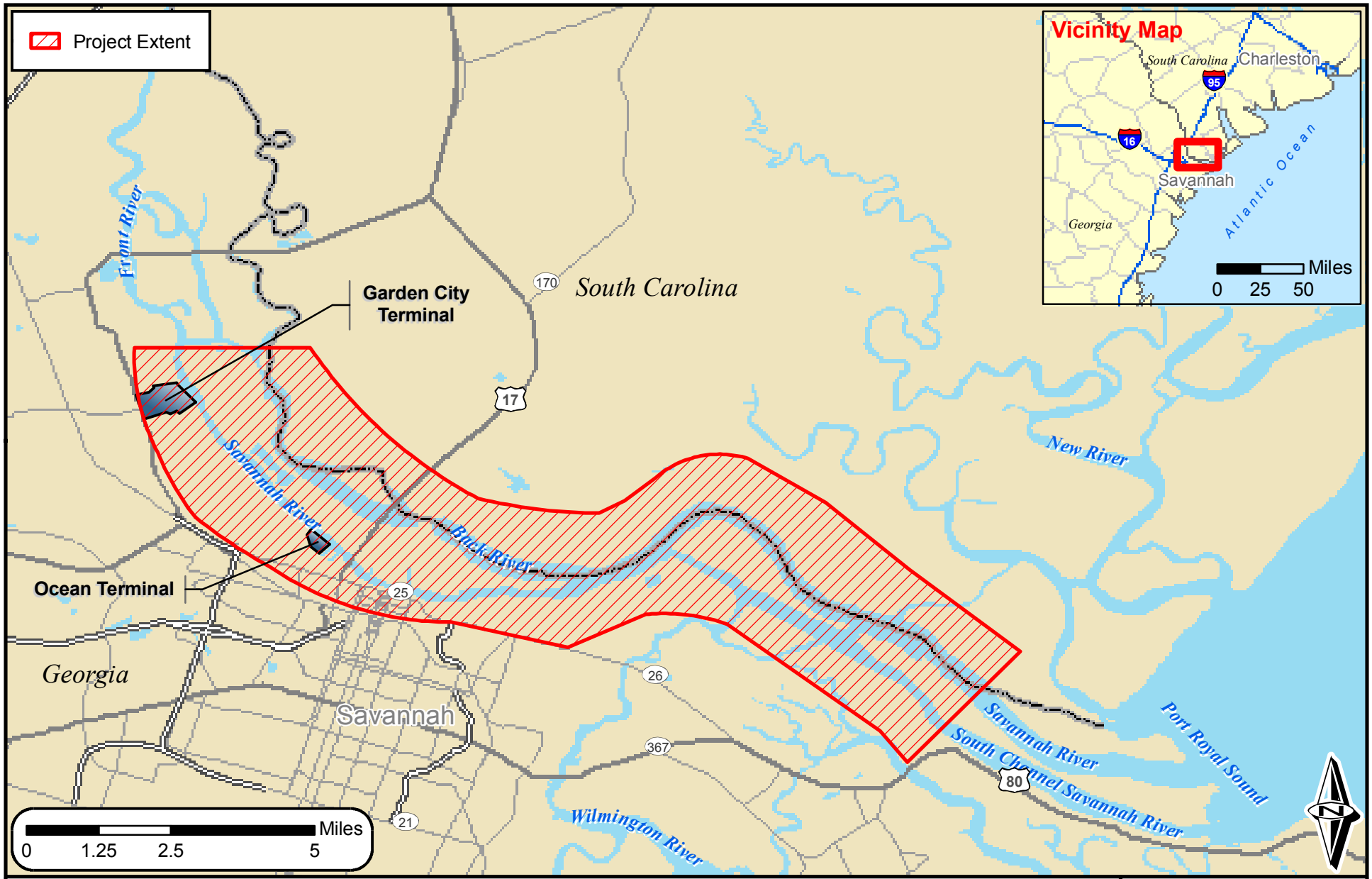

Savannah ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 2
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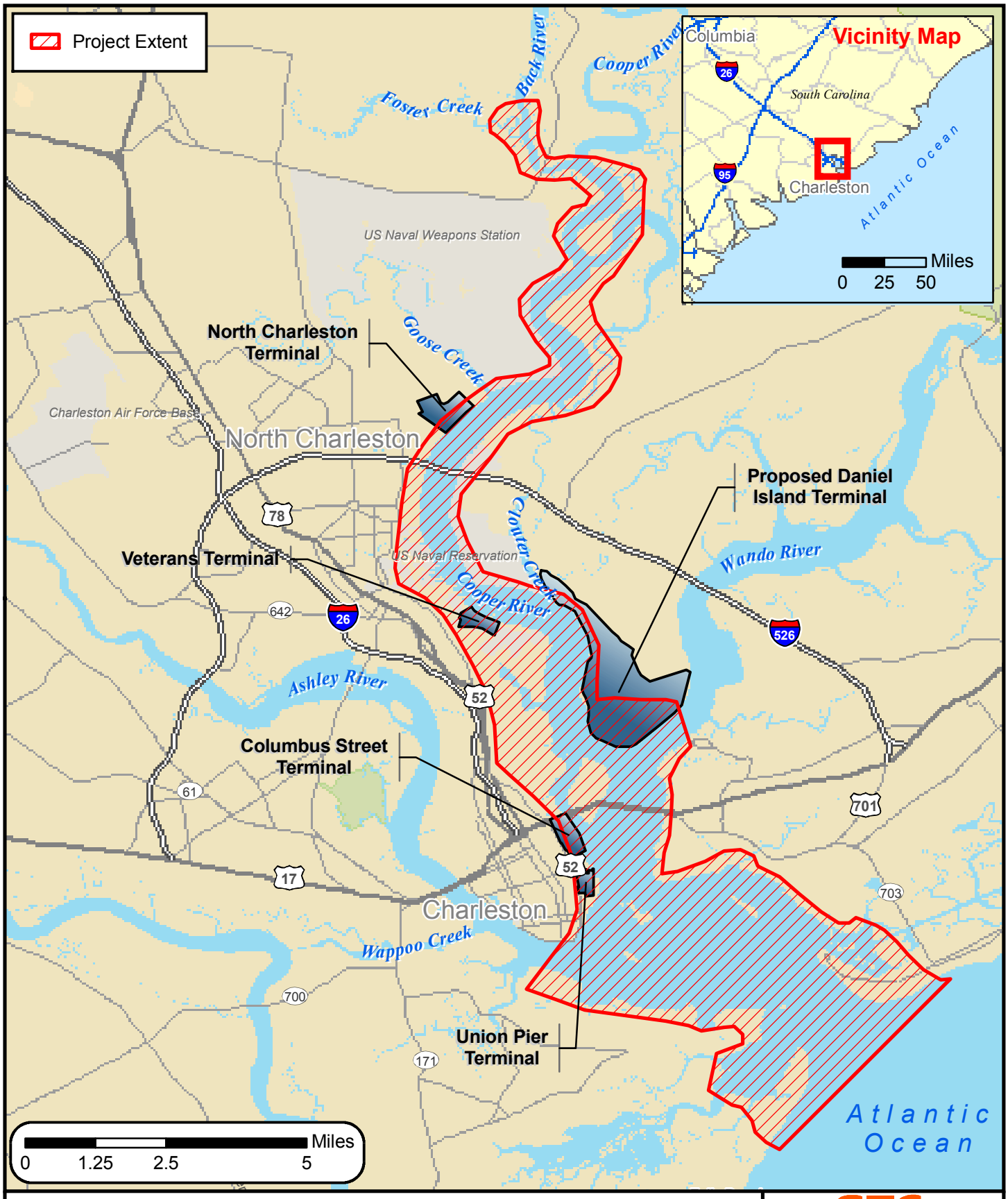

Berkeley - Charleston County ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrolgy Dataset

Figure: 3
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Source: ESRI, USGS NHD
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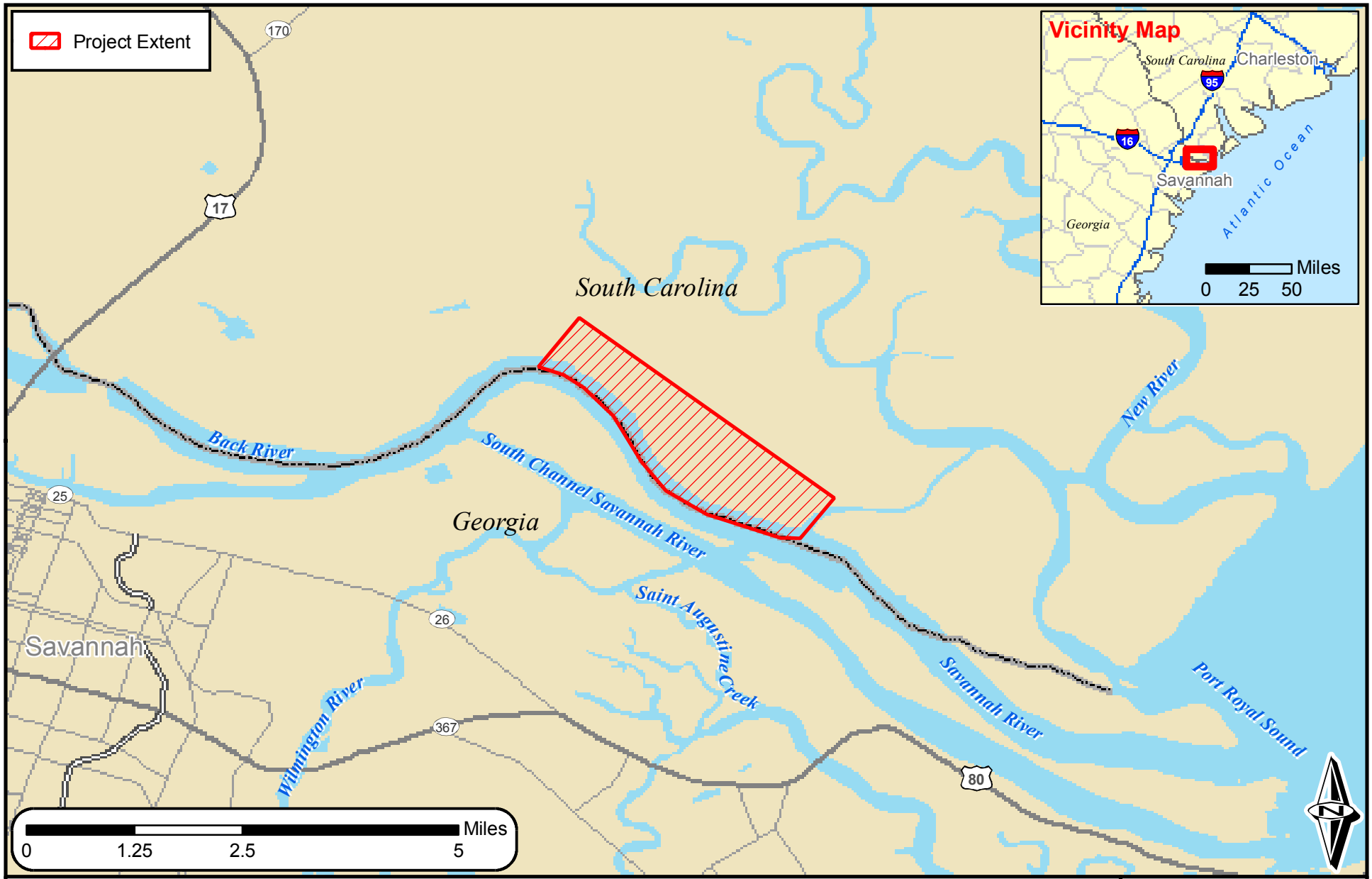

Jasper County ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 4
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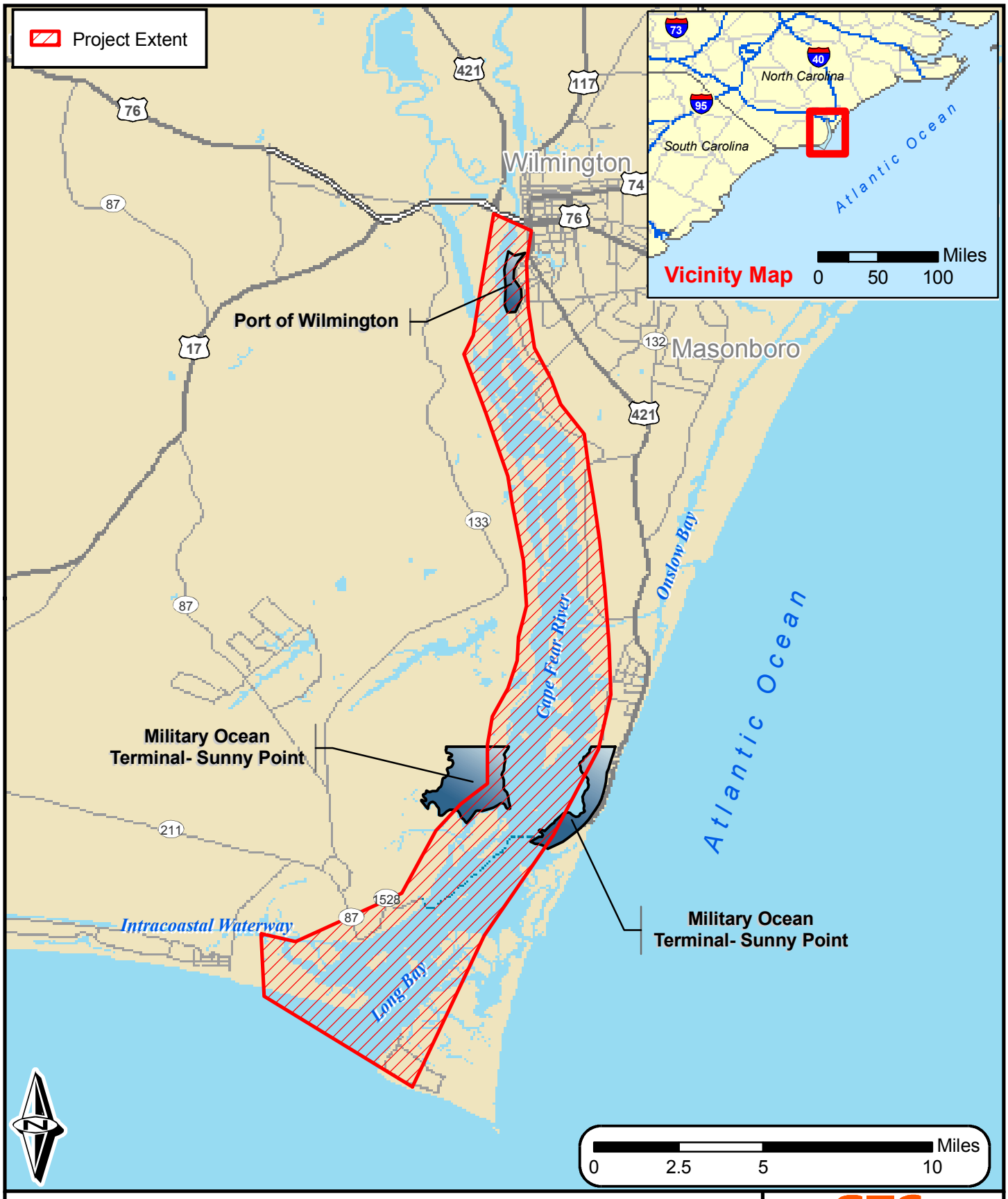

Wilmington ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrolgy Dataset

Figure: 5
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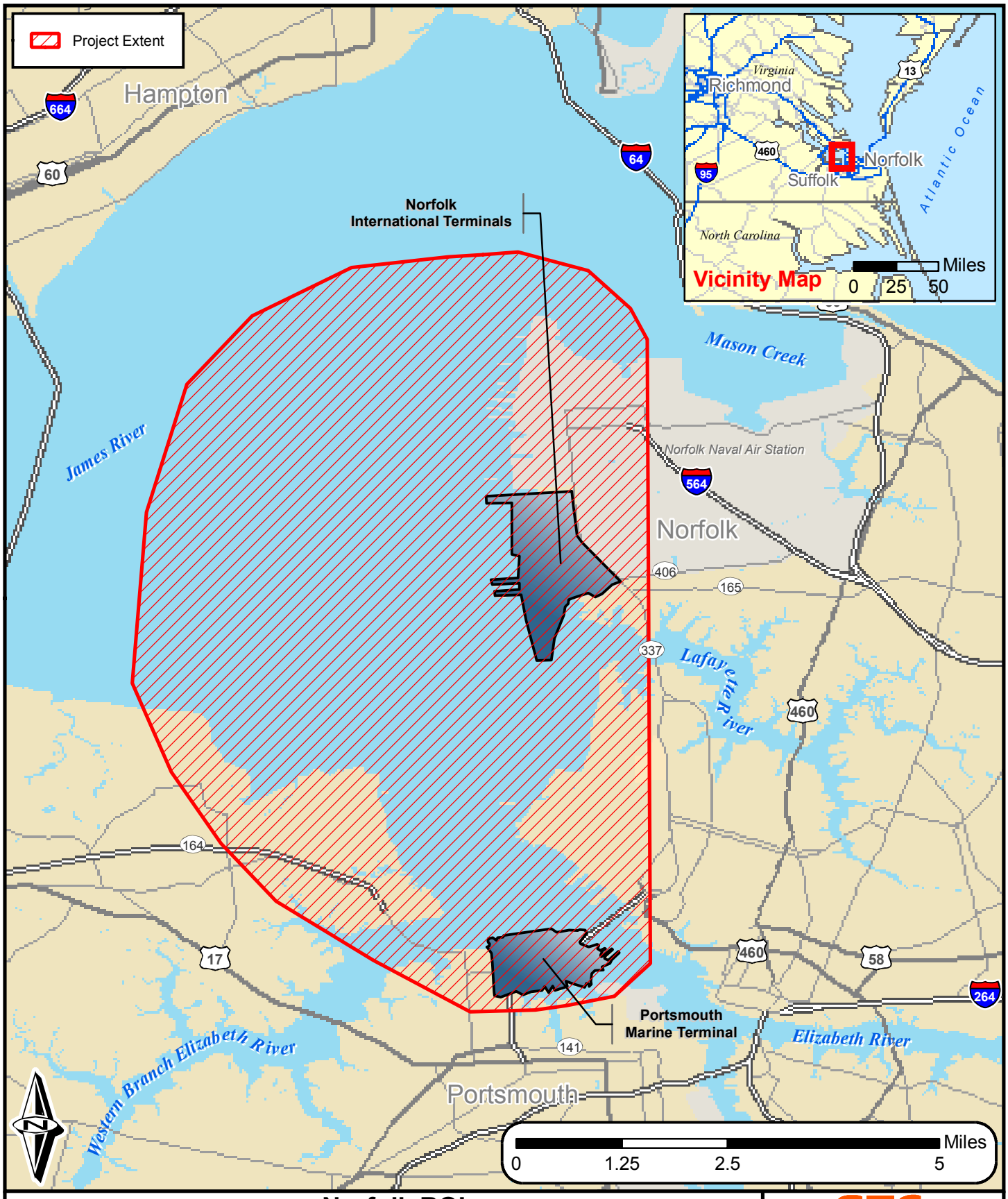

Norfolk ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Summary Regional Port Analysis

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 6
Date: April 2007
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Source: ESRI, USGS NHD
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ATTACHMENT 1

FIRST INTERIM REPORT
JULY 2006

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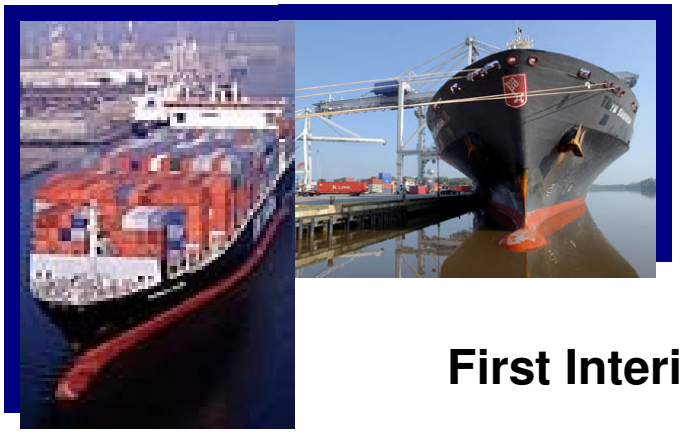
First Interim Report

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS
PORT CAPACITY ANALYSIS

US Army Corps of Engineers
Savannah District
Savannah, Georgia



First Interim Report

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS
PORT CAPACITY ANALYSIS

Contract No. DACA-03-02-D-0003
Delivery Order No. 0015
GEC Project No. 22312115

Prepared by

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U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
SAVANNAH, GEORGIA

July 26, 2006
(Revised September 20, 2006)

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Regional Port Analysis (RPA) reflects concerns of different stakeholders who indicated that there should be a study of allocating Federal improvement funds at one regional port in the South Atlantic region rather than deepening several competing ports with excess capacity. Accordingly, the RPA is being performed to address port capacity and related issues. This first interim report will address South Atlantic port marine container terminal capacity and demand.

Marine container terminal capacities were developed from secondary data for the ports between Norfolk and Jacksonville. Marine container terminal capacity is expressed in millions of 20 foot equivalent units (TEUs) that can be moved through each terminal during a year. Marine terminal annual TEUs of capacity were developed for existing, developing, and prospective terminals at each port (tables 1, 2, and 3). The first two categories are reasonably robust based on current and planned facilities. The prospective terminals are more conceptual in nature and not viewed as exhaustive of possible expansion capability at the different ports.

The projected loaded containers for each port developed in 2004 for the period 2004 to 2050 were adjusted to reflect 2005 total reported TEUs of throughput for loaded and empty containers at each port. The 2005 total TEU volumes were forecasted out to 2050 using the 2004 to 2050 projections of loaded containers (Table 4).

The capacity at each port among the existing, developing, and proposed terminals was compared to current and projected annual throughput TEUs (Table 5). The results indicate that there is substantial current capacity, but demand is projected to grow significantly in the near term, 2005 to 2020. By 2010 the existing terminal capacity at most ports will be nearly fully utilized. Developing terminals coming on line will be needed to meet demand after 2010 at most ports.

A regional port concept that concentrates existing capacity and/or future growth in demand was examined by shifts in port throughput (Table 6 and figures 3, 4, 5, 6, 7, and 8) and shifts in growth of container volumes among adjacent ports (Table 8 and figures 9, 10, 11, 12, 13, and 14). The South Atlantic port region, including Norfolk, is dominated by three large container ports (Norfolk, Charleston, and Savannah). Shifts in port throughput for Jacksonville and Wilmington are relatively inconsequential compared to Norfolk, Charleston, and Savannah. Similarly, shifts in future growth of container volume at Jacksonville and Wilmington can be more readily absorbed by existing and developing capacities at major ports compared to shifts of container volume growth away from the major ports.

The analysis confirms that the major ports are growing rapidly relative to existing terminal capacities and in substantial volumes compared to the capability of planned marine container terminals. For example, Charleston and Savannah together will experience nearly one million TEU growth between 2005 and 2010 and nearly two million TEU growth between 2005 and 2015 (Table 7). This kind of growth is indicative of a new Greenfield terminal site rather than employing a load center hub port that would concentrate containers at existing terminals or accelerate the full utilization of developing terminals.

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REGIONAL REPORT

REGIONAL PORT ANALYSIS
FIRST INTERIM REPORT: PORT CAPACITY ANALYSIS

I. INTRODUCTION

Public review comments and litigation-related issues resulting from the 1998 Savannah Harbor Expansion Feasibility Study by the Georgia Ports Authority (GPA) were highlighted by a request for a Regional Port Analysis (RPA) in the final analysis of the Savannah Harbor Expansion Project (SHEP) PED formulation. The RPA reflects concerns of different project stakeholders who indicated that there should be a study of allocating Federal improvement funds at one regional port in the South Atlantic region, rather than deepening several competing ports with excess capacity. Adherents to a regional approach to port capacity analyses and expansion believe that this would make sense economically (because fewer funds would be expended) and environmentally (because the impact of harbor improvements would be focused on one port rather than several).

The RPA is being performed in three segments as follows: (1) port capacity analyses; (2) environmental survey and institutional analysis; and (3) summary report. Accordingly, there will be an interim report for each segment followed by a Final Report. The RPA assumes that readers are familiar with the current status of development at the container ports (Norfolk to Jacksonville). Readers seeking more general information on the developments at these ports are referred to the appendix to this report.

A. PURPOSE/OBJECTIVES

The purpose of the port capacity analyses is to assess whether and to what extent there is sufficient marine terminal capacity in the region to absorb the projected cargo increases at a limited number of harbors. The capacity analysis is for the various container-capable ports in the South Atlantic, including Hampton Roads (Norfolk) to Jacksonville. South Florida container ports, notably Miami and Port Everglades, have been omitted because they normally service a regional domestic market for imports and foreign transshipment (Caribbean, Latin America, and South America) not otherwise competitive with the traditional South Atlantic container ports at Charleston and Savannah. Hampton Roads is traditionally regarded as a North Atlantic container port, competing primarily with New York and in a more marginal manner with the major South Atlantic container ports, Charleston and Savannah (refer to Section VIII of SHEP Multiport Analysis Final Report). The major reason for including Hampton Roads is that Maersk-SeaLand is building the first privately owned marine container terminal on the U.S. east coast, which may have implications for how this major container line will load center cargo relative to its services calling Charleston and Savannah. Other smaller South Atlantic container ports such as Wilmington and Jacksonville were included in the analysis for a comprehensive treatment of the major and minor ports with respect to container volumes.

Not only is the “South Atlantic” region interpreted broadly for capacity purposes to include Hampton Roads, but the capacity analysis is also intended to address “hub and spoke” operations with respect to domestic and foreign load centering container ports. Consequently, some

assessment will be made of the potential that a hub and spoke port system could take up capacity that would otherwise be distributed among the various ports and terminals.

B. ORGANIZATION

The RPA container ports and marine terminals capacity assessment and related survey of the environmental resources within the regions of port expansions were originally envisioned to be a product of site visits that would confirm and update existing secondary information with respect to container terminal capacity, expansion, and related environmental features. No new primary data were to be collected. The site visits were to familiarize the team with each of the marine terminals from an operations (capacity) assessment perspective, including expansion potential for existing, planned, and prospective sites and related environmental resources within the region of proposed port expansion.

Some of the various port interests expressed concerns about directly participating in a study that was related to SHEP.[1] As a result it appeared that port marine container terminal site visits for confirming and updating secondary information for capacity and related environmental surveys were not deemed practical. There was a reluctance among some of the public ports to discuss capacity, particularly related to planned and prospective expansions other than what was considered part of the public domain, such as existing environmental impact statements.[2] Rather than directly communicate with the ports, the different Corps districts (Norfolk, Wilmington, Charleston, Savannah, and Jacksonville) were contacted to serve as liaison to attempt to confirm or otherwise provide existing secondary information pertaining to port capacity, expansion, and related environmental features.

Rather than rely on data exchanged directly with ports, the capacity assessment and environmental review used other secondary sources, including port web sites, Corps districts, and related state and Federal agencies. The collected data have not been reviewed or otherwise approved by the ports or the Corps districts. All of the capacity and environmental survey related data have abundant source documentation, as will be evident in this report.

II. PORT INFRASTRUCTURE SURVEY: MARINE CONTAINER TERMINALS

The major marine container ports for the RPA, including existing, planned, and potential terminals, identified from secondary sources are presented for the ports from south to north as follows:

- Jacksonville – Talleyrand, Blount Island, and Dames Point terminals
- Savannah – Garden City Terminal, Ocean Terminal, Other
- Charleston – Wando Welch, North Charleston, Columbus Street, Charleston Navy Container Terminal, Jasper County, Other

[1] The major container ports view themselves as competitors and are reluctant to participate in a study that would ostensibly benefit Savannah Harbor from deepening.

[2] For example, concerns have been expressed that declaration of new marine terminal sites not otherwise identified in the existing public domain could become pre-judgmental from the perspective of other interested groups.

- Wilmington – Wilmington and North Carolina International Port (NCIP)
- Norfolk – Norfolk International Terminal, Portsmouth Marine Terminal, Newport News Marine Terminal, Maersk-SeaLand, and Craney Island

The structure of tables 1, 2 and 3 is similar in that the major physical elements that describe each port terminal are presented, subject to data availability, including distance from sea buoy, a proxy for sailing time and other harbor related variables such as pilotage and tug assistance, number of container berths, berth length, total terminal site space (acres), developed yard space for container storage (loads and empties) channel depth (MLLW) in feet, and rail accessibility to the container yard. Tables 1, 2, and 3 present a description of existing, developing/proposed, and other potential sites for marine container terminals at these ports, respectively.

Data compiled from secondary sources indicates that total annual marine container capacity for existing terminals (Table 1) is approximately between 11 and 13 million TEUs. For developing/proposed container terminals (Table 2), the total annual marine container capacity is approximately seven million TEU. For a sample of other indicated potential terminals (Table 3), total annual identified marine container capacity is approximately nine million TEUs.[3]

Table 1. Existing South Atlantic Marine Container Terminals – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access container	Annual Capacity Notes
Jacksonville								
Talleyrand	21	6	4,800	173	47	38	ND	(1) 0.258 million TEU based on 5500 TEU/acre
Blount Island	9	8	6,600	754	167	40	ND	(2) 0.920 million TEU based on 5500 TEU/acre
Total container storage					214			1.178 million TEU based on 5500 TEU/acre
Savannah								
Garden City	13	8	9,693	1208	407	500x42	ND	(3) currently 1.750 million TEU; planned 3.850 million TEU
Ocean Terminal	13	na	na	208	na	500x42		Not currently configured for containers
Charleston								
Wando Welch	16.4	4	3,800	na	194	400-600x45	No	(4) 1.584 million TEU
North Charleston	15	3	3,500	na	123	400-600x45	ND	(4) 0.713 million TEU
Columbus Street	6	2	na	na	78	400-600x45	ND	(4) 0.35 million TEU
Total container storage					456			(5) 2.646 million TEU
Wilmington								
Cape Fear River	26	na	6,768	na	na	500x42	No	(6) 0.250 to 1.0 million TEU
Norfolk								
Norfolk International	na	5	5,730	811	na	50	ND	
Portsmouth Marine	na	3	3,540	219	46.8	50	ND	
Newport News Marine	na	na	na	140	43	45	ND	
Total build out					664			(7) 3.20 million TEU (664 acres at 5000/TEU/acre).
Ports/Terminals								(8) 10.874 to 13.097 million TEU

Notes: Rail Access for containers "ND" = "near dock"; na = not available
(1) Jax Port container throughput based on "Business and Development Strategy Port of Jacksonville" (April 25, 2005).
(2) Blount Island berths 32, 34 and 35 feet (900, 1000 and 750 feet long, respectively) are used for container handling.
(3) "Planned Measures to Augment Capacity of Garden City Terminal" would increase throughput to 3.850 million TEU by 2015/2019.
GPA Facilities Master Planning indicate current capacity of GCT to be 2.652 million TEU which could be increased to 5.073 million TEU
Future capacity for Garden City increases to 5.07 million TEU per year based on maximum berth, reduced empty dwell time, RTG loads and 8000/TEU/acre stacking.
GPA berths include completion of CB 8 (2076 lineal feet).
(4) Maximum terminal throughput for SCSPA from "Updated Throughput Analysis" (November 13, 2004).
(5) Total storage at Charleston reflects incremental improvements at Wando, North Charleston and Columbus terminals.
(6) Wilmington terminal is common to bulk, general cargo and container cargoes.
No container yard size and capacity is available but likely not to exceed 0.250 million TEU as currently developed and 1.0 million "fully" developed.
(7) Maximum land use at the three existing VPA terminals is 664 acres. Current undeveloped area is 89 acres at NIT,
34.7 acres at PMT and 5.8 acres at NNMT. VPA 2040 Strategic Plan undeveloped area is 19.0, 0 and 5.8 acres for these facilities, respectively.
VPA efficient terminal capacity is capped at 5000 TEU per acre per year.
(8) Summation excluding Wilmington includes "planned" expansions at GPA (3.850 million TEU). Including GPA maximum of 5.07 million TEU would be 12.097 million TEU.
Including Wilmington (estimated) and the full GPA planned development (5.073 million TEU) the total build out annual capacity would be 13.097 million TEU.

Source: G.E.C., Inc.

[3] Table 3 serves as an example of other sites and should not be regarded as exhaustive or inclusive of all other possible sites for marine container terminal development at the different ports.

Table 2. Developing/Proposed South Atlantic Marine Containers Terminals – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access Container	Container Annual Capacity Notes
Jacksonville								
Dames Point	12	2	2,400	158		40	no	(1) 0.8 to 1.0 million TEU
Savannah								
Ocean Terminal						500x42		Not configured for container development
Charleston								
Charleston Navy		3	3,510	238.7	201.4	400-600x45	No	(2) 1.430 million TEU
Wilmington								
Norfolk								
Maersk-SeaLand			4,000	570	291	50	ND	(3) 1.0 million TEU Phase 1 and 2.16 million TEU final
Craney Island			8,400	580		50	ND	(4) 2.5 million TEU
Ports/Terminals								(5) 7.09 million TEU

Notes: Rail Access for containers "ND" = "near dock."
(1) Dames Point is stated to have expansion capability to 200 contiguous acres with limited expansion capability unless one or both of two other.
facilities for bulk cargo and cruise vessels are relocated. Accordingly, 158 and 200 acres will have capacities of 0.8 and 1.0 million TEUs respectively.
Dames Point is a 585 acre site that handles dry bulk cargoes and a cruise facility. There are approximately 160 to 200 acres for new marine development.
Relocating the cruise facility from Dames Point to increase cargo capacity does not appear likely at this time.
(2) Furnished by SCSPA.
(3) Various estimates have appeared for this private facility.
(4) VPA estimates.
(5) Summation of Dames Point (1.0 million), Charleston Navy (1.430 million), Maersk-SeaLand (2.16 million) and Craney Island (2.5 million).

Source: G.E.C., Inc.

Table 3. Other Potential South Atlantic Marine Container Terminal Sites – Norfolk to Jacksonville

Port/Terminal	Sea Buoy (miles)	Berth No.	Berth (feet)	Terminal (acres)	Container (storage acres)	Channel (feet)	Rail Access Container	Annual Capacity Notes
Jacksonville								
Other	21			120		38	ND	(1) Slated for auto processing
Savannah								
Site 1	?				212	42	?	(2) 1.7 million TEU
Site 2	?				200	42	?	(2) 1.6 million TEU
Charleston								
Jasper County	7			1,776	?	42	?	(3) 2.0 million
Other						400-600x45		(4) 2.0 million
Wilmington								
NCIP	9.5		4,000	600	?	42	?	(5) 2.0 million TEU
Norfolk								
Other								(6)
Ports/Terminals								(7) 9.3 million TEU

Notes: Rail Access for containers "ND" = "near dock," "?" indicates that rail near dock access unknown and/or non-existent at present but could be planned.
(1) Jax Port owns the Smurfitt Stone property (120) acres to the north of Talleyrand. The property is currently earmarked for automobile processing.
(2) Savannah site 1 based on 1.7 million TEU throughput. Savannah site 2 based on 1.6 million TEU throughput.
(3) Jasper County site size and development estimates likely to range above and below 2.0 million TEU per year.
(4) There are possibly other suitable properties such as Navy facilities that could be used in Charleston Harbor for further marine container development
(5) NCIP capacity estimate likely to be "conceptual" along with the rest of the site development at this time.
(6) DEIS for the Craney Island Eastward Expansion indicates that other sites exist and were evaluated.
(7) Summation of Savannah Site 1 and Site 2, Charleston Jasper County and Other, and Wilmington NCIP.

Source: G.E.C., Inc.

III. CAPACITY METHODOLOGY

A. STATIC

Static measures of marine terminal capacity will use a critical component of throughput, usually berthage or yard area, and assume constant throughput factors for utilization. Marine container terminal capacity for containers, specified in TEUs, will typically use yard space (acres) and

assume an average number of TEU throughput per acre per year based on the following: (1) stack height; (2) stack configuration; and (3) box dwell time.

Stack height will vary for loads and empties and is affected by soil bearing strength. Most ECUS container yards can stack loaded containers at least four boxes high. Some facilities can stack loaded boxes five high. Stack configuration relates to the density of the clusters of boxes with respect to box handling systems. Box dwell time is the average duration that import and export boxes occupy yard space before discharge. Typically import boxes will average about four days of yard occupancy, and export boxes will average about three to five days of yard occupancy. Dwell times very widely by type of merchandise, steamship line, and service. Dwell time for empty boxes can be quite long, upwards of an average of thirty or more days.

Table 1 reflects prevailing static measures of marine container terminal capacity based on yard occupancy expressed as average annual throughput in TEUs. The data reflects port-specific capacity measures for container yard stowage that reflect assumptions about berth utilization and dwell time. Practically, maximum berth utilization is relatively unknown unless it is presumed as some ports do that it should be a minimum of 50 percent but not more than 75 percent of "berth occupancy." Berth congestion and delays to vessels rise exponentially above a threshold greater than 50 percent occupancy, sharply increasing beyond 75 percent occupancy. A distinction has to be made between productive berth occupancy, assuming that the vessel is working or actively preparing for working (loading/unloading cargo), and other berth occupancy characteristics not related to cargo handling such as standing by for labor, waiting for tide, and repairs.

Container yard dwell times are normally taken as a given in most trades, although there is discussion of their impact on marine container terminal capacity in the second interim report relating to institutional constraints. Traditionally, ports have focused on yard capacity as a critical measure of terminal capacity because the space of the yard and its occupancy under a set of operating circumstances (box layout, handling systems, and stacking) is much clearer to observe and measure than berth capacity or container dwell time.

For Jacksonville, the annual yard container throughput capacity was based on an average of 5,500 TEUs per acre per year.[4] The Virginia Ports Authority capped yard annual throughput capacity at 5,000 TEUs per acre per year to reflect efficient use of storage space relative to stacking density, etc. Savannah (GPA) indicates that future capacity ranges from 6,553 TEUs per acre per year to upwards of 11,115 TEUs per acre. The current maximum annual throughput capacity of the 407-acre Garden City site is said to be 2.6 million TEUs per year. This is planned to increase to 5.073 million TEUs by 2020 under three different scenarios: (1) maximum berth capacity, current dwell time, and pure Rubber Tired Gantry cranes (RTG) for loads – 639 acres and an average of 7,939 TEUs per acre per year; (2) maximum berth capacity, current dwell time, pure RTG for loads, and 50 percent of empty containers offsite – 477.5 acres and an average of 10,625 TEUs per acre; and (3) maximum berth capacity, reduced empty dwell time, pure RTG for loads – 456.4 acres and an average of 11,115 TEUs per acre.

[4] Business and Development Strategy Port of Jacksonville (April 25, 2005).

The lower TEU throughput per acre per year at Jacksonville and Norfolk, 5500 TEUs and 5,000 TEUs, respectively, compared to Savannah is in part a reflection of lower stacking capabilities resulting from soil weight bearing properties. This is a particular concern for Blount Island (dredge spoil). Also, it appears that both Norfolk and Jacksonville have used a desirable or practical working maximum stowage per acre based on a conventional forklift and top-pick box handling systems. Conversely, it appears that Savannah has sought to press toward the ultimate maximum stowage based on the use of a rubber tired gantry system (more capital intensive and slower but more intensive use of yard space), as well as some other noted measures (maximum berth capacity, reduced empty dwell time) that can increase marine terminal capacity. Because marine container terminal capacity is not absolute, higher capacities are possible, but they might not be as efficient or particularly practical other than for peak periods. Thus, at key points in a terminal operating cycle for any given stacking configuration, it may be that the stowage is over 100 percent of efficient "capacity," with boxes stacked all over (a condition that is not convenient or efficient, but may increase throughput for peak periods).

There have been gradual expansions at most of the major ports, depending on the site characteristics and options. Savannah is a good example of a single facility (Garden City Terminal) that has been progressively expanded by extending the berth and the container yard north for more space while at the same time strengthening the container yard for stacking boxes higher consistent with greater yard stowage capacity. Similarly, Norfolk has been progressively making improvements to Norfolk International Terminal for additional capacity. Other ports with older, smaller urban facilities with more limited expansion potential such as Jacksonville (Talleyrand) and Charleston have sought newer facilities (Blount Island and Wando Welch) for buildout purposes. As these newer sites have filled up, Jacksonville and Charleston have sought more space such as Dames Point and Charleston Navy Container Terminal, respectively.

Foreign ports, like domestic ports, have adjusted their capacity to meet the current demands and are concentrating their decision-making on ideas for expansion that will meet the future demand of globalization. Among the three current major benefiting vessel services at Savannah Harbor for deepening (AEX, PAX, and ZCS), such ports as Gioria Tauro, Rotterdam, and Barcelona are expanding their TEU capacity to become volume leaders among their respective services. In addition, the Port of Jeddah is aggressively expanding its volume of TEUs and experienced a 26 percent volume growth from 2003 to 2004.

B. DYNAMIC

Dynamic measures of marine container terminal capacity reflect the interaction of actual and projected box flows with the different interdependent capacity elements typically described in terms of berth, yard storage space, and gate operations. In practice, each terminal will have its own box input and output patterns relative to the capacity elements as determined by the vessel sailing schedules and associated volumes of box moves.

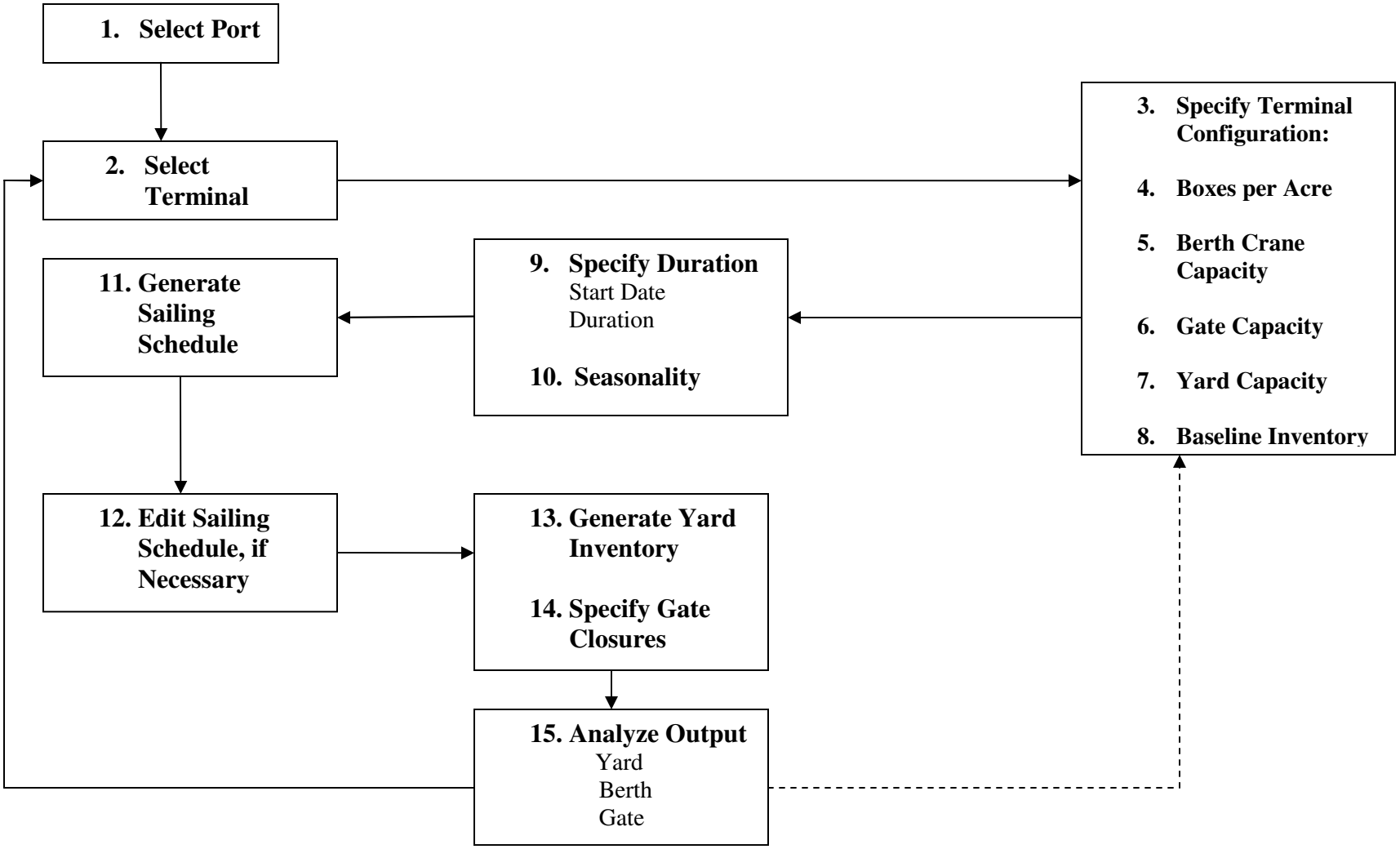
There are two general patterns of sailing schedules for marine container terminals with respect to the concentration of vessel calls and box movements during the week.[5] Sailing schedules that are clustered into part of the week will typically lead to sharply ascending and descending utilization of capacity elements. For example, a terminal with a "weekend" pattern of sailings will be nearly full shortly before and after as well as during the weekend and at a sharply lower level of capacity utilization by mid-week. Conversely, a container terminal with a more even pattern of vessel calls (and box moves) during the week will maintain a more constant level of capacity utilization.

Figures 1 and 2 display the conceptual logic of marine container terminal capacity elements. The diagrams refer to spreadsheet simulations of major U.S. marine container terminal capacities that were done nearly a decade ago to illustrate that "capacity" is not a nebulous issue or a simplistic rule of thumb but can be calculated quite carefully to reflect particular terminal characteristics and operations.

The logic and flow of Figure 1 is as follows:

1. Select Port – container capacity is estimated for particular ports and specific facilities within those ports.
2. Select Terminal – each terminal will usually have distinct physical and operating characteristics that will define the "capacity" for that facility.
3. Specify Terminal Configuration – the terminal capacity is a combination of interrelated factors as shown in items 4-8 as follows:
4. Boxes per Acre – is the facility storage capability that is determined by the stacking configurations for different sizes of boxes.
5. Berth Crane Capacity – refers to the number of cranes and effective average sustained box moves per hour for vessel loading/unloading that results in berth occupancy time by particular vessels.
6. Gate Capacity – the number of units that can pass through the gates in a defined period of working time for each day is a function of the number of gates, operating hours, and processing times for vehicles (which may be differentiated by whether the trucks have a chassis and the chassis is loaded or empty with respect to a container).
7. Yard Capacity – refers to the effective number of boxes that can be stored (as a function of box size, stack configuration, and other requirements for handling boxes) given a specified yard storage space (acres).
8. Baseline Inventory – is the effective on-hand yard inventory whenever any particular period of time is used to determine capacity and throughput (because the baseline inventory will include loaded import and export boxes on hand as well as empty containers).
9. Specify Duration – Marine terminals will reflect different levels of throughput and utilization depending on the time period relative to the vessels and cargo calling the facility. Because most major container vessel sailing schedule services are weekly, a seven-day period should reflect the general overall pattern of terminal activity with

[5] The week has been used since most major liner services are of this frequency. Therefore, other than some bi-monthly calls, the week is a typical pattern for the staging of container vessel calls and flows of import and export boxes in relation to the ship calls.



Source: "Response Model to Disruption of Maritime Transportation Systems" (Maritime Administration, U.S. Department of Transportation, August 1996).

Figure 1. Port Marine Container Model Conceptual Logic of Input-Output Relationships

10. respect to berth, yard, and gate utilization. However, when there are 10-day, bi-monthly, or monthly services (which are usually not major sources of volume), the duration of the time period used to determine terminal volumes should exceed one week.
11. Seasonality – many services have distinct seasonal patterns wherein the volume of cargo fluctuates during the year. Accordingly, seasonal adjustments to average cargo should be used to capture the throughput and utilization of the facility for peak and off-peak cargo flow periods for particular services.
12. Generate Sailing Schedule – the terminal throughput will vary based on the sailing schedule, which identifies the dates of vessel calls and departures, berth occupancy, and containers loaded and unloaded for loads and empties by box size and associated yard dwell times and stacking patterns preferred by the line, assuming not all containers are grounded but some may be left on chassis (which is declining in frequency because stacking of boxes affords more intensive use of yard storage space).
13. Edit Sailing Schedule if Necessary – allows the user to reflect any real world changes in the sailing schedule such as late or early vessel arrivals, chartered vessels (particularly at peak seasonal periods), or substitutions of larger or smaller vessels, changes in loaded or empty boxes, or associated dwell times.
14. Generate Yard Inventory – The spreadsheet will specify the number of containers, boxes by size, and type and yard storage pattern that are in the yard based on the sailing schedule information for each day assuming no gate constraints. This is an unconstrained yard inventory.
15. Specify Gate Closures – if gates are closed on a particular day(s), the yard inventory of boxes on hand will be adjusted to reflect that import boxes with predetermined dwell times (days) cannot exit the yard before the dwell time, and export boxes must enter the yard before the sailing time. Effectively, weekend or holiday gate closures will delay the exodus of import boxes and accelerate the arrival of export boxes in response to particular sailing schedules (arrivals and departures).
16. Analyze Output – the model will show the number of boxes in the yard and corresponding space utilization, berth occupancy by vessel, and gate utilization throughput for each day of the exercise.

The capacity logic reflects particular ports and terminals as a product of terminal characteristics (boxes per acre, berth crane capacity, gate capacity, yard capacity, and baseline box inventory) for a period of time (weeks and seasonal variations) in response to sailing schedules (days of the week of vessel and associated container arrivals and departures) that will result in box flows (imports, exports of loaded and empty boxes by size and associated yard dwell time distributions). The terminal configuration and the sailing schedules will determine the yard inventory of boxes at any particular time, exclusive of empty boxes.

Gate access between the terminal and public roads will affect the accumulation of boxes in the yard as a function of gate closures. Restricted gate hours, typically limited to a five-day week, excluding holidays, and open for eight to 10 hours a day means that all boxes must enter or exit the yard during these times (other than near dock rail intermodal, which does not typically rely on public streets or roads for box movements). Marine container terminal gates are typically closed during the weekends. Consequently, export boxes for Friday night, weekend sailings, and early Monday departures have to arrive at the terminal by close of business Friday. Similarly,

import boxes received late Friday through early Monday cannot be immediately discharged from the terminal until the gates open on Monday.[6]

Typically, most public marine terminals will work the berth seven days a week and upwards of twenty-four hours a day. Lines may have berthing preferences regarding the scheduling of labor shifts utilized due to overtime payments outside of the usual daylight time frame. However, berth vessel container cargo transfers will normally prevail any day of the week. Conversely, marine terminal gate operations that allow ingress and egress to the public roads, including off-dock rail intermodal, are normally closed during the weekends. Consequently, most container terminals tend to fill up during the weekends if there are related sailings.

Figure 2 represents a conceptual capacity model of a marine container terminal from the perspective of the interaction of various capacities of different elements (yard, berth, and gate) with the dynamics of the sailing schedules and services (box flows). The more or less static physical components of marine container terminal capacity in the traditional context of yard, berth, and gate elements are integrated with the dynamics of vessel sailing schedules and gate operations to compute yard inventory. The model results in calculating berth, gate, and yard utilization, integrating the physical elements with the flows of boxes from vessel schedules.

The dynamic model of container yard throughput reflects the integration of berth, yard, and gate characteristics with vessel schedules and box flows. Changes in gate operations and vessel schedules, including box dwell times, will effect capacity utilization of the marine terminal elements. For example, weekend gate operations can have a significant effect on yard capacity utilization, particularly if there are vessel calls and sailings during the weekend from late Friday until early Monday.[7] Changes in box dwell times for loads and empties also have a bearing on throughput capacity.

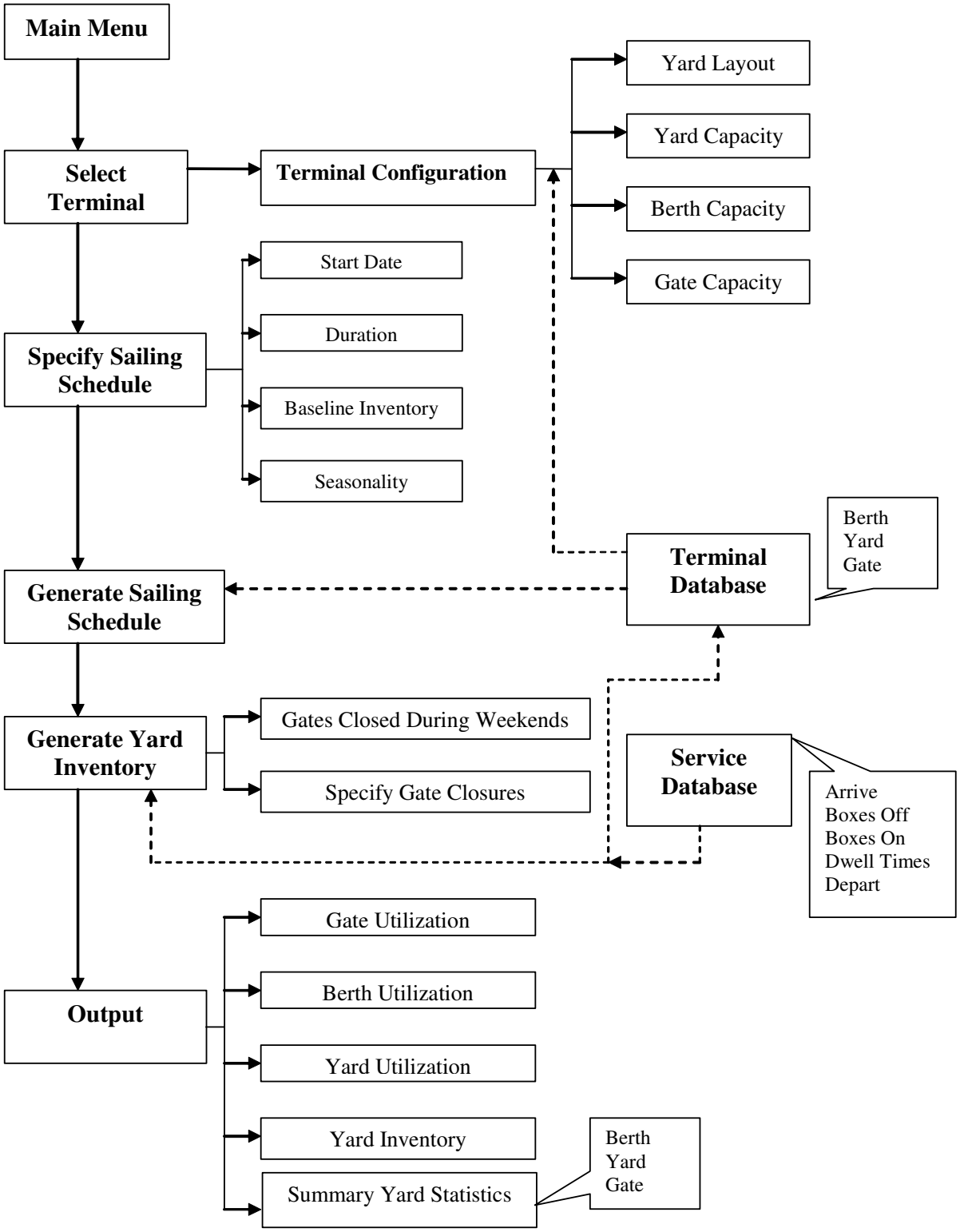
IV. CAPACITY ESTIMATES

The different approaches to marine terminal capacity described in the previous section can result in a range of estimates, depending on the methodology and the assumptions used. Because most of the public ports have "capacity" related information with regard to existing and planned container terminals, it was decided to use these public domain estimates rather than recreate them or otherwise come up with another set of estimates.

The projected number of containers (TEUs) for each port is shown in Table 4. Table 4 uses TEUs as a common measure of container volume, consistent with industry practices. However, TEU is really an artificial value because the predominant volume of containers at most U.S.

[6] There are instances in which lines will run a "late" gate on Friday or a weekend day gate. The Georgia Ports Authority runs gates on Saturday. Most public ports close gates on weekends and nights other than the exceptions noted.

[7] This assumes that local businesses would be able to make and accept deliveries of containers during the weekend, which has been problematic for marine terminals. More likely is that the distant shippers would be served by extended gate hours, allowing boxes to arrive and depart the terminal during the weekend when these businesses are typically closed for distribution operations.



Source: "Response Model to Disruption of Maritime Transportation Systems" (Maritime Administration, U.S. Department of Transportation, August 1996).

Figure 2. Model of Marine Container Terminal Systems

ports, including South Atlantic ports, is 40 to 45 foot length dimensions.[8] Consequently, converting from boxes (20-foot, 40-foot and 45-foot) to a common measure (20-foot) is an estimate. The conversion factors to translate containers of different lengths to an equivalent TEU vary among ports and industry groups, so resulting estimates of TEUs can also vary (refer to Table 4, year 2003 "loaded" versus WCSC reported TEUs).

There are also different measures of container (TEU) volume for the ports. Cargo forecasts will focus on loaded boxes, whereas port measures of throughput volume will focus on loaded and empty boxes because ports are commonly paid by lines for volumes of box throughput. Empty containers represent varying proportions of a port's total throughput, measured in TEUs or boxes. Empty containers as an institutional constraint to port capacity and throughput are discussed in greater detail in the institutional analysis component of the RPA.

Table 4 compiles the estimated number of loaded TEUs for foreign trade in 2003 from SHEP commodity projections (November 2004) and compares this with the number of loaded foreign trade TEUs reported by the Waterborne Commerce Statistics Center (WCSC). [9] Generally, the loaded TEUs for 2003 are less than the loaded TEUs of reported boxes from WCSC. For most of the ports, the fit between 2003 estimated loaded TEUs and WCSC reported loaded TEUs is close. For example, Savannah had an estimated 990,468 loaded foreign TEUs in 2003, whereas WCSC reported 1,120,839 (990,468/1,120,839 = 0.88). Charleston had 1,183,549 loaded foreign TEUs in 2003, whereas WCSC reported 1,244,587 (1,183,549/1,244,587 = 0.95). Wilmington had 65,274 loaded foreign TEUs in 2003 compared to WCSC 70,754 loaded foreign TEUs (65,274/70,754 = 0.92). Norfolk had 952,107 loaded TEUs in 2003 compared to WCSC 1,083,529 loaded TEUs (952,107/1,083,529 = 0.88).

Table 4 has a larger discrepancy between Jacksonville with 133,901 loaded foreign boxes in 2003 and the WCSC reported total of 107,871 TEUs for 2003. The Jacksonville container trade is dominated by Puerto Rico and consequently is predominantly domestic offshore. WCSC reports that the Jacksonville domestic TEU volume (loaded and empty boxes) was 463,500 in 2003.

Table 4 contains the 2004 SHEP port projections for loaded TEUs for the period 2005 through 2050. To normalize the container throughput in total TEUs, the most recent reported TEU volumes were used from the American Association of Port Authorities (AAPA) for 2005.[10] The difference between 2005 projected loaded TEUs and 2005 total reported TEUs of throughput was ascribed to "empty." Then, the total TEUs were projected using the growth of total forecasted loaded TEUs and estimated empty TEUs. For example, for Savannah Harbor the reported total TEUs of throughput in 2005 was 1.902 million. The projected loaded TEUs was 1.074 million, leaving 0.828 million as the estimated number of empty TEUs. The empty TEUs were then projected using the change in loaded TEUs for the period 2010 through 2050. The total TEUs for the period 2010 through 2050 is the sum of the projected loaded and empty TEUs

[8] 48-foot boxes are common at Jacksonville with the Puerto Rican trade.
[9] WCSC container TEUs for the port are reported to be compiled by PIERS, which has its own methodology for converting different sizes of boxes to a TEU equivalent.
[10] AAPA Advisory May 8, 2006, "North American Port Container Traffic 2005."

for this period, using 2005 reported total TEUs (loaded and empty) as the baseline for future projections.[11]

Table 4. Projected TEUs for South Atlantic Ports, 2005-2050

Port		2003	2005	2010	2015	2020	2030	2040	2050
Jacksonville	Imports	39,632	207,389	285,008	360,091	453,996	722,891	1,093,184	1,540,227
	Exports	94,269	99,299	112,183	122,307	135,491	181,511	285,999	500,993
	Loaded	133,901	306,688	397,191	482,398	589,487	904,402	1,379,183	2,041,220
	Empty		470,630	609,512	740,267	904,601	1,387,856	2,116,434	3,132,367
	Total		**777,318**	1,006,703	1,222,665	1,494,088	2,292,258	3,495,617	5,173,587
	WCSC	107,871							
Savannah	Imports	602,107	664,876	916,546	1,105,626	1,310,895	1,848,206	2,585,808	3,527,589
	Exports	388,361	408,991	420,447	442,855	488,149	637,739	945,571	1,543,369
	Loaded	990,468	1,073,867	1,336,993	1,548,481	1,799,044	2,485,945	3,531,379	5,070,958
	Empty		827,653	1,030,450	1,193,448	1,386,563	1,915,973	2,721,712	3,908,299
	Total		**1,901,520**	2,367,443	2,741,929	3,185,607	4,401,918	6,253,091	8,979,257
	WCSC	1,120,839							
Charleston	Imports	756,533	766,376	1,053,532	1,282,451	1,522,373	2,125,422	2,917,229	3,905,324
	Exports	427,016	449,301	505,916	567,983	648,299	895,918	1,364,276	2,196,283
	Loaded	1,183,549	1,215,677	1,559,448	1,850,434	2,170,672	3,021,340	4,281,505	6,101,607
	Empty		770,909	988,908	1,173,434	1,376,509	1,915,952	2,715,072	3,869,271
	Total		**1,986,586**	2,548,356	3,023,868	3,547,181	4,937,292	6,996,577	9,970,878
	WCSC	1,244,587							
Wilmington	Imports	45,717	92,810	139,503	182,438	230,356	357,183	533,105	770,210
	Exports	19,557	21,143	24,479	28,956	36,222	71,517	178,500	435,375
	Loaded	65,274	113,953	163,982	211,394	266,578	428,700	711,605	1,205,585
	Empty		34,831	50,123	64,615	81,483	131,037	217,510	368,500
	Total		**148,784**	214,105	276,009	348,061	559,737	929,115	1,574,085
	WCSC	70,754							
Norfolk	Imports	631,842	747,670	986,995	1,137,987	1,297,150	1,719,736	2,294,811	3,028,714
	Exports	320,265	391,428	419,754	447,059	488,878	640,788	993,433	1,720,759
	Loaded	952,107	1,139,098	1,406,749	1,585,046	1,786,028	2,360,524	3,288,244	4,749,473
	Empty		842,857	1,040,901	1,172,829	1,321,542	1,746,631	2,433,083	3,514,295
	Total		**1,981,955**	2,447,650	2,757,875	3,107,570	4,107,155	5,721,327	8,263,768
	WCSC	1,083,529							
Total			6,796,163	8,584,257	10,022,346	11,682,507	16,298,359	23,395,726	33,961,576

Notes: Imports and Exports are loaded TEUs from SHEP Commodity Projections.
"Loaded" is the sum of Import and Export TEUs from SHEP Commodity Projections.
"Total" is the number of TEUs (loaded and empty) reported by American Association Port Authorities (May 8, 2006).
"Empty" is the difference between "Total" and "Loaded" TEUs.
"WCSC" is the total number of loaded foreign import and export TEUs reported by Waterborne Commerce Statistics Center (2003).
Jacksonville TEUs for foreign and domestic were reported by WCSC to be 568,090.
Norfolk TEUs for foreign and domestic were reported by WCSC to be 1,211,332.

Source: Savannah Harbor Expansion Project Deep-Draft Channel Improvements Economic Analysis: Commodity Projections (Final Report, November 2004).

There is a discrepancy between the total projected TEUs (loaded) for Jacksonville for 2005 and the total reported TEUs handled by the port (loaded and empty) such that the estimated empty

[11] This assumes that empty TEUs will grow in proportion to loaded TEUs. In practice, empty TEUs may grow faster than loaded TEUs, particularly if imports are increasing faster than exports.

TEUs (0.471 million) is larger than the projected loaded TEUs. The Jacksonville discrepancy between lower projected number of loaded TEUs and actual TEUs seems to arise out of the port's dependence on domestic offshore TEUs as noted earlier. Although the adjustment for total TEUs of throughput for Jacksonville is regarded to be robust, the proportion of loaded and empty TEUs does not seem accurate owing to the large spread between projected foreign TEUs and actual foreign and domestic TEUs.

The capacity estimates in tables 1, 2, and 3 for the existing, planned, and other potential marine container terminal sites are compiled for each port in Table 5 with projected demand from Table 4. The capacity of existing marine terminals for all the ports is 10.176 million TEUs compared to 2005 existing throughput of 6.797 million TEUs. Figure 3 shows the annual capacity of existing marine container terminals and existing 2005 throughput for Jacksonville, Savannah, Charleston, Wilmington, and Norfolk. The average annual capacity utilization will mask seasonal fluctuations in volume for the ports. Ports will prefer a lower capacity utilization for yard space because stacking will be less dense, resulting in less costly box handling associated with gate and berth movements into and out of the yard.[12]

Table 5 shows the projected TEUs of throughput for the ports for the period 2010 through 2050. Figures 4, 5, 6, 7, and 8 show the total TEUs of port capacity (existing, developing, and other potential terminals) with projected growth in annual throughput demand from Table 5 for the ports of Jacksonville, Savannah, Charleston, Wilmington, and Norfolk, respectively. The 2004 SHEP projections for loaded TEUs for Norfolk and the South Atlantic ports (Wilmington through Jacksonville) were used to adjust the 2005 throughput of total TEUs to reflect actual volume of boxes. For the individual ports, the data indicates the buildup of forecasted throughput compared to the capacity from existing, developing, and other possible terminals.

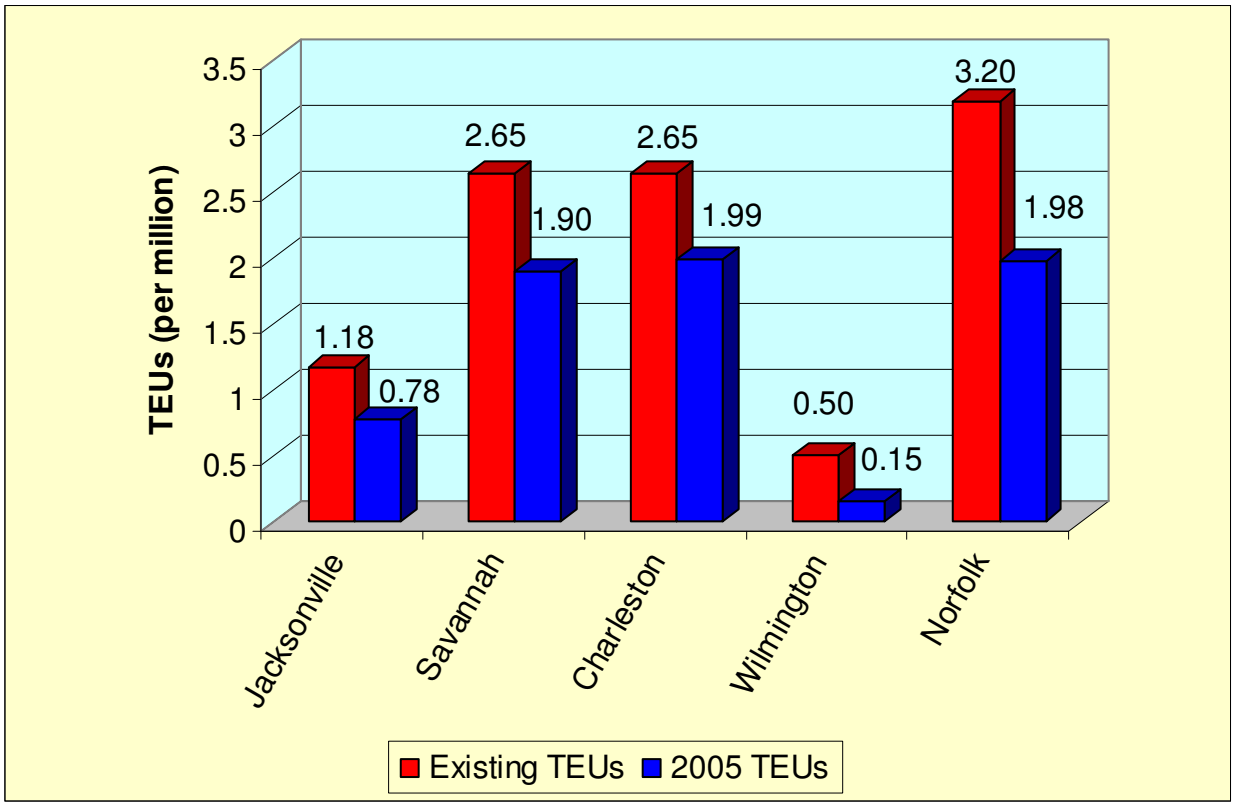
A more robust measure of existing and forthcoming port capacity is used to rely on existing and developing terminals, excluding other potential terminals. For Savannah, the existing and developing terminals will have a capacity of 5.073 million TEUs (2.652 + 2.421 = 5.073) compared to projected throughput of 4.402 million TEUs by 2030 and 6.253 million TEUs by 2040. Similarly, for Charleston the existing and developing (Charleston Navy Container Terminal) facilities will have a capacity of 4.076 million TEUs (2.646 + 1.430 = 4.076). This indicates that Charleston would have sufficient container capacity beyond 2020 when projected demand is 3.547 million TEUs. Norfolk would be comparatively well established for marine container terminal capacity, with the full buildout of three existing terminals (3.200 million TEUs) and the full buildout of the Maersk-SeaLand and Craney Island terminals (4.660 million TEUs), amounting to a total capacity of 7.860 million TEUs. This would be sufficient beyond 2040, with a projected throughput demand of 5.721 million TEUs.

[12] Marine container yards that operate at high levels of capacity (exceeding 90 percent) are regarded as congested and have higher box handling costs associated with nearly full stacks. From an operations efficiency perspective, container terminals prefer more space and less dense box stacking rather than full terminals as a measure of efficient use of space.

Table 5. Estimated TEU Annual Capacity of South Atlantic Ports, Existing, Developing, and Other Terminals (000,000)

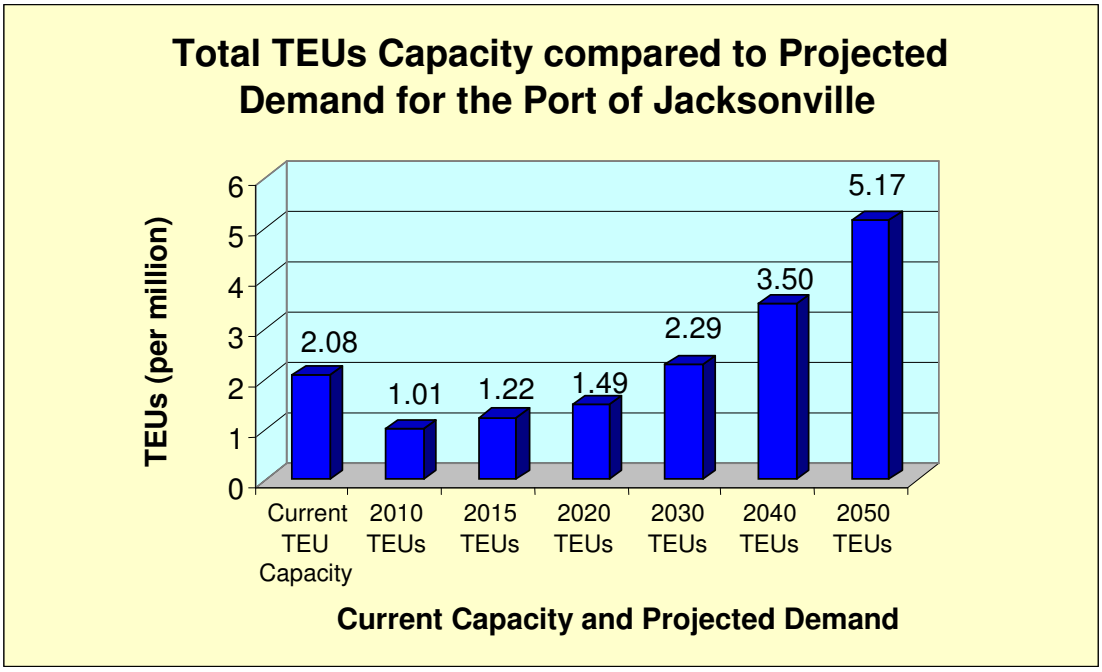
Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Developing	0.900							
	Other								
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
Savannah	Existing	2.652	1.902						
	Developing	2.421							
	Other	3.300							
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Charleston	Existing	2.646	1.987						
	Developing	1.430							
	Other	2.000							
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Norfolk	Existing	3.200	1.982						
	Developing	4.660							
	Other								
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
Total	Existing	10.176	6.797						
	Developing	9.411							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962

Source: G.E.C., Inc.



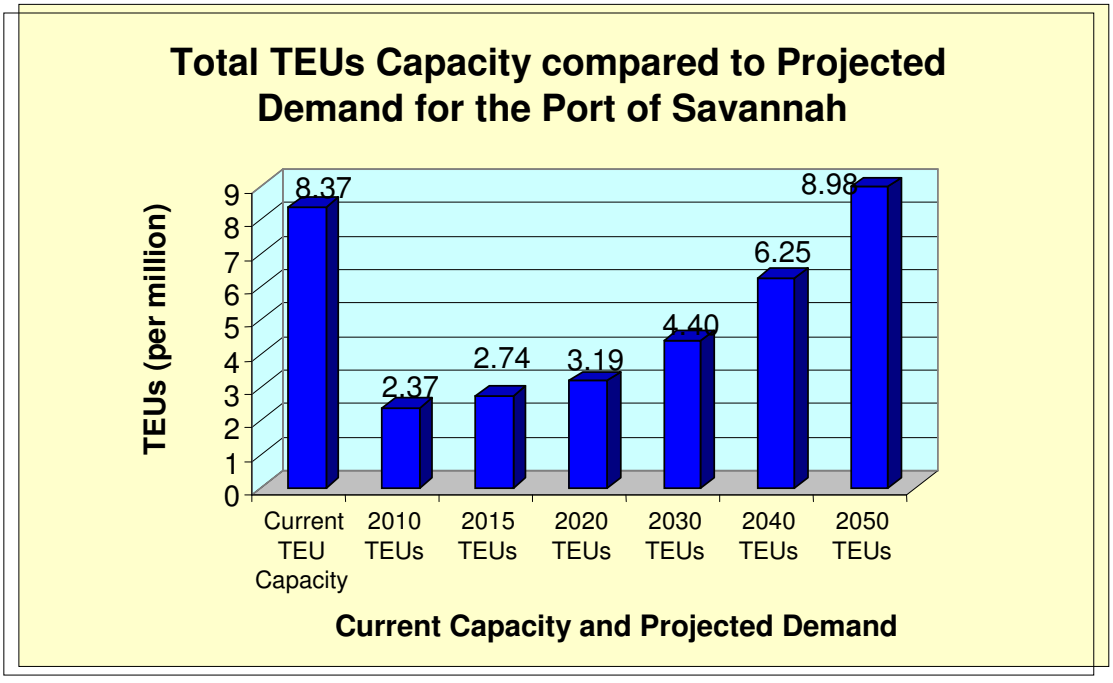
Source: Table 1.

Figure 3. Existing TEU Annual Capacity Compared to 2005 TEUs Throughput for Selected South Atlantic Ports



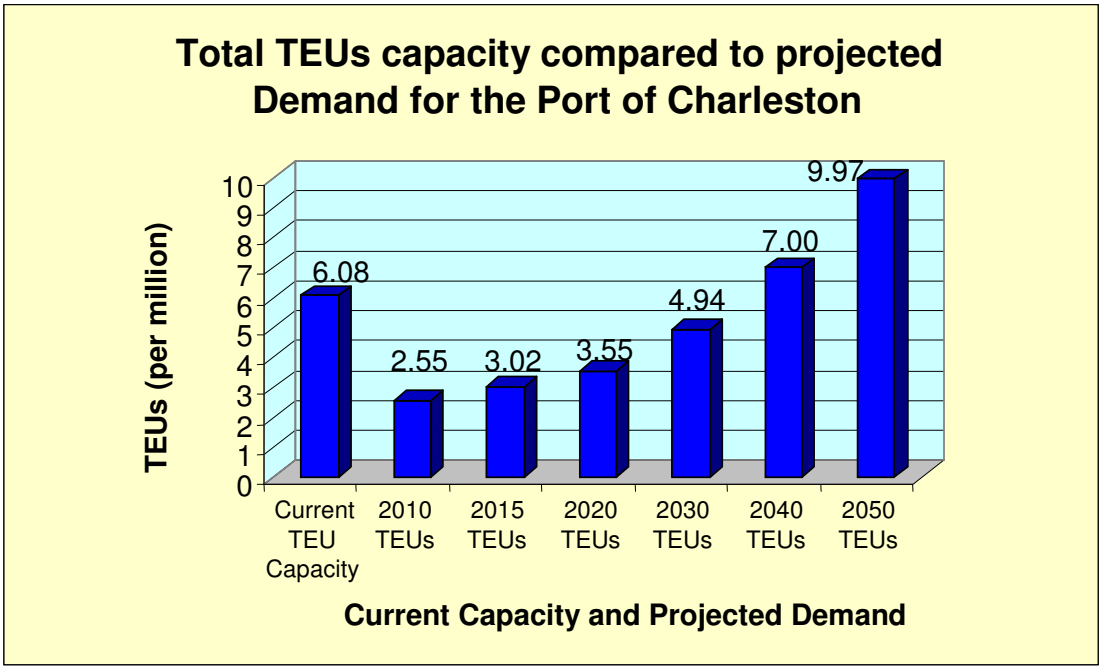
Source: Table 5.

Figure 4. Total TEU Capacity Compared to Projected Demand for the Port of Jacksonville



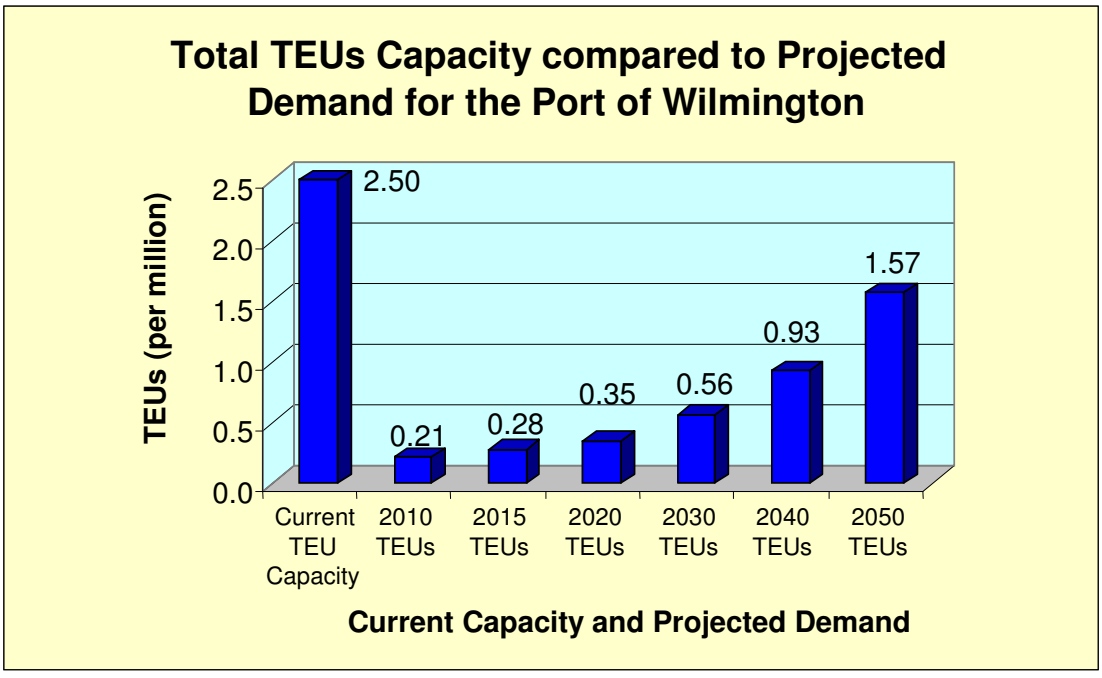
Source: Tables 1, 2, 3, and 4.

Figure 5. Total TEU Capacity Compared to Projected Demand for the Port of Savannah



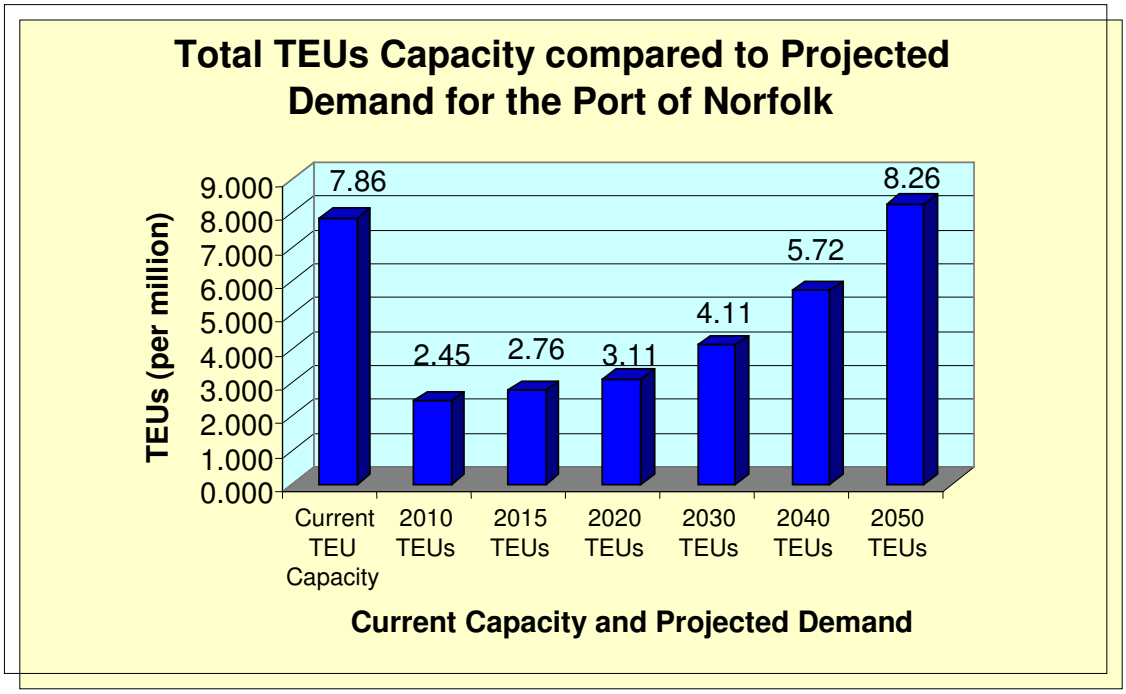
Source: Table 5.

Figure 6. Total TEU Capacity Compared to Projected Demand for the Port of Charleston



Source: Table 5**.**

Figure 7. Total TEU Capacity Compared to Projected Demand for the Port of Wilmington



Source: Table 5.

Figure 8. Total TEU Capacity Compared to Projected Demand for the Port of Norfolk

The smaller container ports in Table 5 (Jacksonville and Wilmington) have different settings for capacity utilization. Jacksonville has nearly fully developed existing marine terminals (Talleyrand and Blount Island) for 1.178 million TEUs and is developing Dames Point for 0.900 million TEUs, for a total of 2.078 million TEUs.[13] Projected growth for Jacksonville is 2.292 million TEUs by 2030.

Wilmington is very different from Jacksonville, with a largely underutilized existing facility (0.500 million TEUs) and a large potential facility, the NCIP (2.000 million TEUs). Unless Wilmington is able to wrestle market share away from other ports, the existing facility would be capable of handling projected TEUs of throughput outward to 2030 (0.560 million TEUs). Clearly, the potential for a NCIP would be to divert some of the projected growth at other South Atlantic ports to Wilmington.

Table 5 indicates that the annual capacity of the existing marine container terminals (10.176 million TEUs) would be sufficient until 2015 when throughput is projected to be 10.021 million TEUs. Excluding Norfolk and Wilmington, the capacity of the existing marine container terminals at Charleston, Savannah, and Jacksonville would be 6.476 million TEUs, compared to 5.922 million TEUs of demand throughput by 2010 (2.548 + 2.367 + 1.007 = 5.922). However,

[13] The three terminals at Jacksonville are all mixed with regard to significant space dedicated to containers and other cargoes.

full buildout of developing terminals at Charleston, Savannah, and Jacksonville will add 4.751 million TEUs of capacity (1.430 + 2.421 + 0.900 = 4.751).

Omitting Jacksonville, Charleston and Savannah as the main traditional South Atlantic container ports still have 5.298 million TEUs of capacity at existing marine terminals that would be sufficient to accommodate projected throughput demand in 2010 of 4.915 million TEUs (2.548 + 2.367 = 4.915), but not by 2015 with a projected throughput demand of 5.764 million TEUs (3.023 + 2.741 = 5.764). Moreover, Charleston and Savannah would have an additional 3.851 million TEUs of developing capacity from the Charleston Navy Container Terminal (1.430 million TEUs) and full buildout of the Garden City Terminal (2.421 million additional TEUs). The full buildout of existing and developing facilities at these ports would be an annual total capacity of 8.766 million TEUs, which would be sufficient for throughput demand beyond 2020 at 6.732 million TEUs (3.547 + 3.185 = 6.732), but not in 2030 when throughput is projected to be 9.339 million TEUs (4.937 + 4.402 = 9.339).

V. HUB/SPOKE ANALYSIS

A. INTRODUCTION

The purpose of a hub and spoke analysis is to assess the throughput of regional cargo from a load center port perspective analogous to an airline hub airport situation. The marine container literature has been replete with load center port references that would serve as hubs that consolidate cargo for smaller satellite ports. Analogous to airlines large capacity vessels with economies of scale would move substantial cargo volumes between hub ports while smaller capacity vessels would serve outlying ports that have lower volumes. The hub and spoke concept envisions a matching of capacity and costs among hubs and ports such that the economies of scale for services between hubs are combined with the economies of smaller better utilized vessels for the services between hubs and outlying (spoke) ports.

In the absence of a specific vessel operation plan the hub and spoke port development concept was analyzed by the capability of shifting existing capacity and or demand (TEUs) among the existing ports to a possible South Atlantic coast hub port. The concept was that the “hub” port would be sufficiently large to absorb the capacity of other ports or their future increases in TEUs as a result of regional port load centering.

Table 6 shows the capacity of existing, developing, and other potential terminals for the South Atlantic container ports. The data are depicted in Figure 9. The five ports have (as previously noted) 10.176 million TEUs of annual capacity for existing terminals and 9.411 million TEUs of annual capacity for developing terminals. Total existing and developing terminal annual capacity is 19.587 million TEUs. This would be sufficient for demand throughput beyond 2030 (roughly 2035).

The ports' annual capacity data in Table 6 is systematically recast, dropping one of the port’s capacity but retaining its projected demand. The data depicted in figures 10, 11, 12, 13, and 14

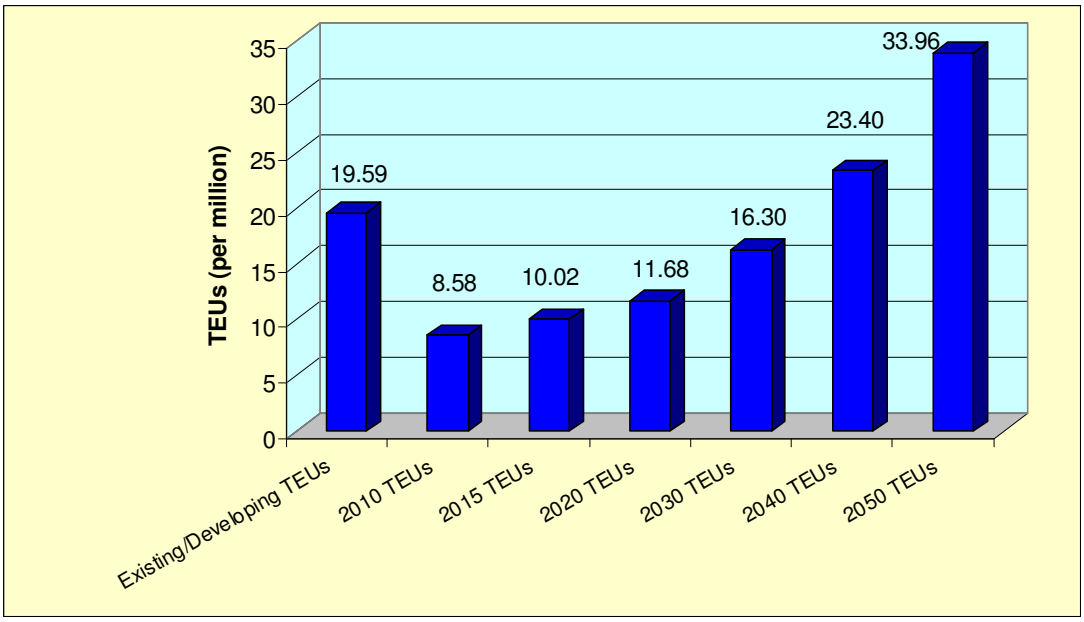
are for exclusions of capacity of Norfolk, Wilmington, Charleston, Savannah, and Jacksonville, respectively.

Table 6. Estimated TEU Annual Capacity of Total South Atlantic Ports, Existing, Developing, and Other Terminals, Excluding One Port (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
	Capacity								
Total	Existing	10.176	6.797						
	Developing	9.411							
	Subtotal	**19.587**							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962
Total, ex Norfolk	Existing	6.976	6.797						
	Developing	4.751							
	Subtotal	**11.727**							
	Other	7.300							
	Total	19.027		8.584	10.021	**11.682**	16.298	23.396	33.962
Total, ex Wilmington	Existing	9.676	6.797						
	Developing	9.411							
	Subtotal	**19.087**							
	Other	5.300							
	Total	24.387		8.584	10.021	11.682	**16.298**	23.396	33.962
Total, ex Charleston	Existing	7.530	6.797						
	Developing	7.981							
	Subtotal	**15.511**							
	Other	5.300							
	Total	20.811		8.584	10.021	11.682	**16.298**	23.396	33.962
Total, ex Savannah	Existing	7.524	6.797						
	Developing	6.990							
	Subtotal	**14.514**							
	Other	4.000							
	Total	18.514		8.584	10.021	**11.682**	16.298	23.396	33.962
Total, ex Jacksonville	Existing	8.998	6.797						
	Developing	8.511							
	Subtotal	**17.509**							
	Other	7.300							
	Total	24.809		8.584	10.021	11.682	**16.298**	23.396	33.962

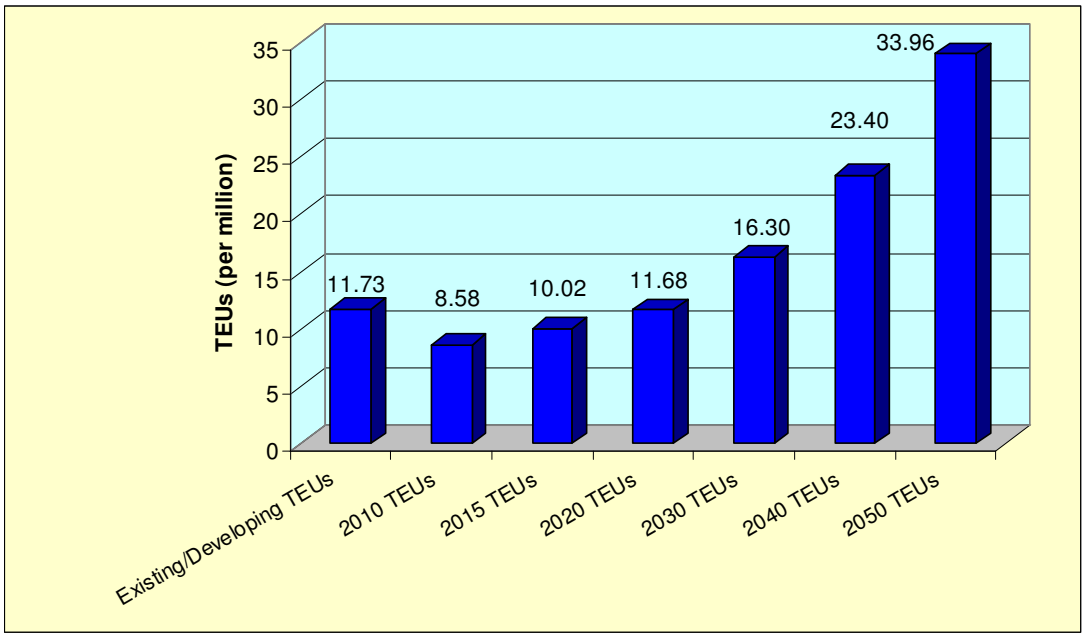
Notes: Growth TEUS represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.
Bold entries for existing and developing capacity (subtotal) correspond to nearest projected throughput demand, 2010 to 2050, in bold.

Source: G.E.C., Inc.



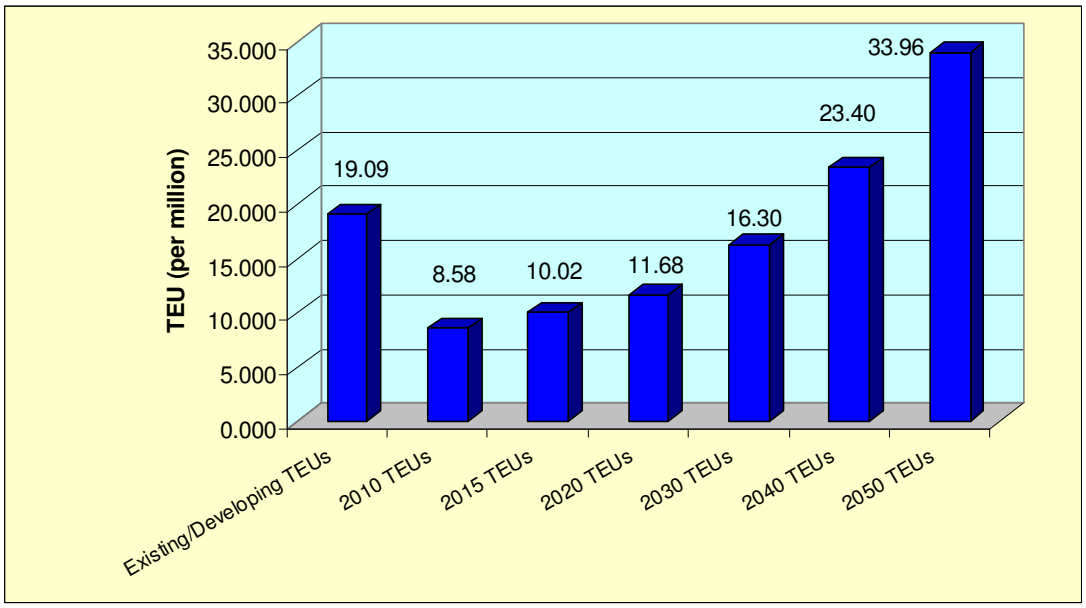
Source: Table 5.

Figure 9. Total Capacity Existing and Developing TEUs for All Selected South Atlantic Ports Compared to Estimated TEU Annual Throughput (2010-2050)



Source: Table 6

Figure 10. Existing and Developing TEU Capacity South Atlantic Ports Excluding Port of Norfolk Compared to Estimated TEU Annual Throughput – All Ports

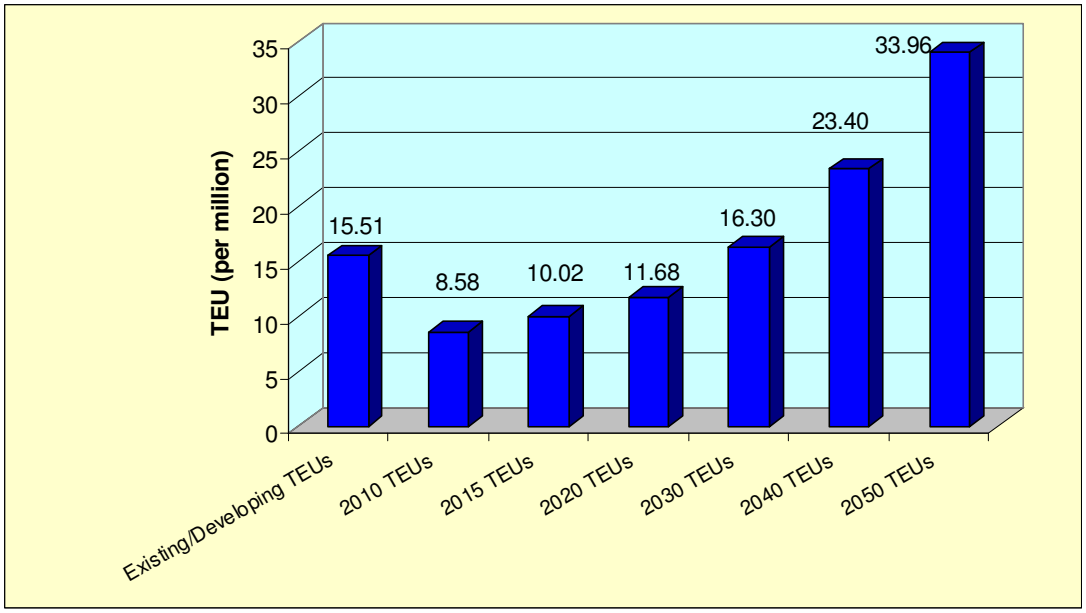


Source: Table 6.

Figure 11. Existing and Developing TEU Capacity South Atlantic Ports Excluding Port of Wilmington Compared to Estimated TEU Annual Throughput – All Ports

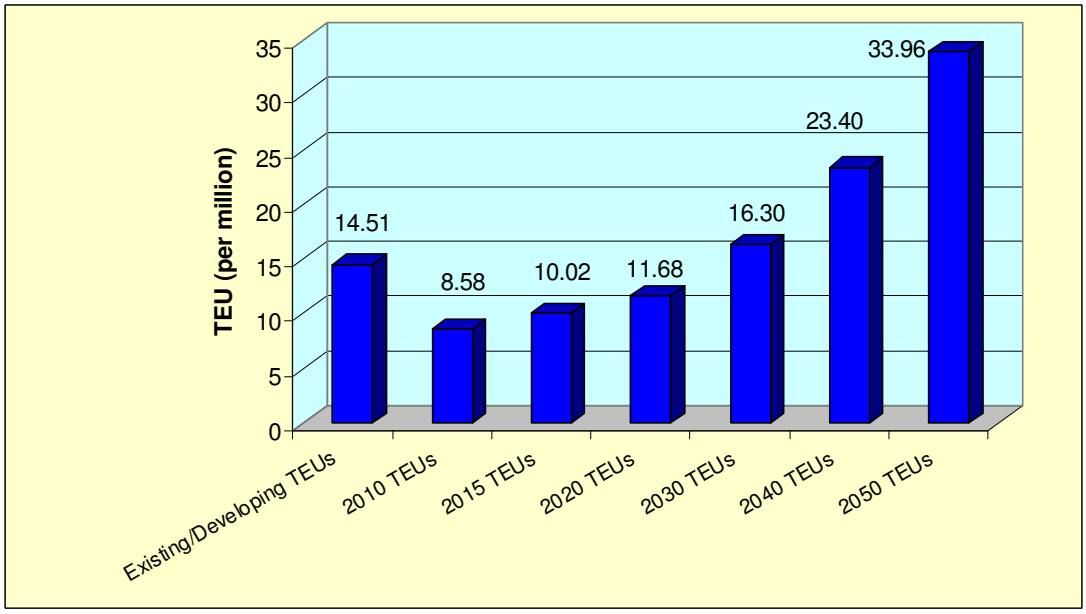
Excluding Norfolk (Figure 10), the existing and developing annual terminal capacity would be 11.727 million TEUs (6.976 + 4.751 = 11.727 million TEUs), which would be sufficient for all projected demand, including Norfolk, until 2020 (11.682 million TEUs). Excluding Wilmington (Figure 11), the existing and developing annual terminal capacity would be 19.087 million TEUs (9.676 + 9.411 = 19.087 million TEUs). This would be sufficient to serve total projected demand beyond 2030 (roughly 2035).

Excluding Charleston (Figure 12), the existing and developing annual terminal capacity would be 15.511 million TEUs (7.530 + 7.981 = 15.511 million TEUs), which would be sufficient for all projected demand, including Charleston, until nearly 2030 (16.298 million TEUs). Excluding Savannah (Figure 13), the existing and developing annual terminal capacity would be 14.514 million TEUs (7.524 + 6.990 = 14.514 million TEUs), which would be sufficient for all projected demand between 2020 and 2030. Finally, excluding Jacksonville (Figure 14), the existing and developing annual terminal capacity would be 17.509 million TEUs (8.998 + 8.511 = 17.509 million TEUs), which would be sufficient to meet projected demand past 2030.



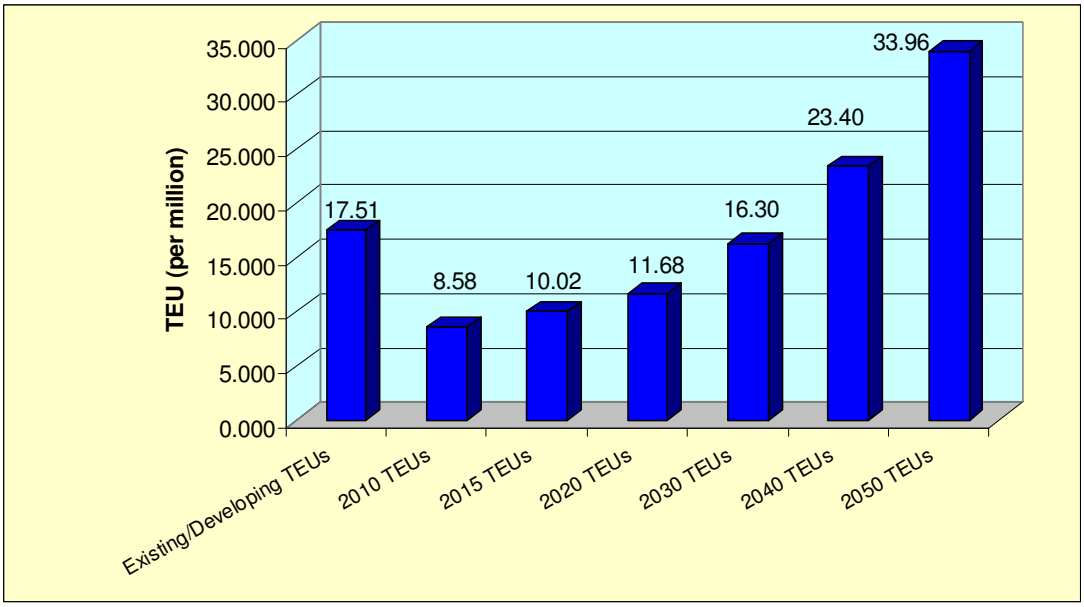
Source: Table 6.

Figure 12. Existing and Developing TEU Capacity South Atlantic Ports Excluding Port of Charleston Compared to Estimated TEU Annual Throughput – All Ports



Source: Table 6.

Figure 13. Existing and Developing TEU Capacity South Atlantic Ports Excluding Port of Savannah Compared to Estimated TEU Annual Throughput – All Ports



Source: Table 6.

Figure 14. Existing and Developing TEU Capacity South Atlantic Ports Excluding Port of Jacksonville Compared to Estimated TEU Annual Throughput – All Ports

Table 6 indicates that the two smallest ports relative to capacity of existing and developing terminals and demand (Wilmington and Jacksonville) have the least effect on capacity utilization at the major ports (Norfolk, Charleston, and Savannah). The most substantial effects on capacity utilization in the South Atlantic occur when shifts from the major ports (Norfolk, Charleston, and Savannah) are envisioned. The data indicate that the major ports all have substantial existing and projected container volumes as well as significant existing and developing marine terminal capacity. It is not readily apparent that selecting the best port for expansion purposes with the volumes currently handled and projected could be efficiently undertaken given the substantial existing and projected traffic at these ports.

B. ASSUMPTIONS

A hub and spoke port analysis requires a substantial number of assumptions related to but exceeding the framework described earlier for port capacity assessment. Foremost among the hub and spoke assumptions is whether the hub will be domestic or foreign with respect to location. A domestic hub would reflect the shift of cargo away from an existing port, effectively resembling a load centering of containers. Boxes would be moved between the load center port and the hinterland by alternative domestic land routes.[14] A foreign hub port would reflect an

[14] Alternatively, boxes could be moved by ocean barge between the load center port and other ports, incurring double handling at marine terminals.

offshore port that would require transshipment of boxes between itself and domestic ports. There is a limited model of this form of transfer already in place with some feeder service, for example between Freeport and Jacksonville.

1. Domestic Hub

Container ports are relatively seamless with respect to the ability to transfer cargo among them. This is particularly true for adjacent container ports on the same coast that share similar highway and rail networks (for example, Savannah and Charleston). Accordingly, it is not unusual for lines to issue shipper bill of ladings at a port but move the box through an adjacent container port. For example, a line might issue a Jacksonville bill of lading and then truck the box to Savannah for shipment.

One way to conceptually address load centering is to look at the effects on the port's capacity utilization of shifting growth cargo to adjacent ports. Growth cargo is a euphemism for new or expanded services that would be shifted to load center ports. Practically, existing cargo would remain at the "zero growth" port, although some might realign as part of shifts in lines' services that would accompany load centering. Overall, the effect would be to freeze existing cargo levels at particular ports and reallocate this growth in cargo volume to adjacent hub ports.

Table 7 presents the projected containerized cargo growth projected at the ports during the period 2005 to 2050. Total growth for the five ports is 1.787 million TEUs during the period 2005 to 2010, nearly doubling to 3.224 TEUs by 2015. The data indicate that the major ports (Norfolk, Charleston, and Savannah) will experience nearly 0.5 million growth in TEUs each during the period 2005 to 2010 and slightly less in the ensuing five-year periods of 2010 to 2015 and 2015 to 2020.

Table 8 shows shifting growth in projected total containers after 2005 among adjacent or otherwise close ports to simulate hub port alignments. In Table 8, Savannah growth is shifted to Jacksonville, Charleston, or Wilmington; Jacksonville growth is shifted to Savannah; Charleston growth is shifted to Savannah or Wilmington; Norfolk growth is shifted to Wilmington; and Wilmington growth is shifted to Charleston or Norfolk.

The key measure in Table 8 is the effect of the shifts in adjacent port container growth on hub port capacity utilization, particularly for the existing and developing terminal capacities that seem more certain than the other potential new terminal capacity. If the hub port throughput capacity utilization is likely to be substantially impacted by shifts in growth traffic from an adjacent port, it would not appear to be a feasible candidate as a hub, other things being equal. Conversely, if shifting of container growth traffic from adjacent ports to a hub port has no substantial impact on capacity utilization, it would appear to be a feasible candidate as a hub, other things being equal.

Table 7. Estimated TEU Annual Capacity and Throughput Growth at South Atlantic Ports (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Developing	0.900							
	Other								
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
	Growth TEUs			0.230	0.446	0.717	1.515	2.719	4.397
Savannah	Existing	2.652	1.902						
	Developing	2.421							
	Other	3.300							
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Charleston	Existing	2.646	1.987						
	Developing	1.430							
	Other	2.000							
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
	Growth TEUs			0.561	1.036	1.560	2.950	5.010	7.984
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Norfolk	Existing	3.200	1.982						
	Developing	4.660							
	Other								
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
	Growth TEUs			0.466	0.776	1.126	2.125	3.739	6.282
Total	Existing	10.176	6.797						
	Developing	9.411							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962
	Growth TEUs			1.787	3.224	4.885	9.501	16.599	27.165

Notes: Growth TEUS represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.

Source: G.E.C., Inc.

Table 8. Estimated TEU Annual Capacity and Shifting Throughput Growth at South Atlantic Ports (000,000)

Ports	Terminals	TEUs	2005 TEUs	2010 TEUs	2015 TEUs	2020 TEUs	2030 TEUs	2040 TEUs	2050 TEUs
Jacksonville	Existing	1.178	0.777						
	Developing	0.900							
	Other								
	Total	2.078		1.007	1.223	1.494	2.292	3.496	5.174
Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				1.472	2.062	2.777	4.792	7.847	12.251
Savannah	Existing	2.652	1.902						
	Developing	2.421							
	Other	3.300							
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Jacksonville	Growth TEUs			0.230	0.446	0.717	1.515	2.719	4.397
Subtotal				2.597	3.187	3.902	5.917	8.972	13.376
Savannah	Existing	2.652	1.902						
	Developing	2.421							
	Other	3.300							
	Total	8.373		2.367	2.741	3.185	4.402	6.253	8.979
Charleston	Growth TEUs			0.561	1.036	1.56	2.95	5.01	7.984
Subtotal				2.928	3.777	4.745	7.352	11.263	16.963
Charleston	Existing	2.646	1.987						
	Developing	1.430							
	Other	2.000							
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				3.013	3.862	4.830	7.437	11.348	17.048
Charleston	Existing	2.646	1.987						
	Developing	1.430							
	Other	2.000							
	Total	6.076		2.548	3.023	3.547	4.937	6.997	9.971
Wilmington	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Subtotal				2.613	3.150	3.746	5.348	7.777	11.396
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Savannah	Growth TEUs			0.465	0.839	1.283	2.500	4.351	7.077
Subtotal				0.679	1.115	1.631	3.060	5.280	8.651
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Charleston	Growth TEUs			0.561	1.036	1.560	2.950	5.010	7.984
Subtotal				0.775	1.312	1.908	3.510	5.939	9.558
Wilmington	Existing	0.500	0.149						
	Developing								
	Other	2.000							
	Total	2.500		0.214	0.276	0.348	0.560	0.929	1.574
Norfolk	Growth TEUs			1.787	3.224	4.885	9.501	16.599	27.165
Subtotal				2.001	3.500	5.233	10.061	17.528	28.739
Norfolk	Existing	3.200	1.982						
	Developing	4.660							
	Other								
	Total	7.860		2.448	2.758	3.108	4.107	5.721	8.264
Wilmington	Growth TEUs			0.065	0.127	0.199	0.411	0.780	1.425
Subtotal				2.513	2.885	3.307	4.518	6.501	9.689
Total	Existing	10.176	6.797						
	Developing	9.411							
	Other	7.300							
	Total	26.887		8.584	10.021	11.682	16.298	23.396	33.962

Notes: Growth TEUS represent the difference between projected TEUs (2010 - 2050) and 2005 actual TEUs.

Source: G.E.C., Inc.

Shifting Savannah container growth to Jacksonville would essentially exhaust the port's existing and developing terminal container capacity by 2015 (2.062 million TEUs of throughput demand compared to 2.078 million TEUs of throughput capacity). Shifting Jacksonville container growth to Savannah would accelerate the port's full utilization of total capacity by nearly a decade, from approximately 2050 (8.979 million TEUs of Savannah throughput demand versus 8.373 million TEUs of throughput capacity) to 2040 (8.972 million TEUs of Savannah and Jacksonville growth throughput demand).

Shifting Charleston growth to Savannah would essentially fill existing and developing terminals (5.073 million TEUs of annual capacity) by 2020 with 4.745 million TEUs of throughput demand. If Savannah developed the other potential terminals for a total annual throughput capacity of 8.373 million TEUs, it would be fully occupied in the early part of the 2030 decade compared to nearly 2050 without Charleston growth.

Shifting Savannah growth to Charleston would quickly fill the 4.976 million TEUs of annual throughput capacity of the existing and developing terminals by 2020 compared to 2030 without Savannah growth shifted to Charleston. Possible other Charleston expansion (such as Jasper County) would accommodate Savannah growth until the mid-2020s (Charleston and Savannah growth throughput would be 4.830 million TEUs in 2020 and 7.437 million TEUs in 2030), unless the other potential terminal site had more than 2.0 million TEUs of annual throughput capacity.

Shifting Wilmington growth to Charleston would not present much of a problem relative to existing and developing container capacity. Charleston with just over 4.0 million TEUs of annual existing and developing terminal capacity would still have sufficient capacity into the early part of the 2020 decade.

Shifting Savannah or Charleston growth to Wilmington would engulf the port in TEUs. Capacity of the existing Wilmington facility, estimated to be fully developable to 0.5 million TEUs throughput annually, would be exceeded before 2010. Initial capacity estimates of the NCIP (2.0 million TEUs annually) would be exceeded early in the 2020 decade.

Shifting Wilmington growth to Norfolk would not present much of a problem relative to existing and developing container capacity. Norfolk would still have sufficient annual throughput capacity (7.860 million TEUs) into the decade of 2040.

The "growth TEUs" in Table 8 are quite large, starting at 1.787 million between 2005 and 2010 and increasing to 3.224 million by 2015 and 4.884 million by 2020. The developing Charleston Navy Container Terminal (CNCT), with 1.430 million TEUs of total annual throughput capacity, would need to be created to absorb most but not all of the five-year growth in South Atlantic TEUs from 2005 to 2010, 2010 to 2015, 2015 to 2020, and so on. Excluding Norfolk, the projected growth in TEUs at Charleston and Savannah is nearly 1.0 million between 2005 and 2010 (0.561 and 0.465 = 1.026 million TEUs) and 2.0 million TEUs between 2005 and 2015 (1.036 + 0.839 = 1.875 million TEUs). Effectively, a major new terminal with 2.0 million TEUs of capacity would have to be opened to handle the projected container growth traffic of Savannah and Charleston between 2005 and 2015.

2. Foreign Hub

Growth TEUs at one or more domestic ports could be handled offshore through a transshipment facility that would use smaller vessels for delivery to domestic ports. Previously, it was noted that the projected TEU growth at major South Atlantic ports such as Savannah and Charleston is a combined total of nearly 1.0 million TEUs for the five-year periods between 2005 and 2020. By 2020, growth TEUs from 2005 are projected to be 1.283 million at Savannah and 1.560 million at Charleston. Effectively, Savannah and Charleston would require an overseas marine container terminal with upwards of 2.0 million TEUs of throughput capacity annually by 2015 to accommodate their TEU growth traffic.

C. PERFORMANCE OF HUBS

To be effective, hub or load center ports must provide competitive cost and service characteristics. A qualitative discussion of these issues follows for domestic and foreign hubs.

1. Cost

Domestic hub ports from a cost perspective would perform similarly to spoke ports except for landside freight cost differences for longer routings. The multiport analysis demonstrates that there is a considerable degree of overlap between adjacent South Atlantic ports, particularly Savannah and Charleston, for a truck-served hinterland, with relatively small differences in least total delivered transportation cost. Port handling costs would be similar at the major ports in the absence of congestion.

A foreign hub port would have a considerable cost disadvantage from the perspective of double port handling of containers shuttled to domestic spoke ports. The double handling of containers could easily add another $150 to $250 per box associated with transshipment port costs. Unless the mother vessel calling at the foreign port had very substantial economies of scale compared to the use of distinctly smaller vessels (not regularly calling U.S. South Atlantic container ports) with direct services, the extra handling costs will increase the shippers' freight costs with no other benefits.

2. Performance

It is not likely that a domestic hub port would add appreciable transit time to domestic containers compared to spoke ports. It would appear that a domestic hub port might add up to a day of transit time to serve more distant hinterlands compared to spoke ports. Transit time differences less than one day can be ignored, and transit times of one day can be subsumed in supply chain procurement systems.

Offshore hub ports would likely add several days of transit time for domestic boxes. Although the time required for transshipment is not substantial, there will be schedule delays if the connecting services are weekly in frequency. Conceivably, foreign hub ports could add several days of average transit time for U.S. spoke ports. Shippers generally would not find this acceptable unless there were offsetting freight cost savings.

APPENDIX

Appendix

THE REGIONAL PORTS

OVERVIEW

What the various ports have in mind with respect to prospective container cargoes is not always clear because some of the ports lack comprehensive plans. When planning documents have been prepared, their contents are sometimes not readily available to the public. Of those that are available, some are not based on detailed commodity projections or an indication of how market share might be obtained. Many of the expansion plans appear to be predicated on an understanding of general trends, with assumptions about the capacity to acquire market share based on experience, opportunity, and intent. This has led to questions on the part of port analysts about potential overcapacity on the part of individual ports and the ports collectively. These questions are usually not raised in circumstances where expansion planning is based on private-sector initiatives.

NORFOLK

The Virginia Port Authority (VPA) owns the Norfolk International Terminals, the Newport News Marine Terminal, the Portsmouth Marine Terminal, and the Virginia Inland Port. These four facilities, which are operated by Virginia International Terminals, constitute the Port of Virginia. The three terminals are located along the Hampton Roads Harbor near the ocean with access to a 50-foot channel. Newport News handles breakbulk and RO-RO. Norfolk International is the largest of the terminals and handles containers, breakbulk, and RO-RO. Portsmouth Marine handles containers, breakbulk, and RO-RO. The Virginia Inland Port is located to the northwest far in the interior of the state and is the intermodal transfer point for the three harbor terminals.

The Port of Virginia is the eighth largest container port in the U.S. and the second largest port on the East Coast in terms of general cargo (container and breakbulk), with a stated intention to surpass the Port of New York/New Jersey. Major retailers have established nearby regional distribution centers. In May 2006, the port signed a cooperative agreement with the Suez Canal Authority to promote trade with Asia and the Indian subcontinent.

Ongoing renovations to Norfolk International totaling $280 million were begun in 2002 and are expected to be completed by 2012. Projects have included reconfiguration of the container yard, reconstruction of the wharf, installation of eight Post-Panamax cranes, and 70 straddle-carriers that will haul containers away from shipside. The improvements are intended to increase by 30 percent the storage and throughput capacity of Norfolk's South Terminal and make it a state-of-the-art facility capable of handling the heaviest cargo worldwide. The wharf reconstruction has been completed and the cranes are in operation. Dredging of the berths and access channels is expected to be completed this year.

The Port of Virginia is expected to experience further growth through the Heartland Corridor project, which will clear a route for double-stack trains directly from Portsmouth to Chicago, cutting a day off current transit times. In May 2006, the governor of Virginia and the CEO of Norfolk Southern signed a memorandum of understanding to finance the project, which will raise the clearance of train tunnels and bridges and eliminate 13 at-grade crossings. The project includes an $18 million intermodal shipping yard that will be built near Roanoke within three years. The project, which is scheduled for completion by 2010, will support operations at the proposed Craney Island and the emergent Maersk-Sealand facilities.

Craney Island and Maersk-Sealand are two terminal projects that will have a significant effect on the Port of Virginia's competitive position. A new Maersk-Sealand cargo terminal is under construction on VPA property on the Elizabeth River immediately below the Craney Island site. The project was announced in April 2004 and will involve a 280-acre facility that will cost $600 million. This is the first major privately developed terminal in the U.S. Phase I of the project is intended to open in July 2007 at one million TEUs, with 2.16 million TEUs projected at final buildout. When Maersk moves into the new facility, VPA will inherit its vacated 300,000 TEU capacity facility. The Corps of Engineers completed an Environmental Assessment on the project in 2003, concluding that it would have no significant impact to the environment. Environmental groups were not opposed to the project, but wanted the Corps to conduct a full-scale Environmental Impact Study of the cumulative impacts of proposed projects in the area, including Craney Island.

The need for the Craney Island project is established through VPA's 2040 Master Plan, which was based on a 1999 forecast of containerized cargo produced in conjunction with a reconnaissance report for the project that showed a growth rate between 3.5 and 4.7 percent. This analysis indicates that VPA will need 1,800 acres of new container cargo area by 2050, of which 664 will be supplied by improvements to existing facilities and 280 will be supplied by the Maersk-Sealand facility, leaving a deficit of 850 acres. The Port of Virginia was expected to run out of capacity in 2007 without the Maersk-Sealand project and in 2015 with the Maersk-Sealand project.

The Craney Island project involves a 580-acre eastward expansion of an existing dredged material disposal site adjacent to a federal navigation channel and subsequent development of the 580 acres for a container terminal complex, including an access channel, berths, wharves, container yards, cranes, gate facilities, intermodal yards, new access roads and ramps, a new rail track, cargo processing and support facilities, and stormwater management areas. The project is expected to cost $1.28 billion. VPA is serving as the local sponsor for the project, for which an Environmental Impact Statement was completed by the Corps in April 2006.

The project is intended to be built in four phases, with the first phase involving 220 acres. Major cumulative components of the four phases are 3,000 feet of wharf and eight 100-foot (Suez Class) cranes in Phase I, 4,800 feet of wharf and 12 100-foot cranes in Phase II, 6,600 feet of wharf and 16 100-foot cranes in Phase III, and 8,400 feet of wharf and 20 100-foot cranes in Phase IV. Phase I operations are expected to be underway by 2018, with a throughput of 600,000 TEUs. Full buildout conditions are projected for 2032, with a throughput of 2.5 million TEUs.

The Corps had considered the Craney Island project to be merely speculative from a federal perspective because of the high cost, assumed navigational safety problems, and environmental harm. However, in May 2006 the Corps granted a policy exemption indicating that it does not have to recommend an alternative. The Corps is now in a position to recommend federal participation in the project. Issues remain with respect to VPA's request that the Corps split the $600 million cost of building the eastward expansion.

WILMINGTON

The Port of Wilmington is located on the Cape Fear River in Wilmington, North Carolina, and is operated by the North Carolina State Ports Authority. The port is located 26 miles from the ocean on a new 42-foot channel and is considered a niche port handling containerized, bulk, and breakbulk cargoes. Exports include chemicals, food, phosphate, and general merchandise; and imports include animal feeds, chemicals, fertilizers, metal products, lumber, rubber, steel, furniture, and general merchandise. The port stresses its eastern seaboard location and the availability of sites for distribution centers.

Although the existing container yard was operating at only half capacity in late 2005, a $130 million enhancement program is underway that is intended to double the container capacity at the port to meet demand during the next 10 years. These efforts include four new 100-foot gauge container cranes, new container handling equipment, a new terminal operating system, and berth, dock, and paving improvements. Phase 1 is to be completed in 2007 and the whole effort in five years. This effort is intended as an interim measure before the construction of the North Carolina International Port (NCIP), which would be the primary container port, with Wilmington's existing facilities continuing to serve the general cargo business.

Conceptual plans for the NCIP envision it as a major international port terminal that would place North Carolina in the ranks of major U.S. ports. The idea of such a port did not emerge until fairly recently and was apparently based on the projected doubling of the East Coast container market by 2015. In April 2006, the Ports Authority closed on the purchase of a 600-acre undeveloped industrial site on the Cape Fear River 9.5 miles from the ocean and with nearby highway and rail access. The facility would have a minimum annual capacity of 1.5 million TEUs, 4,000 linear feet of berthing space, and an industrial park on site for distribution centers or related operations. About 75 percent of the facility's container traffic would be moved by rail. Planning and construction is expected to take about 10 years, with a current projected opening in 2015.

The project is expected to cost $1 billion, including $300 million that would be needed from Congress for channel dredging. The Ports Authority plans to seek a private-sector partner to invest in the development of the port facility. Some preliminary interest has been shown by Seattle-based SSA, South Korea's Hanjin Shipping, and Denmark's A.P. Moeller-Maersk.

The Authority is moving forward quickly to plan development of the new terminal. Among the tasks required before the new port could open are dredging the navigation channel, design and

construction of terminal facilities, and working with state and federal authorities to ensure highway and rail access. The project has Congressional delegation support. The Corps of Engineers will soon be undertaking a reconnaissance study to deepen the navigation channel to 50 feet. Authority representatives have met with the North Carolina Department of Transportation and state and local officials to discuss highway and rail access, and a working group has been established to coordinate the effort. CH2M Hill was selected in May to manage the port development process, including project management, planning and design of port and intermodal facilities, investigation of environmental issues, and conduct of public outreach efforts.

Contacts by the Port Authority with persons in the area that would be impacted by the project indicate that transportation is a key concern. Among the transportation concerns are proximity of the proposed highway to residential streets, rail traffic hindering access to a neighborhood, and implications for the proposed Cape Fear Skyway Bridge. An alternative to NC 87 has already been proposed that would involve access from US 17 and points north and west. The proposed Skyway Bridge was designed to move port-generated highway traffic off Wilmington's streets while providing 225 feet of clearance for the passage of large ships to the existing port, which may no longer be necessary.

Critics question whether a third major port in roughly 300 miles of coastline could compete. The location of the site in a coastal environment raises issues about the potential impacts to water quality, fisheries, and other natural resources. Environmentalists expressed concerns about the prior deepening of the channel from 38 to 42 feet and are expected to express even greater concern about the increased depths.

CHARLESTON

The Port of Charleston is located in Charleston, South Carolina, and is operated by the South Carolina State Ports Authority (SPSCA). The port contains five terminals: (1) Columbus Street, which handles breakbulk and containers; (2) North Charleston, which handles containers; (3) Wando Welch, which handles containers and is the largest terminal in size and volume; (4) Union Pier, which handles breakbulk and RO-RO; and (5) Veterans, which handles bulk, breakbulk, RO-RO, and project cargo. All of the terminals are located on the Cooper River, with the exception of Wando Welch, which is located on the Wando River. The North Charleston Terminal is two hours sailing time to the ocean, and the Wando Welch Terminal is 1.5 hours sailing time to the ocean. The channels to all of the terminals have been deepened to 45 feet, and the entrance channel has been deepened to 47 feet. The new Ravenel Bridge over the Cooper River provides 186 feet of vertical clearance.

The port ranks fourth nationally in container movements, is the busiest container port on the Southeast and Gulf coasts, and is exceeded on the entire East Coast only by the Port of New York/New Jersey. To handle near-term growth and improve utilization of existing terminals, the port has a two-year $159 million capital plan to provide new container stacking equipment, container cranes, and other capacity enhancements. The cranes include four new Super Post-Panamax container cranes, with North Charleston and Wando Welch expected to receive two each by 2007. The near-term plan translates into 400,000 TEUs of additional capacity.

The port has been interested in capacity expansion through new terminal development since the late 1980s. Attention was first focused on Daniel Island, a dredge fill area at the junction of the Cooper and Wando rivers. Attention shifted to the Charleston Naval Complex when its impending closure was announced. The Naval Complex project was abandoned when it was opposed by the residents of North Charleston, a largely black low-income community. Attention shifted back to Daniel Island, but the project was opposed by the residents of Mount Pleasant (a wealthy suburb across the Wando) and new residents of Daniel Island. Although a Draft Environmental Impact Statement was completed in 1999, a compromise plan failed, the SCSPA withdrew its permit application in 2000, and the land is presently being offered for sale.

Efforts are presently directed toward development of a 280-acre site in the Naval Complex, with a cost estimate of $600 million. The need for the project is established by a 2002 update by SCSPA of a 1999 container cargo projections analysis. The update utilized trade lane data compiled by PIERS, macroeconomic growth drivers and annual growth rates by trade lane projected by Wharton Econometric Forecasting Associates, and customer-specific information. Based on this analysis, SCSPA estimates that the maximum practical capacity of its nine berths at its three existing container terminals will be exceeded by 2008.

The purpose of the proposed project is to accommodate Post-Panamax class ships. The project will have a maximum practical capacity of 1.4 million TEUs, is expected to be operational in 2012, and is expected by SCSPA to meet their needs through 2025. The project will not involve channel dredging. The project includes:

1. Three berths with a total length of 3,510 feet.
2. A berth area 50 feet deep and 150 feet wide.
3. A turning basin at least 1,500 feet square and 50 feet deep.
4. Six container cranes with a minimum outreach of 200 feet.
5. A 203-acre paved area for container processing and storage.
6. A 40-acre paved area and buildings for support gate structures and other operations and facilities.
7. A dedicated access road.

A $10 million federal earmark was obtained in August 2005 to plan for the access road to the south, which has broad community support. In December, SCSPA received three proposals for development of the terminal, two of which were disclosed: Hanjin Shipping and OOCL (USA).

A Draft Environmental Impact Statement on the project was completed by the Corps of Engineers in October 2005. Comments on the project have not yet been summarized by the Corps. SCSPA has offered North Charleston $4 million for social programs to help neighborhoods affected by the development. In May 2006, the North Charleston City Council voted nine to two to accept the offer and direct the money toward affordable housing, educational opportunities, health care, and landscaping between the proposed project and nearby communities.

SCSPA is pursuing a parallel terminal project in Jasper County that would provide three container berths. In January 2005, SCSPA's Board voted unanimously to begin the necessary

steps to acquire 1,800 acres on the South Carolina side of the Savannah River. The land, which is a dredged material disposal area, is presently owned by the Georgia Department of Transportation. Jasper County had wanted its own container terminal and had reached an agreement with the Seattle-based Stevedoring Services of America to build and operate the port when SCSPA intervened. A dispute over condemnation rights is presently in litigation, with the most recent court case finding in favor of SCSPA.

SAVANNAH

The Port of Savannah is located on the Savannah River in Savannah, Georgia, about 13 miles from the ocean and is owned by the Georgia Ports Authority (GPA). The port contains two terminals: the Garden City Terminal and the Ocean City Terminal. The Garden City Terminal is among the top five container handling facilities in the U.S. and is the largest of its kind on the East and Gulf coasts. The Ocean Terminal slightly downstream handles breakbulk and RO-RO. The channel is 42 feet deep and is under investigation by the Corps of Engineers for deepening to 48 feet.

The port is considered one of the fastest growing ports on the East Coast[15]. Major retailers have established nearby regional distribution centers. In 2003, *Expansion Management* magazine ranked Savannah as the Number 1 distribution and logistics location in the U.S. The ports of Savannah and New York/New Jersey are the only East Coast ports cited in national publications for port-related traffic congestion. However, the interstate highway system in Savannah is considered congestion-free.

GPA will invest $700 million over the next ten years at the Port of Savannah. In June 2006, GPA's Board approved $83 million in capital improvements, including four Super Post-Panamax cranes, 15 rubber-tired Gantry cranes, and container yard improvements. The most important element of the investment is the completion of Container Berth 8. The first phase of the Container Berth 8 project involved the completion of 1,200 feet of berth space in April 2006. An additional 1,000 feet is now under construction. By mid-2007, there will be an additional 100 acres of paved storage area. The improvements will increase the port's capacity to 4.37 million TEUs in 2015.

The deepening project is opposed by various environmental groups, citing saltwater intrusion and the proposed new port in Jasper County, South Carolina, which would be on the north side of the Savannah River downstream from the Port of Savannah.

JACKSONVILLE

The Port of Jacksonville is located in Jacksonville, Florida, on the St. Johns River and is operated by the Jacksonville Port Authority (JAXPORT). The port operates three public marine terminals (Blount Island, Talleyrand, and Dames Point) and one temporary passenger cruise terminal. The port handles dry and liquid bulk, breakbulk, vehicle (RO-RO), and containerized

[15] "How Savannah Revised Its Aging Cargo Port," The Wall Street Journal Online (www.Realestatejournal.com/propertyreport/industrial/20050823-machalaba.html)

cargoes, as well as oversized specialty cargoes. It is known as one of the largest vehicle-handling ports in the country.
The St. Johns River harbor deepening project began in 2002. Thus far, the main shipping channel has been deepened from 38 feet to 40 feet from the mouth of the river to Drummond Point. A proposal to extend the harbor deepening from Drummond Point to the Talleyrand terminal was authorized in late 2005 and is being constructed. The U.S. Army Corps of Engineers is also studying the impact of deepening the St. Johns River main channel to 45 feet.

The port indicates that it has committed more than $200 million to capital projects during the past decade to improve the three marine terminals and Jacksonville's harbor. Expansion plans are concentrating on a new container terminal at Dames Point. The need for the Dames Point facility is supported by a 1986 JAXPORT master plan, which projects cargo tonnage (including containers) through 2000 based on historic trends for the port.

In August 2005, Mitsui O.S.K. Lines (MOL), a Tokyo-based logistics and ocean transportation company, signed a 30-year lease agreement with JAXPORT for the construction of a 158-acre container-handling facility on an undeveloped portion of the Dames Point terminal about 10 miles from the ocean. Additional phases of the project could expand MOL's container facility to more than 200 acres.

Ships will sail directly between the facility and ports in Asia, as well as Latin America. This agreement marks the first time a company will regularly ship containers directly between Jacksonville and Asia, which is in keeping with JAXPORT'S efforts to diversify beyond its historic trading partners in Latin America and the Caribbean.

Facility construction (including equipment) is expected to cost approximately $200 million, with facility opening expected in late 2007 or early 2008. The underlying purpose of the project is to create a terminal that can accommodate two Panamax-class container ships. The project includes:

1. Construction of a 3,000-foot steel sheetpile bulkhead, a utility trench, and pile-supported crane rails to provide two 1,200-foot berths for containerized cargo ships.
2. Installation of six electric-powered, Post-Panamax container cranes.
3. Construction of a 158-acre paved container yard.
4. Construction of an access road and improvements to offsite roads to provide safe access for trucks and other vehicles.
5. Construction of infrastructure and utilities to accommodate a planned throughput of approximately 400,000 container units annually.
6. Construction of maintenance and administrative buildings.
7. Dredging of the St. Johns River to 42 feet from the bulkhead line to the limits of the federally maintained navigation channel.

According to the March 2006 Environmental Assessment by the Corps of Engineers, the project is expected to have no significant negative environmental effects. The existing road system is not sufficient to accommodate the projected truck traffic. Needed road improvements would

include widening the New Berlin Road and modifying Heckscher Drive and the northbound SR 9A ramp.

Initial plans call for the new facility to handle 360,000 TEUs annually, with an expectation of growth to 800,000 TEUs annually by 2011. When added to existing container activity, this would push Jacksonville beyond 1.5 million TEUs, making it one of only a dozen U.S. ports to handle more than one million containers annually. The port has stated a goal to become one of the three largest ports on the East Coast.

ATTACHMENT 2

SECOND INTERIM REPORT
REVISED MARCH 8, 2007

Volume I

Second Interim Report
(Revised March 8, 2007)

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS
ENVIRONMENTAL ISSUES SURVEY
INSTITUTIONAL ANALYSIS

US Army Corps of Engineers
Savannah District
Savannah, Georgia

Volume I

Second Interim Report
(Revised March 8, 2007)

SAVANNAH HARBOR EXPANSION PROJECT

REGIONAL PORT ANALYSIS
ENVIRONMENTAL ISSUES SURVEY
INSTITUTIONAL ANALYSIS

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U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
SAVANNAH, GEORGIA

March 8, 2007

ORGANIZATION OF REPORT

This report contains the following sections, published in two volumes:

Volume I

Executive Summary
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I. Introduction
II. Environmental Issues Survey Overview
III. Institutional Analysis
Appendix A: Savannah District Letter to Ports
Appendix B: Savannah District Communication to Other Districts
Appendix C: Memorandum Concerning Secondary Information Sought

Volume II

Attachment: Environmental Issues Survey

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The Regional Port Analysis (RPA) reflects concerns of different stakeholders who indicated that there should be a study of allocating Federal improvement funds at one regional port in the South Atlantic region rather than deepening several competing ports with excess capacity. Accordingly, the RPA is being performed to address port capacity and related issues such as environmental resources and institutional factors affecting port expansion and development. The first interim report (July 2006) addressed South Atlantic port marine container terminal capacity and demand. This second interim report addresses environmental resources and institutional factors pertaining to port expansion and development. This volume presents the constraint determination and anticipated impact level evaluation for environmental resources in the areas of potential port expansion based on the data presented in Volume II of the Second Interim Report.

ENVIRONMENTAL ISSUES SURVEY

An Environmental Issues Survey was prepared in accordance with the February 2004 scope of work and superseding guidance provided by the Savannah and Mobile districts. The work plan envisioned selection of discrete expansion alternative sites and associated intermodal access points and hinterland corridors for each candidate site, site reconnaissance and primary data collection, and interviews with personnel at pertinent ports. Concern was raised by the Mobile District that an environmental survey of discrete sites prior to a full National Environmental Policy Act analysis would constitute a "pre-decisional" action. Consequently, new guidelines were issued specifying that the survey would evaluate environmental resources that could potentially be impacted during any planned port or deep-draft channel expansion. The survey would utilize publicly available information, and no new data would be collected.

The July 2006 Multiport Analysis identified five ports as candidates for the proposed Regional Port: Jacksonville, Savannah, Charleston, Wilmington, and Hampton Roads (Norfolk). To prevent concerns over pre-decisional expansion site selection(s), a Region of Interest (ROI) was selected for each port that was broad in extent and generally included both coastal and inland areas (in the case of Charleston, two ROIs were selected). The following environmental resources were identified for evaluation: geology and soils; air quality; water quality; sediment quality; Coastal Zone Management Act (CZMA) resources; noise environment; wetlands; wildlife resources (including invasive species, threatened and endangered species, unique or unusual habitats, and Essential Fish Habitat [EFH]); cultural resources; hazardous, toxic, and radioactive waste (HTRW); socioeconomic profile (including environmental justice); transportation; and recreation. Data on these environmental resources were collected for each ROI from environmental agencies as well as independent research. Level of constraint and degree of impact were assessed. These data are summarized in Chapter II and included fully in the attachment to this report. A synopsis of determinations by environmental resource is presented below.

Geology and soils are not believed to constitute a constraint to port expansion within any ROI. No appreciable primary or secondary impacts are anticipated to this resource as a result of port expansion activities or consequences.

Air quality has been assessed as a moderate constraint for all ROIs except Savannah and Norfolk, where it has been assessed as a substantial constraint. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville, Charleston, and Wilmington ROIs. Substantial secondary adverse impacts are anticipated for the Savannah and Norfolk ROIs.

Water quality has been assessed as a moderate constraint for all ROIs except Savannah, Wilmington, and Norfolk, where it has been assessed as a substantial constraint. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville and Charleston ROIs. Substantial secondary adverse impacts are anticipated for the Savannah, Wilmington, and Norfolk ROIs.

Sediment quality has been assessed as a substantial constraint for the Savannah, Wilmington, and Norfolk ROIs and a moderate constraint for the remaining ROIs. Minor primary adverse impacts are anticipated for all ROIs, and moderate secondary adverse impacts are anticipated for the Jacksonville and Charleston ROIs. Substantial secondary adverse impacts are anticipated for the Savannah, Wilmington, and Norfolk ROIs.

CZMA resources have been assessed as a substantial constraint to port expansion within all ROIs. Moderate primary and secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

Noise environment has been assessed as a moderate constraint for all ports except the Charleston ROIs. Noise environment has been assessed as a substantial constraint for the Berkeley-Charleston County ROI and is not believed to constitute a constraint for the Jasper County ROI. Moderate primary adverse impacts to noise are anticipated for all ROIs except the Jasper County ROI, where no appreciable primary adverse impacts are anticipated. Moderate secondary adverse impacts are anticipated for all ROIs except the Charleston ROIs, where substantial secondary adverse impacts are anticipated for the Berkeley-Charleston County ROI, and no appreciable secondary adverse impacts are anticipated for the Jasper County ROI.

Wetlands have been assessed as a moderate constraint to port expansion for all ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential port expansion actions or consequences.

Invasive species have been assessed as a moderate constraint to port expansion within all ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

Natural areas have been assessed as a minor constraint for all ROIs except the Jacksonville and Wilmington ROIs, where it has been assessed as a moderate and significant constraint, respectively. Minor primary adverse impacts are anticipated for all ROIs except the Jacksonville and Wilmington ROIs, where moderate primary adverse impacts are anticipated. Minor secondary adverse impacts are anticipated for all ROIs except Jacksonville and Wilmington, where moderate and significant secondary adverse impacts are anticipated, respectively.

Threatened and endangered species has been assessed as a substantial constraint to port expansion at all ROIs. Substantial primary and secondary adverse impacts are anticipated for this resource at all ROIs as a result of port expansion activities or consequences. The National Marine Fisheries Service (NMFS) Southeast Regional Office (SERO) has stated that the species of greatest concern with regard to port expansion in the South Atlantic region is the North Atlantic right whale (*Eubalaena glacialis*), which is particularly vulnerable to secondary impacts such as increased vessel traffic. The SERO indicated that in order for port expansion actions in or near right whale critical habitat to proceed, NMFS may impose reasonable and prudent alternatives on the federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation.

Critical habitat has been assessed as a substantial constraint to port expansion within the Jacksonville and Wilmington ROIs. Substantial primary adverse impacts to critical habitat are anticipated for the Jacksonville ROI, and minor primary adverse impacts to critical habitat are anticipated for the Wilmington ROI. Substantial secondary adverse impacts are anticipated for both ROIs. No designated critical habitat exists in the other ROIs, and critical habitat is not believed to constitute a constraint to port expansion within these ROIs at this time. No appreciable primary or secondary adverse impacts are anticipated to this resource at the remaining ROIs as a result of port expansion actions or consequences.

Unique or unusual habitat has been assessed as a minor constraint to port expansion within the Jacksonville, Savannah, and Norfolk ROIs and as a moderate constraint for the Charleston and Wilmington ROIs. Minor primary and secondary adverse impacts are anticipated as a result of port expansion within the Jacksonville, Savannah, and Norfolk ROIs, and moderate primary and secondary adverse impacts are anticipated for the Charleston and Wilmington ROIs.

EFH has been assessed as a substantial constraint to port expansion at all ROIs. Substantial primary and secondary adverse impacts are anticipated for EFH at all ROIs as a result of port expansion activities or consequences.

Cultural resources have been assessed as a substantial constraint to port expansion within the Wilmington and Norfolk ROIs, a moderate constraint within the Jacksonville and Berkeley-Charleston County ROIs, and a minor constraint within the Savannah ROI. The resource is not believed to constitute a constraint within the Jasper County ROI at this time. Minor primary adverse impacts are anticipated for all ROIs except Jasper County (where no adverse impacts are anticipated) and Norfolk (where substantial impacts are anticipated). Moderate secondary adverse impacts are anticipated for all ROIs except Jasper County, where no such impacts are anticipated, and the Wilmington and Norfolk ROIs, where substantial secondary adverse impacts are anticipated.

HTRW has been assessed as a substantial constraint to port expansion within the Norfolk ROI, a moderate constraint within the Jacksonville ROI, and a minor constraint within the Savannah, Berkeley-Charleston County, and Wilmington ROIs and is not believed to constitute a constraint within the Jasper County ROI at this time. Minor primary adverse impacts are anticipated as a result of port expansion for all ROIs except Norfolk, where substantial primary adverse impacts are anticipated. Substantial secondary adverse impacts are anticipated for all ROIs.

Socioeconomic conditions are not believed to constitute a constraint to port expansion within any ROI. Port expansion would likely constitute a net benefit to socioeconomic conditions within all ROIs, and no net primary or secondary adverse impacts are anticipated as a result of port expansion actions or consequences.

Environmental justice has been assessed as a minor constraint to port expansion within all ROIs. Minor primary adverse impacts are anticipated for all ROIs, and no net secondary adverse impacts are anticipated for any ROI as a result of port expansion actions or consequences.

Transportation has been assessed as a substantial constraint to port expansion within all ROIs. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of port expansion activities or consequences within all ROIs.

Recreation has been assessed as a substantial constraint to port expansion within the Wilmington ROI, a moderate constraint within the Jacksonville and Berkeley-Charleston County ROIs, and a minor constraint within the remaining ROIs. Minor primary adverse impacts are anticipated as a result of port expansion for all ROIs except Wilmington, where moderate primary adverse impacts are anticipated. Substantial secondary adverse impacts are anticipated for the Wilmington ROI, moderate secondary adverse impacts are anticipated for the Jacksonville and Berkeley-Charleston County ROIs, and minor secondary adverse impacts are anticipated for the remaining ROIs.

INSTITUTIONAL ANALYSIS

An Institutional Analysis (IA) was conducted as a third task of the RPA to identify other "critical factors" (in addition to the capacity analysis and the environmental survey) enabling or inhibiting development of a regional port. The IA was intended to concentrate on "deal makers and breakers" for particular ports and sites among other factors.

Because of a change in the way in which the scope of work was to be executed, the IA was developed from desktop materials and general familiarity with the ports, as opposed to site visits and specific local assessments. Consequently, the focus of the IA is on general impediments to the efficient use of existing marine terminal capacity and the major considerations for new marine terminal development.

Among the general institutional impediments to efficient use of existing marine capacity are restricted hours and days of gate operations. Labor rules and practices require overtime payments for extended gate operations. This acts as a disincentive to expand marine terminal access to trucks, which handle over 80 percent of the U.S. East Coast container port traffic. Also, many local businesses are not staffed to receive freight after an eight-hour workday five days of the week, thus limiting the effectiveness of expanded marine terminal access hours.

Although much attention has been paid to marine terminal storage of empty containers, the dwell times of loaded boxes are a more substantial determinant of throughput capabilities. Reductions in average dwell times of loaded boxes sitting in the terminal will have a proportional impact on

increasing throughput. Consequently, it would appear that there are opportunities for substantial increases in throughput for existing and proposed facilities, other things being equal.

Major new marine terminal capacity considerations include land, intermodal access, public/ private partnerships, and community acceptance. Modern marine container terminal sites require a minimum of 200 acres, preferably with room for expansion. Rail intermodal access is considered important, but a distinct minority of containers move by rail (generally for niche markets with respect to longer distances and overweight and empty boxes). Truck and highway access continues to be predominant for ECUS ports because of the comparatively shorter distances and volumes served.

There is evidence of a paradigm shift in financing and ownership of marine container terminals away from the traditional public port model and involving greater private sector investment and control. There is also a shift away from urban locations in favor of rural areas where the local economic impacts are likely to be greater and there is more community acceptance.

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SAVANNAH HARBOR EXPANSION PROJECT (SHEP) REGIONAL PORT ANALYSIS (RPA)

I. INTRODUCTION

OBJECTIVES

The Savannah Harbor Expansion Project (SHEP) Regional Port Analysis (RPA) technical scope was designed to address public review comments and items of litigation interest resulting from the 1998 Feasibility Study by the Georgia Ports Authority (GPA). At that time some project stakeholders expressed that there should be a study of allocating Federal improvement funds at one regional port in the South Atlantic range, rather than deepening several ports. They believed that this would make sense economically (since fewer funds would be expended) and environmentally (since the impact of dredging would only occur at one port rather than at several). The regional port concept was envisioned as a separate task in the overall economic analysis with an approach that would likely require extensive discussion with port authorities and shipping lines, as well as with the environmental interests in order to present a balanced view of the concept. It was also presumed that it might also be necessary to include economic development specialists and other local government authorities in these discussions.

The RPA scope of work developed in 2004 identified five tasks as follows: (1) Port Capacity Analysis; (2) Port Infrastructure Survey; (3) Hub and Spoke Analysis; (4) Environmental Survey; and (5) Institutional Analysis. The port capacity analysis would pertain to the various container ports and existing and developing terminals in the South Atlantic (Jacksonville to Norfolk). The port infrastructure survey would be an inventory of port capacity inputs and the ability to increase throughput volumes of container traffic. The hub and spoke analysis would evaluate the feasibility of regional load center ports that would feed container traffic to other ports.

The RPA scope for the environmental survey would compile existing secondary information on environmental resources and would require evaluation for each port and related site under consideration for expansion or development. Also, landside potentials for intermodal operations would be inventoried and arrayed. Finally, an assessment would be made of the secondary environmental impacts.

The RPA included an institutional analysis component that would focus on other “critical factors” (in addition to the capacity analysis and the environmental survey) enabling or inhibiting a port to expand, including such things as legal authority, non-federal sponsorship, and community acceptance. The institutional analysis was intended to concentrate on “deal makers and breakers” for particular ports and sites, such as intermodal access, dredge disposal, and bridge clearances. It was also envisioned that the institutional analysis would address whether the states under consideration would be both able and willing to fund a regional port. Similarly, the institutional analysis presumed that the shipping industry would need to be persuaded that designation of regional port improvements would better serve their needs.

EXECUTION

Data collection on marine container terminal infrastructure for the South Atlantic ports, including Norfolk, commenced through website searches in June 2005 in preparation for subsequent port site visits for confirming capacity inputs and documenting secondary data

related to the survey of environmental resources. In preparation for meetings with the ports and site visits, letters were sent in late August 2005 from the Savannah District (see Appendix A) to the senior executives, including port directors, assistant directors, and executives related to operations, engineering and planning, etc., at adjacent public ports (Norfolk, Wilmington, Charleston, and Jacksonville) explaining the purpose of the RPA and advising that G.E.C., Inc. (GEC) would be contacting them concerning matters related to port capacity and expansion.

In September, all further work on the RPA was put on hold until further notice, with no outside contacts to be made pending Corps resolution of issues raised about the scope with regard to inclusion of ports other than Savannah Harbor. Late November communications were sent from the Savannah District Commander to the respective Commanders of districts covered by the RPA ports, including Norfolk, Wilmington, Charleston, and Jacksonville (see Appendix B) requesting district assistance with the RPA in lieu of direct contact with the ports. The status of the execution of the moribund RPA was discussed at the Mobile District at a December 7 progress report meeting and presentation. As of late December 2005, there was still no closure on how to begin the execution of the RPA in terms of direct interaction with different Corps districts and possible local port participation through districts to document the capacity and related environmental secondary information available or otherwise sought for these tasks.

At the request of the Savannah District, a description of the secondary information sought for the RPA tasks was prepared January 6, 2006 (see Appendix C). A January 10 conference call among the Corps districts resulted in agreement that the Planning Chiefs in the various districts would be the initial points of contact for any possible interaction with the ports. In a followup conference call on January 12, members of the GEC team for capacity analysis and the environmental survey were introduced to the district points of contact. The districts were requested to assist GEC to compile existing secondary data and perform port liaison to the extent that this was possible with the resources available. Subsequently, GEC met with the districts as follows: (1) Jacksonville – February 28; (2) Charleston – March 1; and (3) Wilmington – May 16. No meetings or communications were held with the public ports other than GPA on February 27. Some port capacity information other than website related was received (from the Jacksonville District). No further meetings or contacts were held with the districts related to port capacity information. The districts and ports have not received or reviewed the information in this report.

Based on initial port capacity assessments, a geographic Region of Interest (ROI) was defined for each port with regard to capacity expansion. This allowed the environmental survey to be initiated March 2006. A draft letter for the District to sign for GEC to send to Federal and state agencies for secondary data collection was developed for District approval. The letter was reviewed, but no further action was taken pending response from the District. During April, GEC independently initiated environmental agency contacts and pursued related secondary data collection. Subsequently, the institutional analysis was initiated. Similar to the port capacity analysis and environmental survey, the institutional analysis was performed with no contacts with the public ports. This Second Interim Report contains the results of the environmental survey and institutional analysis. This volume presents the constraint determination and anticipated impact level evaluation for environmental resources in the areas of potential port expansion based on the data presented in Volume II of the Second Interim Report.

II. ENVIRONMENTAL ISSUES SURVEY OVERVIEW

INTRODUCTION

The Environmental Issues Survey was prepared in accordance with the February 2004 *Economic Analysis Work Plan for the Savannah Harbor Expansion Project* and superseding guidance provided by the Savannah and Mobile districts.

The development of the Environmental Issues Survey as described in the 2004 work plan relied on the selection of discrete expansion alternative sites and associated intermodal access points and hinterland corridors for each candidate site, site reconnaissance and primary data collection, and interviews with personnel at pertinent ports. Concern was raised by the Mobile District that an environmental survey of discrete sites prior to a full National Environmental Policy Act (NEPA) analysis would constitute a "pre-decisional" action. In November 2005, the Savannah District issued new guidelines for the preparation of the Environmental Issues Survey. The new guidelines specified that the survey would evaluate environmental resources that could potentially be impacted during any planned port or deep-draft channel expansion. No new data would be collected, but rather the survey would utilize publicly available information that would then be used to create a matrix characterizing the level of constraint posed by each environmental resource and the severity of the anticipated impacts resulting from potential port expansion activities. The guidance provided by the Savannah District was determined to supersede the 2004 work plan, and the methodology for the preparation of the Environmental Issues Survey was based on these latter directives where appropriate.

The July 2006 Multiport Analysis identified five ports as candidates for the proposed Regional Port: Jacksonville, Savannah, Charleston, Wilmington, and Hampton Roads (Norfolk). To prevent concerns over pre-decisional expansion site selection(s), a Region of Interest (ROI) was selected for each port that was broad in extent and generally included both coastal and inland areas (in the case of Charleston, two ROIs were selected). The following environmental resources were identified for evaluation: geology and soils; air quality; water quality; sediment quality; Coastal Zone Management Act (CZMA) resources; noise environment; wetlands; wildlife resources (including invasive species, threatened and endangered species, unique or unusual habitats, and Essential Fish Habitat [EFH]); cultural resources; hazardous, toxic, and radioactive waste (HTRW); socioeconomic profile (including environmental justice); transportation; and recreation. Data on these environmental resources were collected for each ROI from environmental agencies as well as independent research for each environmental resource category and compiled for analysis.

The complete environmental analysis is presented as an attachment to this report. This chapter of the report presents a qualitative summary of the environmental resources within the ROIs that are described fully within the attachment. The chapter characterizes the level of constraint posed by each environmental resource for each ROI and the anticipated level of adverse impacts to each environmental resource resulting from port expansion or the development of a regional port at each ROI. Constraints posed by the environmental resources were assessed and assigned to one of the following categories: (1) not a constraint at this time; (2) minor constraint;

(3) moderate constraint; and (4) substantial constraint. Anticipated adverse impacts to these environmental resources from potential port expansion activities at each ROI were assessed and assigned to one of the following categories: (1) no appreciable adverse impacts anticipated at this time; (2) minor adverse impacts anticipated; (3) moderate adverse impacts anticipated; and (4) substantial adverse impacts anticipated. Separate assessments are provided for primary impacts (i.e., those impacts resulting from construction of any facilities or projects associated with port expansion) and secondary impacts (i.e., those impacts resulting from the subsequent operations of port expansion facilities). A matrix presenting these determinations is presented in Table 1. The justification for these determinations is presented for each ROI in the following sections of this chapter.

JACKSONVILLE REGION OF INTEREST

There is one ROI in the Jacksonville area (Figure 1). Potential impacts to each environmental resource in the ROI are summarized in the following subsections.

Geology and Soils

No rare or environmentally sensitive geologic features are present within the Jacksonville ROI. No prime or unique farmland soils are present within the ROI. Consequently, geology and soils are not believed to pose an environmental constraint for potential expansion activities within the Jacksonville ROI, and no appreciable primary or secondary adverse environmental impacts to these resources are anticipated as a result of any expansion activities.

Air Quality

The ROI is within an attainment zone for all six air criteria pollutants identified by the National Ambient Air Quality Standards (NAAQS). Criteria pollutant concentrations are significantly below NAAQS values for all pollutants except ozone, concentrations of which are moderately below NAAQS values. Air quality in the ROI is generally good, with minimal periods in which air quality is classified as unhealthy for the general public or for sensitive groups. Potential primary impacts to air quality that could result from port expansion within the Jacksonville ROI include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. These impacts would be temporary in nature. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROI include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Air quality has been assessed as a moderate constraint for port expansion within the Jacksonville ROI. Minor primary adverse impacts and moderate secondary adverse impacts to air quality are anticipated as a result of potential expansion activities or consequences.

Water Quality

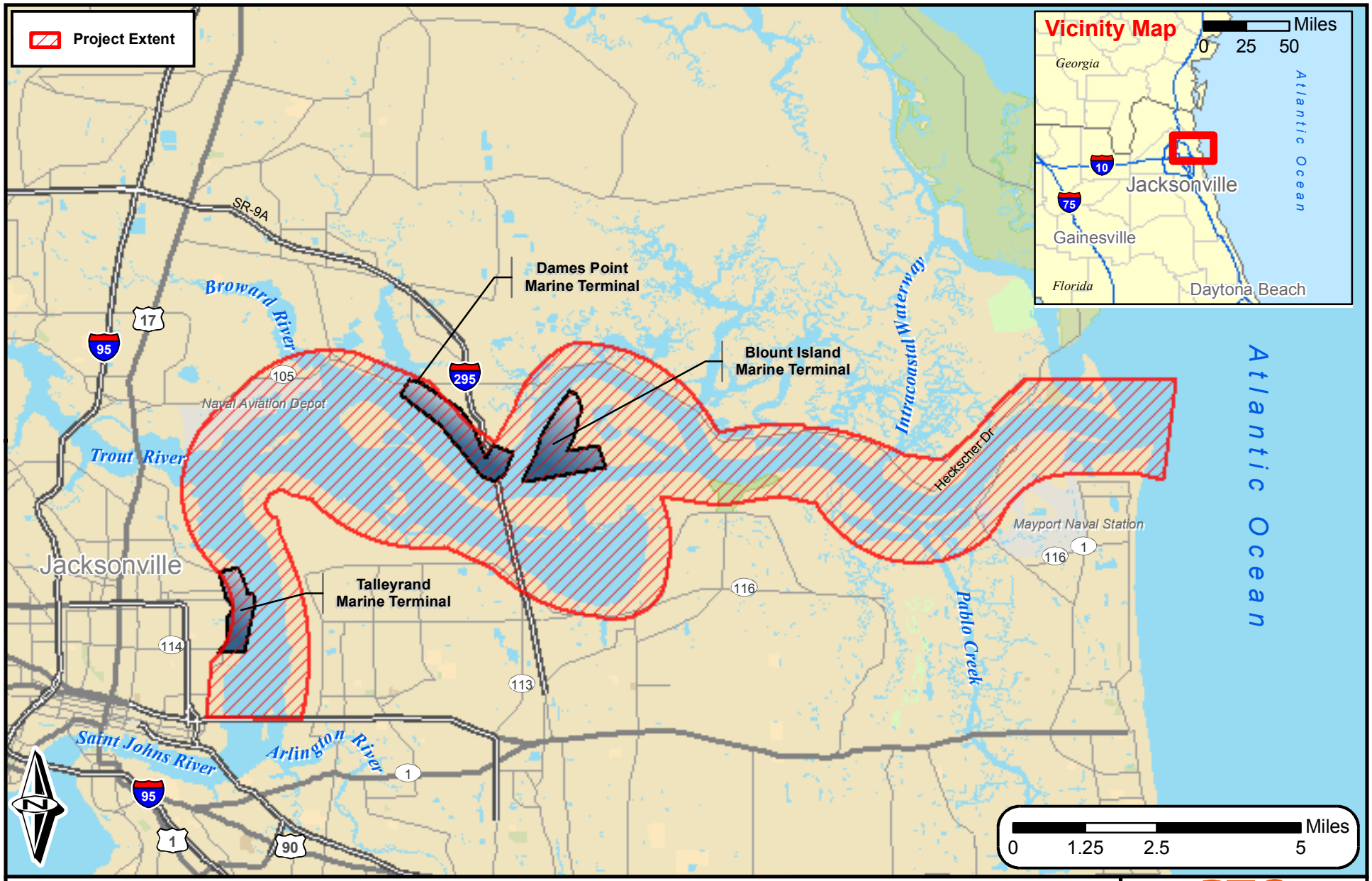
Portions of the St. Johns River within the Jacksonville ROI are currently listed as impaired because of metals contamination. Potential primary impacts to water quality within the

Table 1. Constraint Determination and Anticipated Impact Levels for Regional Port Expansion ROIs

Parameter	Port Expansion Region of Interest																	
	Jacksonville			Savannah			Charleston						Wilmington			Norfolk		
							Berkeley-Charleston County			Jasper County								
	Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level		Constraint Determination	Anticipated Impact Level	
		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary		Primary	Secondary
Geology and Soils	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Air Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M1	M1	M2	M2	M1	M2	S	M1	S
Water Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M2	M1	M2	S	M1	S	S	M1	S
Sediment Quality	M2	M1	M2	S	M1	S	M2	M1	M2	M2	M1	M2	M2	M1	M2	S	M1	S
Noise Environment	M2	M2	M2	M2	M2	M2	S	M2	S	N	N	N	M2	M2	M2	M2	M2	M2
Coastal Zone Management Act Resources	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2	S	M2	M2
Wetlands	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2
Wildlife Resources																		
Invasive Species	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2	M2	M1	M2
Natural Areas	M2	M2	M2	M1	M1	M1	M1	M1	M1	M1	M1	M1	S	M2	S	M1	M1	M1
Threatened and Endangered Species	S	S	S	S	S	S	S	S	S	S	M	S	S	S	S	S	S	S
Critical Habitat	S	S	S	N	N	N	N	N	N	N	N	N	S	M1	S	N	N	N
Unique or Unusual Habitats	M1	M1	M1	M1	M1	M1	M2	M2	M2	M2	M2	M2	M2	M2	M2	M1	M1	M1
Essential Fish Habitat	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Cultural Resources	M2	M1	M2	M1	M1	M2	M2	M1	M2	N	N	N	S	M1	S	S	S	S
Hazardous, Toxic, and Radioactive Waste	M2	M1	S	M1	M1	S	M1	M1	S	N	M1	S	M1	M1	S	S	S	S
Socioeconomic Profile	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Environmental Justice	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N	M1	M1	N
Transportation	S	M1	S	S	M1	S	S	M1	S	S	M1	S	S	M1	S	S	M1	S
Recreation	M2	M1	M2	M1	M1	M1	M2	M1	M2	M1	M1	M1	S	M2	S	M1	M1	M1

Notes:
For Constraint Determination:
S = Substantial Constraint
M2 = Moderate Constraint
M1 = Minor Constraint
N = Not a Constraint at Present
For Anticipated Impact Level:
S = Substantial Adverse Impacts Anticipated
M2 = Moderate Adverse Impacts Anticipated
M1 = Minor Adverse Impacts Anticipated
N = No Appreciable Adverse Impacts Anticipated at Present

Source: GEC, 2006.



Jacksonville ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 1
Date: February 2007
Scale:1:150,000
Source: ESRI, USGS NHD
MapID: 22312115-671

Jacksonville ROI that could result from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Actions or consequences associated with port expansion within the Jacksonville ROI that could result in secondary adverse impacts to water quality include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a moderate environmental constraint to port expansion within the Jacksonville ROI; minor primary adverse environmental impacts and moderate secondary adverse impacts are anticipated for this resource as a result of potential port expansion.

Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the ROI that could result from potential port expansion activities include emissions and discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts to water quality from port expansion activities include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal accesses.

Sediment quality in the lower St. Johns River is generally good according to recent studies performed by the USACE Jacksonville District. Polychlorinated biphenyl (PCB) and polynuclear aromatic hydrocarbon (PAH) concentrations were below detection limits in virtually all sediments sampled, with the exception of the areas around Dames Point and the Talleyrand Terminal, which exhibited low concentrations of both contaminant types. Metals concentrations were below minimum sediment quality guidelines (SQGs) for all sediments sampled. Sediment quality has been assessed as a moderate constraint to potential port expansion. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Noise Environment

Few noise data are available for the Jacksonville ROI. Ambient noise levels appear to be within U.S. Environmental Protection Agency (EPA) and U.S. Department of Housing and Urban Development (HUD) recommended standards. Noise-sensitive areas within the ROI include natural areas such as the Timucuan National Ecological and Historic Preserve and populated places such as the Town of Mayport and City of Jacksonville. Actions associated with port expansion within the Jacksonville ROI that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts

to the noise environment associated with potential port expansion within the ROI could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a moderate constraint to port expansion within the Jacksonville ROI, and moderate primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Coastal Zone Management Act Resources

The ROI is located entirely within the designated coastal zone for the state of Florida. Potential primary adverse impacts to CZMA resources within the ROI resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROI from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. CZMA resources have been assessed as a substantial constraint to port expansion activities within the ROI. With adherence to state coastal management policies, moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wetlands

Wetlands comprise a significant percentage of land surfaces within the Jacksonville ROI. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROI. Potential secondary impacts to wetlands resulting from port expansion could include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion within the Jacksonville ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wildlife Resources

Invasive Species

At least 99 invasive species may be present within the Jacksonville ROI. Potential primary adverse impacts associated with invasive species resulting from port expansion activities within the ROI include the introduction of new species to the ROI from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROI to new areas. Secondary impacts

associated with invasive species within the ROI resulting from port expansion activities could include the introduction of new species as a result of ballast water dumping from commercial vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROI and disposing of any dredged material at locations within the ROI, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of U.S. Coast Guard (USCG) ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion activities within the Jacksonville ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Natural Areas

The ROI contains portions of a number of managed conservation areas, including the Timucuan National Ecological and Historic Preserve and the Machaba Balu Preserve. Most of these managed lands occur in the eastern portion of the ROI. Additionally, numerous areas within the ROI have been designated by the Florida Fish and Wildlife Conservation Commission (FFWCC) as Strategic Habitat Conservation Areas (SHCAs). Potential primary adverse impacts to natural areas resulting from port expansion activities include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to natural areas resulting from potential port expansion within the ROI include erosion of nearshore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur within any designated preserves, the increase in cargo vessel traffic and surface transport vehicles associated with port expansion could result in adverse impacts to these resources. Additionally, because SHCA designation does not necessarily indicate any legal protection status, these natural areas could be adversely impacted by the construction of new port facilities and adjacent intermodal rail and surface road accesses. Natural areas have been assessed as a moderate constraint to port expansion within the Jacksonville ROI, and moderate primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Threatened and Endangered Species

Numerous Federal and state listed species are present in the ROI. Potential primary impacts to listed species that could result from port expansion within the ROI include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses, disturbance of benthic habitat from dredging operations, and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses and disturbance of terrestrial, nearshore, benthic, and pelagic habitat from increased cargo vessel traffic. Species of particular concern for the Jacksonville ROI include the North Atlantic right whale (*Eubalaena glacialis*), West Indian manatee (*Trichechus manatus latirostris*), piping plover (*Charadrius melodus*), sea turtles, and Atlantic sturgeon (*Acipenser oxyrhynchus oxyrhynchus*).

The National Marine Fisheries Service (NMFS) Southeast Regional Office (SERO) has stated that the species of greatest concern with regard to port expansion in the South Atlantic is the North Atlantic right whale (Habitat Conservation Division, personal communication). The SERO further stated that port expansion projects that result in increased vessel traffic threats to North Atlantic right whales will be subject to intense scrutiny by NMFS. The SERO explained that, because takes of this species cannot be authorized (due to small population size), for some port expansion actions (in or near right whale critical habitat) to proceed, it may be necessary for NMFS to impose reasonable and prudent alternatives on the Federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation.

Because of concerns raised by environmental agencies over potential impacts to threatened and endangered species resulting from port expansion operations, threatened and endangered species have been assessed as a substantial constraint to port expansion within the Jacksonville ROI. Substantial primary and secondary adverse impacts are anticipated for this resource as a result of potential expansion activities or consequences.

Critical Habitat

Critical habitat is present within the Jacksonville ROI for three federally listed species. Critical habitat for the North Atlantic right whale and piping plover is present at or near the mouth of the St. Johns River, and critical habitat for the West Indian manatee is present for the entire extent of the St. Johns River within the ROI. Potential primary impacts to critical habitat resulting from port expansion within the ROI include loss of critical habitat from construction of new port facilities and adjacent intermodal rail and surface road accesses and disturbance of nearshore and aquatic critical habitat from dredging operations. Secondary impacts to critical habitat resulting from potential port expansion within the ROI include erosion of nearshore critical habitat from increased wake action resulting from an increase in cargo vessel traffic and disturbance of nearshore, upland, and aquatic critical habitat caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. Although it is unlikely that the construction of new port facilities and adjacent intermodal accesses would occur within a designated critical habitat area, potential secondary impacts from wave erosion and noise disturbance associated with vessel traffic increases are possible. Because critical habitat is present throughout the ROI, this resource has been assessed as a substantial constraint; substantial primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Unique or Unusual Habitats

Small discontinuous populations of submerged aquatic vegetation (SAV) and oysters are present within the ROI. No significant natural hardbottoms have been identified within the ROI. Because these resources are not present in significant quantities within the ROI, unique or unusual habitats have been assessed as a minor constraint, and minor primary and secondary environmental impacts are anticipated as a result of potential expansion activities or consequences.

Essential Fish Habitat

Essential Fish Habitat (EFH) is found throughout the Jacksonville ROI for a large assemblage of managed marine fishes and invertebrates, including various shrimp species, red drum (*Scianeops ocellatus*), members of the snapper-grouper complex, and highly migratory managed species. Potential primary adverse impacts to EFH that could result from port expansion activities within the ROI include loss of nearshore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of nearshore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. Because of the widespread nature of EFH within the ROI, this resource has been assessed as a substantial environmental constraint, and substantial primary and secondary adverse impacts are anticipated to EFH as a result of potential expansion activities or consequences.

Cultural Resources

The ROI contains an abundance of cultural resource sites. Despite the large number of sites within the ROI, many of these sites are concentrated in the central and western portions of the ROI, near the south shore of Mill Cove and on the right descending riverbank in the vicinity of Reddie Point, respectively. Potential primary adverse impacts to cultural resources from port expansion activities within the ROI include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of nearshore cultural resources from wave action associated with increased commercial vessel traffic. Significant areas with low densities of cultural resource sites are present within the ROI, indicating that construction of new facilities may not pose a significant threat to cultural resources; however, the potential loss of nearshore sites from wave action remains a possibility. Consequently, cultural resources have been assessed as a moderate constraint to port expansion within the Jacksonville ROI; minor primary adverse impacts and moderate secondary adverse impacts are anticipated for cultural resources as a result of potential expansion activities or consequences.

Hazardous, Toxic, and Radioactive Waste

Hazardous, toxic, and radioactive waste (HTRW) may pose a constraint to port expansion activities. The presence of significant recognized environmental conditions (REC) sites in a given area may render the given area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels.

Significant concentrations of potential REC sites in the ROI are present in the vicinity of the Mayport Naval Station, on Blount Island, and on the left descending river bank in the vicinity of Blount Island; particularly high concentrations of potential REC sites are present on the left descending river bank in the vicinity of the existing Talleyrand terminal. Much of the remainder of the ROI, however, exhibits a low density of potential REC sites. Considerable potential for the avoidance of existing HTRW sites exists, and the likelihood of substantial primary adverse impacts resulting from port expansion activities is believed to be minimal. Secondary HTRW impacts are a substantial concern, however. HTRW has been assessed as a moderate environmental constraint to port expansion within the Jacksonville ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential port expansion.

Socioeconomic Profile

Expansion of port facilities in the Jacksonville ROI would likely result in the creation of new jobs and new infrastructure within the ROI. Potential primary impacts to socioeconomic conditions within the Jacksonville ROI include the acquisition of property from residents or landowners for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROI. Overall socioeconomic conditions are not believed to constitute a constraint to potential port expansion within the Jacksonville ROI at this time, and no net primary or secondary adverse impacts to this resource are anticipated as a result of potential port expansion.

Environmental Justice

Areas with significant minority and/or poverty levels within the ROI include the vicinity of the Mayport Naval Station and the area from the Trout River to the Talleyrand Terminal on the left descending riverbank and adjacent property on the right descending bank. Construction of new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, ample areas exist within the ROI for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROI. Environmental justice has been assessed as a minor constraint. Minor primary adverse impacts are anticipated as a result of potential port expansion. No net secondary adverse impacts are anticipated as a result of potential port expansion.

Transportation

The Jacksonville ROI contains an extensive network of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. Potential primary adverse impacts to transportation resulting from port expansion activities

include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses, and temporary disruption of vessel traffic in areas selected for channel modification. Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROI include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Consequently, transportation has been assessed as a substantial constraint to port expansion within the Jacksonville ROI. Minor primary adverse impacts and substantial adverse secondary impacts are anticipated as a result of potential port expansion within the ROI.

Recreation

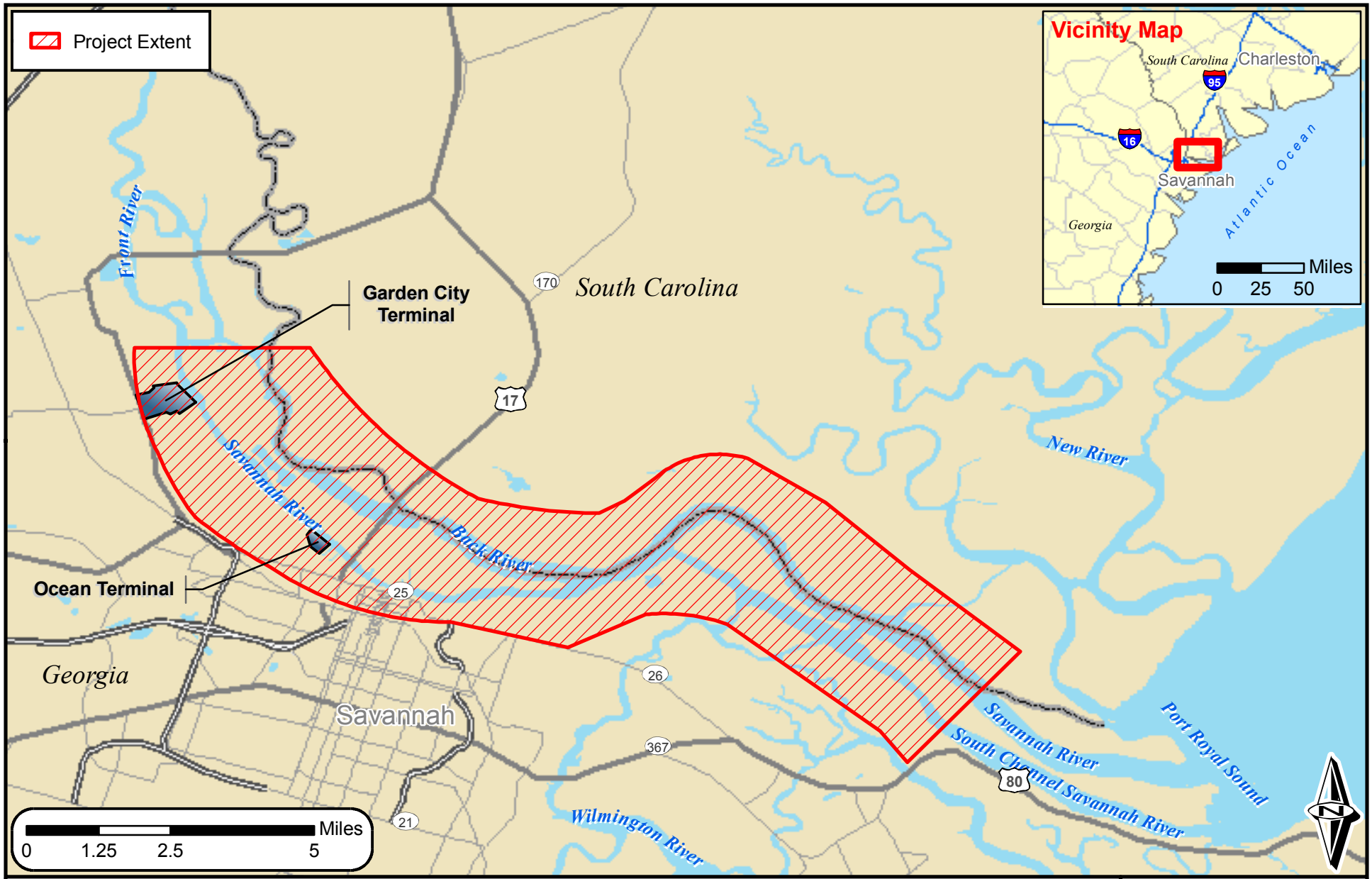
Common recreational activities on the lower St. Johns River include boating, fishing, birding, and visiting the area's parks, preserves, and natural areas. Potential primary adverse impacts to recreation within the ROI resulting from port expansion include loss of nearshore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses; secondary adverse impacts include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic. Recreational fishing, one of the predominant recreational activities on the lower St. Johns River, may be less affected than other activities, because the large number of inlets and bays off the main river channel would likely still provide significant recreational fishing opportunities despite any additional cargo vessel traffic associated with port expansion. Consequently, recreation has been assessed as a moderate constraint to port expansion within the Jacksonville ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated for the resource as a result of potential port expansion.

SAVANNAH REGION OF INTEREST

There is one ROI in the Savannah area (Figure 2). Potential impacts to each environmental resource in the ROI are summarized in the following subsections.

Geology and Soils

No rare or environmentally sensitive geologic features are present within the ROI. No prime or unique farmland soils are present within the ROI. Consequently, geology and soils do not pose an environmental constraint for potential expansion activities within the Savannah ROI, and no appreciable adverse primary or secondary environmental impacts to these resources are anticipated as a result of any expansion activities.



Savannah ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 2
Date: February 2007
Scale:1:150,000
Source: ESRI, USGS NHD
MapID: 22312115-675

Air Quality

The ROI is within an attainment zone for all six air criteria pollutants identified by the NAAQS. Concentrations of ozone and particulate matter in the ROI are near the NAAQS limit, however. Air quality in the ROI is generally good to moderate, with minimal periods in which air quality is classified as unhealthy for the general public or for sensitive groups. Potential primary impacts to air quality from port expansion within the Savannah ROI that could adversely impact air quality include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROI include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Because the ROI is currently near nonattainment status with regard to air quality, this resource has been assessed as a substantial constraint for port expansion within the Savannah ROI. Primary adverse impacts to air quality from potential port expansion are anticipated to be minor and temporary in nature; however, substantial secondary adverse impacts to air quality are anticipated as a result of potential expansion activities or consequences.

Water Quality

Waterbodies within the Savannah ROI are currently listed as only partially supporting their designated uses because of low dissolved oxygen, fecal coliform, and metals contamination. Potential primary impacts to water quality within the Savannah ROI that could result from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Actions or consequences associated with port expansion within the ROI that could result in secondary adverse impacts to water quality include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a substantial environmental constraint within the Savannah ROI. Minor temporary primary adverse impacts and substantial secondary adverse environmental impacts are anticipated for this resource as a result of potential port expansion.

Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the Savannah ROI that could result from potential port expansion activities include emissions and discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts to

water quality from port expansion activities include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal accesses.

Recent sediment quality studies in Savannah Harbor indicate that metals contamination is a concern for sediments within the ROI. PCB and PAH concentrations were below detection limits in virtually all sediments sampled, with the exception of the areas around the Ocean Terminal, which exhibited significant exceedences of PAH SQGs. SQG exceedences for arsenic, cadminum, and magnesium were documented in a number of sediment samples collected from the harbor. Sediment quality has been assessed as a substantial constraint to potential port expansion within the Savannah ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Noise Environment

No noise data are available for the Savannah ROI. Noise-sensitive areas within the ROI include the Savannah Wildlife Refuge and the City of Savannah. Actions associated with port expansion within the Savannah ROI that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts to the noise environment associated with potential port expansion within the ROI could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a moderate constraint to port expansion within the Savannah ROI, and moderate primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Coastal Zone Management Act Resources

The ROI is located entirely within the designated coastal zones for the states of Georgia and South Carolina. Additionally, the portion of the ROI located in South Carolina is within a designated critical area. Potential primary adverse impacts to CZMA resources within the ROI resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROI from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. Because the ROI is located entirely within the designated coastal zones, CZMA resources have been assessed as a substantial constraint to port expansion activities within the ROI. With adherence to state coastal management policies, moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wetlands

Wetlands comprise a significant percentage of land surfaces within the Savannah ROI. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROI. Potential secondary impacts to wetlands resulting from port expansion could include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion within the Savannah ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wildlife Resources

Invasive Species

At least 75 invasive species may be present within the Savannah ROI. Potential primary adverse impacts associated with invasive species resulting from port expansion activities within the ROI include the introduction of new species to the ROI from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROI to new areas. Secondary impacts associated with invasive species within the ROI resulting from port expansion activities could include the introduction of new species as a result of ballast water dumping from commercial vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROI and disposing of any dredged material at locations within the ROI, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of USCG ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion activities within the Savannah ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Natural Areas

Natural areas are not widespread throughout the Savannah ROI. Managed conservation areas within the ROI include the Savannah National Wildlife Refuge and Fort Pulaski National Monument, located near the northwestern and southeastern termini of the ROI, respectively. Potential primary adverse impacts to natural areas resulting from port expansion within the ROI include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to natural areas include erosion of nearshore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur in either of the designated preserves, the increase in cargo vessel traffic and surface transport

vehicles associated with port expansion could result in adverse impacts to these resources. Natural areas have been assessed as a minor constraint to potential port expansion within the Savannah ROI, and minor primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Threatened and Endangered Species

Numerous Federal and state listed species are present in the Savannah ROI. Potential primary adverse impacts to listed species from port expansion within the ROI include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses, disturbance of benthic habitat from dredging operations, and disturbance of terrestrial, nearshore, benthic, and pelagic habitat from increased cargo vessel traffic. Species of particular concern for the Savannah ROI include the North Atlantic right whale, piping plover, sea turtles, shortnose sturgeon (*Acipenser brevirostrum*), eastern Indigo snake (*Drymarchon corais couperi*), and gopher tortoise (*Gopherus polyphemus*).

The NMFS SERO has stated that the species of greatest concern with regard to port expansion in the South Atlantic is the North Atlantic right whale (Habitat Conservation Division, personal communication). The SERO further stated that port expansion projects that result in increased vessel traffic threats to North Atlantic right whales will be subject to intense scrutiny by NMFS. The SERO explained that, because takes of this species cannot be authorized (due to small population size), for some port expansion actions (in or near right whale critical habitat) to proceed, it may be necessary for NMFS to impose reasonable and prudent alternatives on the Federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation. Although no critical habitat for the North Atlantic right whale is present within the ROI, the ROI is located in close proximity to such critical habitat. Additionally, the ROI is located immediately west of South Atlantic coastal waters that are used as a migration corridor by the species.

Because of concerns raised by environmental agencies over potential impacts to threatened and endangered species resulting from port expansion operations, threatened and endangered species have been assessed as a substantial constraint to port expansion within the Savannah ROI, and substantial primary and secondary adverse environmental impacts are anticipated for this resource as a result of potential expansion activities or consequences.

Critical Habitat

No critical habitat is present within the ROI. Consequently, critical habitat is not considered to be a constraint for potential port expansion at this time, and no appreciable adverse environmental impacts to critical habitat are anticipated as a result of potential expansion activities or consequences.

Unique or Unusual Habitats

Small discontinuous populations of oysters are present within the ROI. No significant SAV communities or natural hardbottoms have been identified within the ROI. Because these resources are not present in significant quantities within the ROI, unique or unusual habitats have been assessed as a minor constraint, and minor primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences within the ROI.

Essential Fish Habitat

EFH is found throughout the Savannah ROI for a large assemblage of managed marine fishes and invertebrates, including various shrimp species, red drum, members of the snapper-grouper complex, and highly migratory managed species. Potential primary adverse impacts to EFH that could result from port expansion activities within the ROI include loss of nearshore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of nearshore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. Because of the widespread nature of EFH within the Savannah ROI, this resource has been assessed as a substantial environmental constraint, and substantial primary and secondary adverse impacts are anticipated to EFH as a result of potential expansion activities.

Cultural Resources

The ROI contains an abundance of cultural resource sites. Despite the large number of sites within the ROI, however, many of these sites are concentrated in downtown Savannah or along the right descending riverbank in the vicinity of Hutchinsons Island. Much of the Jasper County portion of the ROI is comprised of dredged material disposal areas that were selected because of minimal impacts to environmental resources, including cultural resources. The likelihood of significant cultural resources occurring within this portion of the ROI is believed to be minimal. Potential primary adverse impacts to cultural resources from port expansion activities within the ROI include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of nearshore cultural resources from wave action associated with increased commercial vessel traffic. Significant areas with low densities of cultural resource sites are present within the ROI, indicating that construction of new facilities may not pose a significant threat to cultural resources; however, the potential loss of nearshore sites from wave action remains a possibility. Because significant opportunities for avoidance of sensitive areas are possible, cultural resources have been assessed as a minor constraint to port expansion within the Savannah ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated for cultural resources as a result of potential expansion activities or consequences.

Hazardous, Toxic, and Radioactive Waste

HTRW may pose a constraint to port expansion activities. The presence of significant REC sites in a given area may render the given area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels.

Significant concentrations of potential REC sites in the ROI are present on the right descending riverbank in the vicinity of the historic Fort Jackson area east of Savannah and downtown Savannah; particularly high concentrations of potential REC sites are present on the right descending bank in the vicinity of the existing Garden City and Talleyrand terminals. Much of the remainder of the ROI, however, exhibits a low density of potential REC sites. No REC sites were identified within the Jasper County portion of the ROI. Considerable potential for the avoidance of existing HTRW sites exists, and the likelihood of substantial primary adverse impacts resulting from port expansion activities is believed to be minimal. Secondary HTRW impacts are a substantial concern, however. Consequently, HTRW has been assessed as a minor constraint to port expansion within the Savannah ROI at this time. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential port expansion.

Socioeconomic Profile

Expansion of port facilities in the Savannah ROI would likely result in the creation of new jobs and new infrastructure within the ROI. Potential primary impacts to socioeconomic conditions within the Savannah ROI include the acquisition of property from residents for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROI. Overall socioeconomic conditions are not believed to constitute a constraint to potential port expansion within the Savannah ROI at this time, and no net primary or secondary adverse impacts to this resource are anticipated as a result of potential port expansion.

Environmental Justice

Areas with significant minority and/or poverty levels within the ROI include the right descending riverbank from the historic Fort Jackson area west to the vicinity of the Ocean Terminal. The Jasper County portion of the ROI is included within a U.S. Census block characterized as having a high percentage of minority and disadvantaged residents; however, this area is virtually unpopulated, and population demographics are not applicable to this portion of

the ROI. Construction of new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, ample areas exist within the ROI for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROI. Environmental justice has been assessed as a minor constraint to port expansion within the Savannah ROI. Minor primary adverse impacts are anticipated as a result of potential port expansion. No net secondary adverse impacts are anticipated as a result of potential port expansion.

Transportation

The Georgia portion of the Savannah ROI contains an extensive network of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. Potential primary adverse impacts to transportation resulting from port expansion activities include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses, and temporary disruption of vessel traffic in areas selected for channel modification. Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROI include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Consequently, transportation has been assessed as a substantial constraint to port expansion within the Savannah ROI. Minor primary adverse impacts and substantial adverse secondary impacts are anticipated as a result of potential port expansion within the ROI.

Recreation

Recreational activities in the vicinity of the Savannah ROI include boating, fishing, birding, and visiting the area's historic sites. Actions or consequences of potential port expansion that could result in primary adverse impacts to recreation within the ROI include loss of nearshore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses; secondary impacts include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic. Recreational boating and fishing in the ROI are currently not prominent activities because of the high volume of cargo vessel traffic associated with port operations. Landside recreational activities appear to have adjusted to any disturbances caused by high cargo traffic volumes and would likely adjust to any increases without substantial impairment. Consequently, recreation has been assessed as a minor constraint to port expansion within the Savannah ROI, and minor primary and secondary adverse impacts are anticipated for the resource as a result of potential port expansion.

CHARLESTON REGIONS OF INTEREST

There are two ROIs (Berkeley-Charleston County and Jasper County) in the Charleston area (figures 3 and 4). Potential impacts to each environmental resource in the ROIs are summarized in the following subsections.

Geology and Soils

No rare or environmentally sensitive geologic features are present within either ROI. No prime or unique farmland soils are present within either ROI. Consequently, geology and soils do not pose an environmental constraint for potential expansion activities within the Charleston ROIs, and no appreciable adverse environmental impacts to these resources are anticipated as a result of any expansion activities.

Air Quality

The Berkeley-Charleston County ROI is within an attainment zone for all six air criteria pollutants identified by the NAAQS. Concentrations of ozone and particulate matter in the ROI are somewhat elevated with respect to other criteria air pollutants; however, concentrations of these pollutants are still substantially within NAAQS limits. Air quality in the ROI is generally good to moderate, with minimal periods in which air quality is classified as unhealthy for the general public or for sensitive groups. No air quality data were available for the Jasper County ROI. The ROI is uninhabited and contains no emission sources. The Jasper County ROI is located several miles from the city of Savannah, Georgia, and likely experiences some degradation of air quality from its proximity; however, no indications that the Jasper County ROI has experienced impaired air quality conditions with respect to NAAQS were identified.

Potential primary impacts to air quality from port expansion within the Charleston ROIs that could adversely impact air quality include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROIs include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Air quality has been assessed as a moderate constraint for port expansion within the Berkeley-Charleston County ROI; minor temporary primary adverse impacts and moderate secondary adverse impacts to air quality are anticipated as a result of potential expansion activities or consequences. Air quality has been assessed as a minor constraint to port expansion within the Jasper County ROI; minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Water Quality

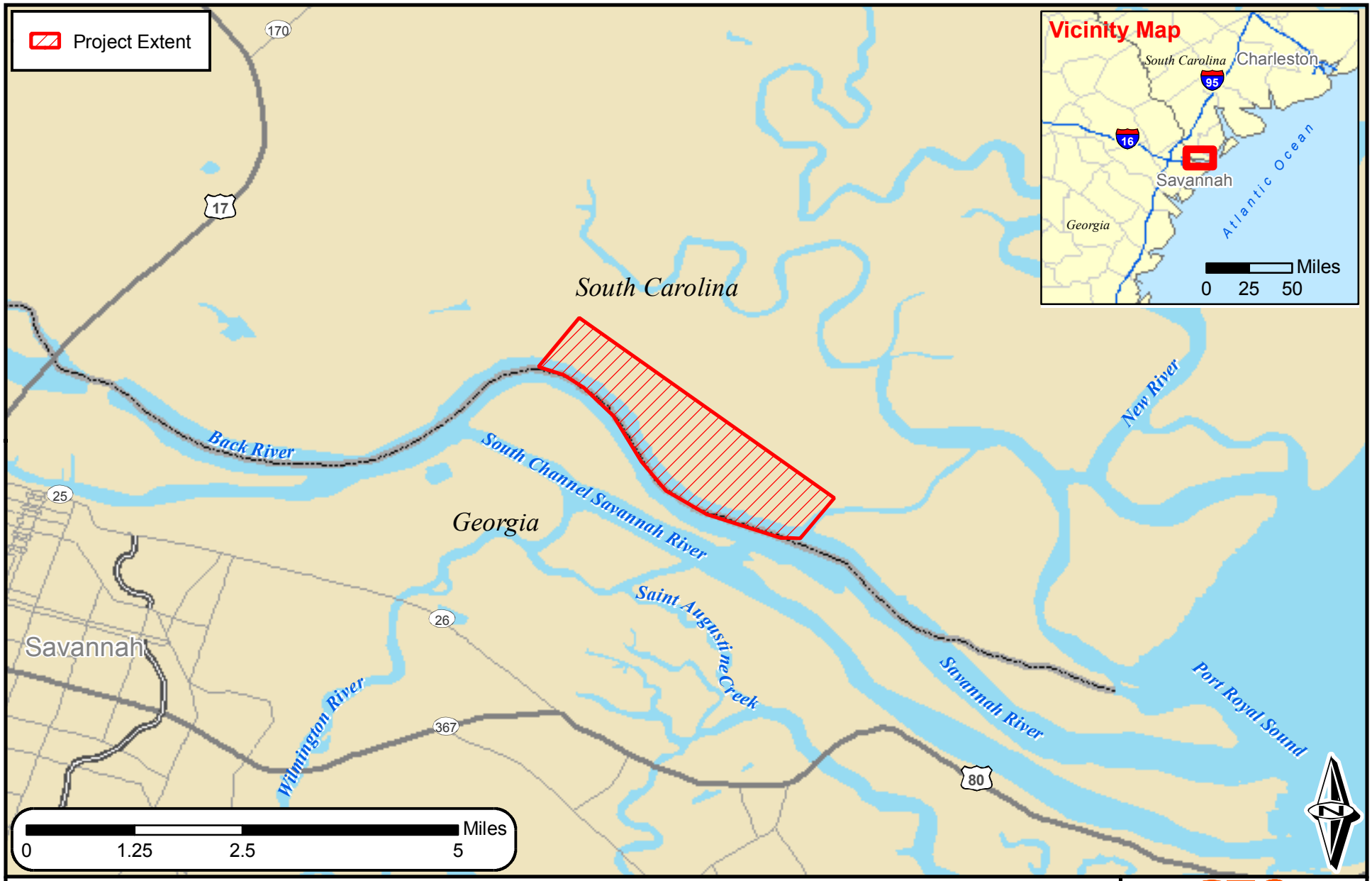
With the exception of the Wando River, waterbodies within the Berkeley-Charleston County ROI are listed as supporting recreational uses. The South Carolina Department of Health and Environmental Control (SCDHEC) has documented decreasing trends in fecal coliform,

Berkeley - Charleston County ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrology Dataset

Figure: 3
Date: February 2007
Scale:1:150,000
Source: ESRI, USGS NHD
MapID: 22312115-676



Jasper County ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 4
Date: February 2007
Scale:1:100,000
Source: ESRI, USGS NHD
MapID: 22312115-674

five-day biochemical oxygen demand, total phosphorus, and total nitrogen concentrations. Waterbodies within the Jasper County ROI are currently listed as only partially supporting their designated uses because of low dissolved oxygen, fecal coliform, and metals contamination.

Potential primary impacts to water quality within the Charleston ROIs resulting from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Potential secondary impacts include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a moderate environmental constraint within the Berkeley-Charleston County ROI. Minor temporary primary impacts and moderate secondary adverse environmental impacts are anticipated for this resource as a result of potential port expansion. Water quality has been assessed as a substantial environmental constraint within the Jasper County ROI, and minor temporary adverse impacts and substantial secondary adverse environmental impacts are anticipated for this resource as a result of potential port expansion.

Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the Charleston ROIs that could result from potential port expansion activities include emissions and discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal rail and surface road accesses.

Data from the South Carolina Estuarine and Coastal Assessment Program (SCECAP) indicate that sediment quality is generally good in the Berkeley-Charleston County ROI. PCB concentrations were below SQGs in all sediments sampled within the ROI. Metals and PAH concentrations were generally below SQGs, although several samples exhibited concentrations exceeding the most conservative SQGs utilized in the study. Sediment quality has been assessed as a moderate constraint to potential port expansion within the Berkeley-Charleston County ROI; minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion opportunities.

Recent sediment quality studies in Savannah Harbor indicate that metals contamination is a concern for sediments in the vicinity of the Jasper County ROI. PCB and PAH concentrations were below detection limits in virtually all sediments sampled, with the exception of the areas around Savannah port facilities, which exhibited significant exceedences of PAH SQGs. SQG exceedences for arsenic, cadminum, and magnesium were documented in a number of sediment

samples collected from the harbor. Sediment quality has been assessed as a substantial constraint to potential port expansion within the Jasper County ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Noise Environment

Ambient noise levels are impaired in portions of the Berkeley-Jasper County ROI, particularly in the vicinity of the U.S. Naval Reservation on the Charleston peninsula. Noise-sensitive areas within the ROI include populated places such as the City of Charleston and the town of Mount Pleasant. No noise data are available for the Jasper County ROI, and no noise-sensitive areas within the ROI were identified. Actions associated with port expansion within the Charleston ROIs that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts to the noise environment associated with potential port expansion within the ROI could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a substantial constraint to potential port expansion within the Berkeley-Charleston County ROI, and moderate primary adverse impacts and substantial secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences. Because no sensitive areas appear to exist within the Jasper County ROI, noise environment is not believed to be a constraint to potential port expansion within the ROI at this time, and no appreciable primary or secondary adverse impacts are anticipated as a result of potential port expansion.

Coastal Zone Management Act Resources

The ROIs are located entirely within the designated coastal zone for the state of South Carolina. Additionally, both ROIs are located entirely within designated critical areas. Potential primary adverse impacts to CZMA resources within the ROIs resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROIs from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. Because the ROIs are located entirely within designated critical areas of the state coastal zone, CZMA resources have been assessed as a substantial constraint to port expansion activities within the ROI. With adherence to state coastal management policies, moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wetlands

Wetlands comprise a significant percentage of land surfaces within both ROIs. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the

construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROIs. Potential secondary impacts to wetlands resulting from port expansion could include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion within the Charleston ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities at both ROIs.

Wildlife Resources

Invasive Species

At least 42 invasive species may be present within the Berkeley-Charleston County ROI, and at least 46 invasive species may be present within the Jasper County ROI. Potential primary adverse impacts associated with invasive species resulting from port expansion activities within the ROIs include the introduction of new species to the ROIs from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROIs to new areas. Secondary impacts associated with invasive species within the ROIs resulting from port expansion activities include the introduction of new species as a result of ballast water dumping from commercial vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROIs and disposing of any dredged material at locations within the ROIs, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of USCG ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion activities within both ROIs. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Natural Areas

Natural areas are not present in significant quantities in either ROI. Managed conservation areas are present in the U.S. Naval Weapons Station in the Berkeley-Charleston County ROI. No other state or Federal designated conservation lands were identified within either ROI. Primary adverse impacts to natural areas that could result from port expansion within the ROI include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include erosion of nearshore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur in either of the designated preserves, the increase in cargo vessel traffic and surface transport vehicles associated with port expansion could result in adverse impacts to these resources.

Natural areas have been assessed as a minor constraint to potential port expansion within the Berkeley-Charleston County ROI, and minor primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities within the ROI. Natural areas are not believed to constitute a constraint to potential port expansion within the Jasper County ROI at this time, and no appreciable primary or secondary adverse impacts to this resource are anticipated as a result of potential expansion activities within the ROI.

Threatened and Endangered Species

Numerous Federal and state listed species are present in the vicinity of both ROIs. Primary adverse impacts to threatened and endangered species that could result from port expansion within the ROI include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses, disturbance of benthic habitat from dredging operations, and disturbance of terrestrial, nearshore, benthic, and pelagic habitat from increased cargo vessel traffic. Species of particular concern for the Berkeley-Charleston County ROI include the North Atlantic right whale, piping plover, sea turtles, shortnose sturgeon, least tern, island glass lizard, and beach morning glory. Species of particular concern for the Jasper County ROI include the North Atlantic right whale, piping plover, sea turtles, and shortnose sturgeon.

The NMFS SERO has stated that the species of greatest concern with regard to port expansion in the South Atlantic is the North Atlantic right whale (Habitat Conservation Division, personal communication). The SERO further stated that port expansion projects that result in increased vessel traffic threats to North Atlantic right whales will be subject to intense scrutiny by NMFS. The SERO explained that, because takes of this species cannot be authorized (due to small population size), for some port expansion actions (in or near right whale critical habitat) to proceed, it may be necessary for NMFS to impose reasonable and prudent alternatives on the Federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation. Although no critical habitat for the North Atlantic right whale is present within either ROI, both ROIs are located immediately west of South Atlantic coastal waters that are used as a migration corridor by the species.

Because of concerns raised by environmental agencies over potential impacts to threatened and endangered species resulting from port expansion operations, threatened and endangered species have been assessed as a substantial constraint to port expansion at both Charleston ROIs. Substantial primary and secondary adverse environmental impacts are anticipated for this resource as a result of potential expansion activities within the Berkeley-Charleston County ROI. Moderate primary adverse impacts and substantial secondary adverse impacts to threatened and endangered species are anticipated as a result of port expansion activities within the Jasper County ROI.

Critical Habitat

No critical habitat is present within either ROI. Consequently, critical habitat is not considered to be a constraint for potential port expansion for either ROI at this time, and no appreciable primary or secondary adverse environmental impacts to critical habitat are anticipated as a result of potential expansion activities within either ROI.

Unique or Unusual Habitats

Significant quantities of oyster reefs and communities are present in the Berkeley-Charleston County ROI, particularly near the mouth of Charleston Harbor. The South Carolina Department of Natural Resources (SCDNR) reports that oyster communities within the harbor are impaired because of water quality. Small discontinuous populations of oysters are present within the Jasper County ROI. No significant SAV communities or natural hardbottoms have been identified within either ROI.

Primary adverse impacts to unique or unusual habitats that could result from port expansion within the ROI include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and disturbance of benthic habitat from dredging operations. Potential secondary impacts to unique or unusual habitats associated with potential port expansion within the ROIs include disturbance of nearshore and benthic habitat from increased cargo vessel traffic and habitat impairment from increased point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses. Unique or unusual habitats have been assessed as a moderate constraint to port expansion within the Berkeley-Charleston County ROI, and moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities within the ROI. Unique or unusual habitats have been assessed as a minor constraint to port expansion within the Jasper County ROI, and minor primary and secondary adverse impacts are anticipated as a result of potential expansion activities within the ROI.

Essential Fish Habitat

EFH is found throughout both ROIs for a large assemblage of managed marine fishes and invertebrates, including various shrimp species, red drum, members of the snapper-grouper complex, and highly migratory managed species. Potential primary adverse impacts to EFH that could result from port expansion activities within the Charleston ROIs include loss of nearshore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of nearshore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. Because of the widespread nature of EFH within both ROIs, this resource has been assessed as a substantial environmental constraint, and substantial primary and secondary adverse impacts are anticipated to EFH as a result of potential expansion activities or consequences.

Cultural Resources

The Berkeley-Charleston County ROI contains an abundance of cultural resource sites. Despite the large number of sites within the ROI, many of these sites are concentrated in the Charleston Peninsula in the vicinity of the existing Union Pier and Columbus Street terminals, at James Island near the mouth of Charleston Harbor, on the eastern shore of Charleston Harbor at Mount Pleasant, and at the confluence of the Wando and Cooper rivers. The Jasper County ROI is comprised of dredged material disposal areas that were selected because of minimal impacts to environmental resources, including cultural resources. The likelihood of significant cultural resources occurring within this ROI is believed to be minimal.

Potential primary adverse impacts to cultural resources from port expansion activities within the Charleston ROIs include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of nearshore cultural resources from wave action associated with increased commercial vessel traffic. Significant areas with low densities of cultural resource sites are present within the Berkeley-Charleston County ROI, indicating that construction of new facilities may not pose a significant threat to cultural resources; however, the loss of nearshore sites from wave action remains a possibility. Because significant opportunities for avoidance of sensitive areas are possible, cultural resources have been assessed as a moderate constraint to port expansion within the Berkeley-Charleston County ROI; minor primary adverse impacts and moderate secondary adverse impacts are anticipated for cultural resources as a result of potential expansion activities within the ROI. Cultural resources are not believed to constitute a constraint to port expansion within the Jasper County ROI at this time, and no appreciable primary or secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Hazardous, Toxic, and Radioactive Waste

HTRW may pose a constraint to port expansion activities. The presence of significant REC sites in a given area may render the area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels.

Significant concentrations of potential REC sites in the Berkeley-Charleston County ROI are present on the Charleston Peninsula in the vicinity of the U.S. Naval Reservation near Shipyard Creek and the Columbus and Union Pier Terminals. The U.S. Naval Reservation and immediate vicinity are believed to constitute a substantial HTRW concern. Much of the remainder of the ROI, however, exhibits a low density of potential REC sites. No REC sites were identified within the Jasper County ROI.

Considerable potential for the avoidance of existing HTRW sites exists within the Berkeley-Charleston County ROI, and the likelihood of substantial primary adverse impacts resulting from port expansion activities is believed to be minimal. Secondary HTRW impacts are a substantial concern, however. HTRW has been assessed as a minor constraint to port expansion within the Berkeley-Charleston County ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential port expansion. HTRW is not believed to constitute a constraint to port expansion within the Jasper County ROI at this time; minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential port expansion.

Socioeconomic Profile

Expansion of port facilities in the Charleston ROIs would likely result in the creation of new jobs and new infrastructure within the ROIs. Potential primary impacts to socioeconomic conditions within the Charleston ROIs include the acquisition of property from landowners or residents for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROIs. Overall socioeconomic conditions are not believed to constitute a constraint to potential port expansion within the Charleston ROIs at this time, and no net primary or secondary adverse impacts to this resource are anticipated as a result of potential port expansion.

Environmental Justice

Areas with significant minority and/or poverty levels within the Berkeley-Charleston County ROI include the Charleston Peninsula from the Columbus Street Terminal north to the Berkeley-Charleston County line and the Charleston Naval Complex on the Cooper River. Construction of new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, ample areas exist within the ROI for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROI. Environmental justice has been assessed as a minor constraint to port expansion within the Berkeley-Charleston County ROI. Minor primary adverse impacts are anticipated as a result of potential port expansion. No net secondary adverse impacts are anticipated as a result of potential port expansion.

The Jasper County ROI is included within a U.S. Census block characterized as having a high percent of minority and disadvantaged residents; however, this area is virtually unpopulated, and population demographics are not applicable to the ROI. Environmental justice is not believed to constitute a constraint to port expansion within the Jasper ROI at this time, and no net primary or secondary adverse impacts are anticipated to this resource as a result of potential port expansion within the ROI.

Transportation

The Berkeley-Charleston County ROI contains an extensive network of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. The Jasper County ROI has been operated by the USACE as a dredged material disposal area and contains no significant transportation infrastructure. Potential primary adverse impacts to transportation resulting from port expansion activities include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses (in the case of the Berkeley-Charleston County ROI), and temporary disruption of vessel traffic in areas selected for channel modification (in the case of both ROIs). Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROIs include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Consequently, transportation has been assessed as a substantial constraint to port expansion within both ROIs. Minor primary adverse impacts and substantial adverse secondary impacts are anticipated as a result of potential port expansion within either ROI.

Recreation

Common recreational activities in the vicinity of the Berkeley-Charleston County ROI include boating, fishing, birding, and visiting the area's historic sites. A substantial recreational fishing industry is centered around Charleston Harbor. Numerous marinas, piers, and public boat ramps offer access to inshore and offshore fishing. Common recreational activities in the vicinity of the Jasper County ROI include boating and fishing. Potential primary adverse impacts to recreation within the ROIs resulting from port expansion include loss of nearshore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses; secondary impacts include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic.

Considerable commercial and military vessel traffic is present within the Berkeley-Charleston County ROI. Landside recreational activities appear to have adjusted to any disturbances caused by vessel traffic and would likely adjust to any increases without significant impairment. Waterborne recreational activities would likely experience greater adverse impacts. Recreation has been assessed as a moderate constraint to port expansion within the Berkeley-Charleston County ROI; minor primary adverse impacts and moderate secondary adverse impacts are anticipated for the resource as a result of potential port expansion within the ROI.

Recreational boating and fishing in the ROI are currently not prominent acitivities because of the high volume of cargo vessel traffic associated with port operations.

Consequently, recreation has been assessed as a minor constraint to port expansion within the Jasper County ROI, and minor primary and secondary adverse impacts are anticipated for the resource as a result of potential port expansion within the ROI.

WILMINGTON REGION OF INTEREST

There is one ROI in the Wilmington area (Figure 5). Potential impacts to each environmental resource in the ROI are summarized in the following subsections.

Geology and Soils

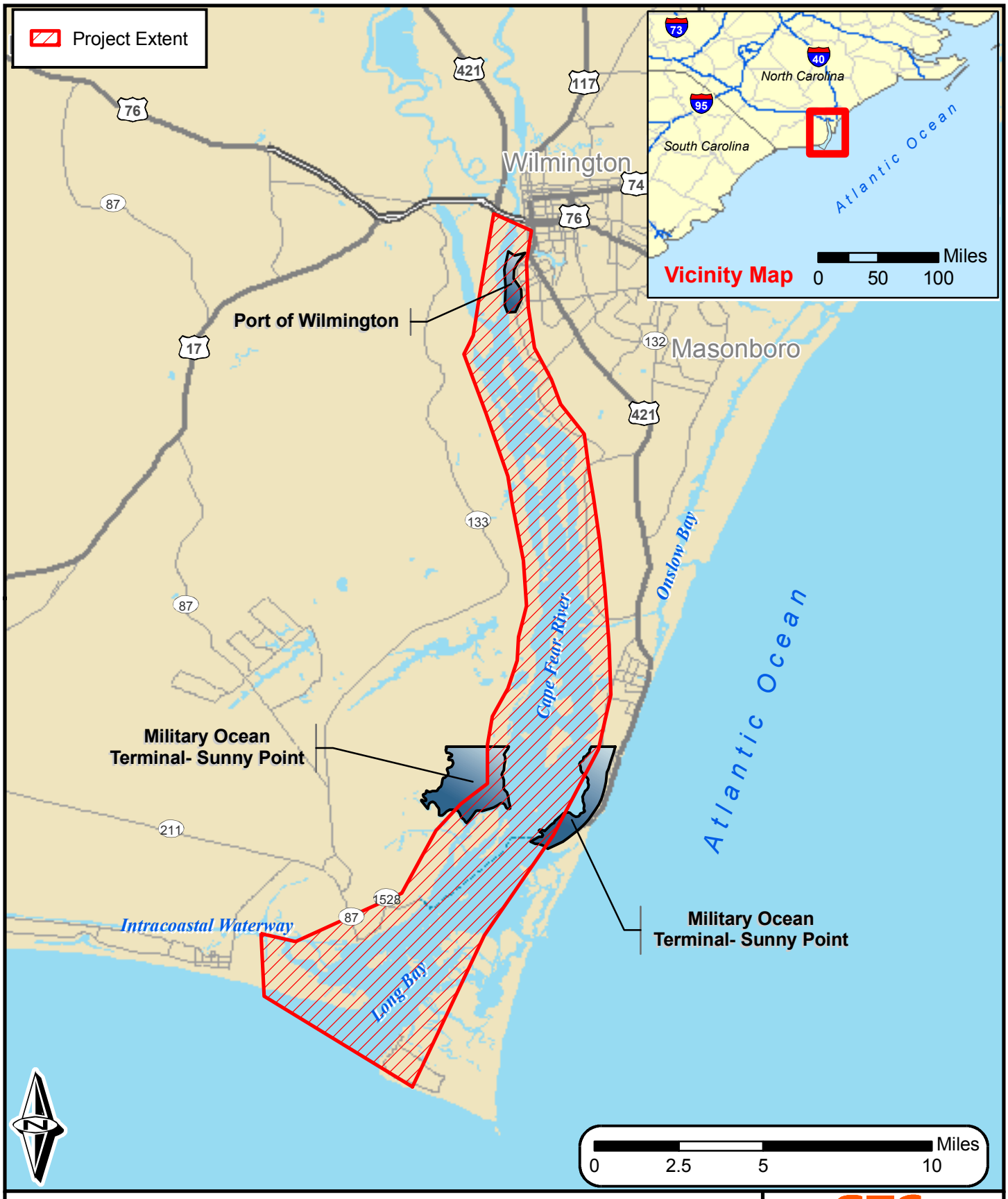
No rare or environmentally sensitive geologic features are present within the Wilmington ROI. Although prime or unique farmland soils are present within the ROI, these soils are not present in sufficient quantity to meet the U.S. Department of Agriculture's definition of prime or unique farmland. Consequently, geology and soils do not pose an environmental constraint for potential expansion activities within the Wilmington ROI, and no appreciable adverse environmental impacts to these resources are anticipated as a result of any expansion activities.

Air Quality

The Wilmington ROI is within an attainment zone for all six air criteria pollutants identified by the NAAQS. Concentrations of ozone in the ROI are near the NAAQS limit, however, and particulate matter concentrations are also somewhat elevated with respect to other criteria air pollutants. Air quality in the ROI is generally good, with minimal periods in which air quality is classified as unhealthy for the general public or for sensitive groups. Potential primary impacts to air quality from port expansion within the Wilmington ROI that could adversely impact air quality include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROI include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Air quality has been assessed as a moderate constraint for port expansion within the Wilmington ROI, and minor temporary primary impacts and moderate secondary adverse impacts to air quality are anticipated as a result of potential expansion activities or consequences.

Water Quality

Waterbodies within the Wilmington ROI are currently listed as impaired for aquatic life and shellfish harvesting uses. Potential primary impacts to water quality within the Wilmington ROI that could result from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Potential



Wilmington ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrololgy Dataset

Figure: 5
Date: February 2007
Scale: 1:250,000
Source: ESRI, USGS NHD
MapID: 22312115-673

secondary impacts include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a substantial environmental constraint within the Wilmington ROI; minor temporary adverse impacts and substantial secondary adverse impacts are anticipated for this resource as a result of potential port expansion.

Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the ROI that could result from potential port expansion activities include emissions and discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts to water quality from port expansion activities include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal rail and surface road accesses.

Recent studies in Wilmington Harbor indicate that sediment quality is good to moderate within the ROI. PAH concentrations exceeding conservative SQGs were present in several locations, particularly in the vicinity of the Military Ocean Terminal at Sunny Point. PCB concentrations were generally below SQC levels, with several minor exceptions. SQG exceedences for arsenic, chromium, and nickel were documented in a number of sediment samples collected from the harbor, particularly in the vicinity of the Port of Wilmington and the Military Ocean Terminal at Sunny Point. Sediment quality has been assessed as a moderate constraint to potential port expansion within the Wilmington ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Noise Environment

No noise data are available for the Wilmington ROI. Noise-sensitive areas within the ROI include natural areas such as the Carolina Beach State Park and North Carolina Coastal Reserve sites and populated places such as the City of Wilmington and the town of Southport. Actions associated with port expansion within the Wilmington ROI that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts to the noise environment associated with potential port expansion within the ROI could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a moderate constraint to port expansion within the Wilmington

ROI, and moderate primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Coastal Zone Management Act Resources

The ROI is located entirely within the designated coastal zone for the state of North Carolina. Additionally, the ROI is located entirely within the state's designated Area of Environmental Concern (AEC). Potential primary adverse impacts to CZMA resources within the ROI resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROI from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. Because the ROI is located entirely within the designated AEC of the state coastal zone, CZMA resources have been assessed as a substantial constraint to port expansion activities within the ROI. With adherence to state coastal management policies, moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wetlands

Wetlands comprise a significant percentage of land surface within the Wilmington ROI. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROI. Potential secondary impacts to wetlands resulting from port expansion could include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion within the Wilmington ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wildlife Resources

Invasive Species

At least 54 invasive species may be present within the Wilmington ROI. Potential primary adverse impacts associated with invasive species resulting from port expansion activities within the ROI include the introduction of new species to the ROI from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROI to new areas. Secondary impacts associated with invasive species within the ROI resulting from port expansion activities could include the introduction of new species as a result of ballast water dumping from commercial

vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROI and disposing of any dredged material at locations within the ROI, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of USCG ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion activities within the Wilmington ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Natural Areas

Natural areas are found throughout the Wilmington ROI. Managed conservation areas within the ROI include the Carolina Beach State Park, the Fort Fisher State Recreation Area, two North Carolina Coastal Reserve Sites, and the Bald Head Island Complex. Additionally, the lower Cape Fear River has been designated a Primary Nursery Area by the North Carolina Marine Fisheries Commission, and numerous areas within the ROI have been designated natural areas by the North Carolina Natural Heritage Program (NCNHP). Actions associated with potential port expansion that could result in primary adverse impacts to natural areas include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to natural areas resulting from potential port expansion within the ROI include erosion of nearshore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur in either of the designated preserves, the increase in cargo vessel traffic and surface transport vehicles associated with port expansion could result in adverse impacts to these resources. Additionally, because natural area designation by the NCNHP does not necessarily indicate any legal protection status, these natural areas could be adversely impacted by the construction of new port facilities and adjacent intermodal rail and surface road accesses. Natural areas have been assessed as a substantial constraint to potential port expansion within the Wilmington ROI. Moderate primary adverse impacts and substantial secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Threatened and Endangered Species

Numerous Federal and state listed species are present in the Wilmington ROI. GIS data provided by the North Carolina National Heritage Program indicate that listed species occurrences are widespread throughout the ROI. Primary adverse impacts to listed species resulting from port expansion within the ROI may include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses, disturbance of benthic habitat from dredging operations, and disturbance of terrestrial, nearshore, benthic, and pelagic habitat from increased cargo vessel traffic. Species of particular concern for the Wilmington ROI include the North Atlantic right whale, piping plover, sea turtles, and Carolina gopher frog (*Rana capito*).

The NMFS SERO has stated that the species of greatest concern with regard to port expansion in the South Atlantic is the North Atlantic right whale (Habitat Conservation Division, personal communication). The SERO further stated that port expansion projects that result in increased vessel traffic threats to North Atlantic right whales will be subject to intense scrutiny by NMFS. The SERO explained that, because takes of this species cannot be authorized (due to small population size), for some port expansion actions (in or near right whale critical habitat) to proceed, it may be necessary for NMFS to impose reasonable and prudent alternatives on the Federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation. Although no critical habitat for the North Atlantic right whale is present within the ROI, the ROI is located immediately west of South Atlantic coastal waters that are used as a migration corridor by the species.

Because of concerns raised by environmental agencies over potential impacts to threatened and endangered species resulting from port expansion operations, threatened and endangered species have been assessed as a substantial constraint to port expansion within the Wilmington ROI, and substantial primary and secondary adverse environmental impacts are anticipated for this resource as a result of potential expansion activities or consequences.

Critical Habitat

Critical habitat is present within the Wilmington ROI for the piping plover in the Fort Fisher State Recreation Area. Potential primary impacts to critical habitat resulting from port expansion within the ROI include loss of critical habitat from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to critical habitat resulting from potential port expansion within the ROI include erosion of nearshore critical habitat from increased wake action resulting from an increase in cargo vessel traffic and disturbance of critical habitat caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. Although it is unlikely that the construction of new port facilities and adjacent intermodal accesses would occur with a designated critical habitat area, potential secondary impacts from wave erosion and noise disturbance associated with vessel traffic increases are possible. Because nearshore critical habitat is present within the ROI, this resource has been assessed as a substantial constraint. Minor primary impacts and substantial secondary adverse environmental impacts are anticipated as a result of potential expansion activities or consequences.

Unique or Unusual Habitats

Few data are currently available about unique or unusual habitats within the ROI. Little if any SAV is believed to be present within the ROI. Intertidal oyster communities are known to be present in the lower Cape Fear River and adjacent waterbodies, but no maps of oyster communities currently exist for the area. Hardbottoms are not present within the ROI. Potential primary adverse impacts to unique or unusual habitats from port expansion within the ROI include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and disturbance of benthic habitat from dredging operations. Potential secondary impacts to unique or unusual habitats associated with

potential port expansion within the ROI include disturbance of nearshore and benthic habitat from increased cargo vessel traffic and habitat impairment from increased point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses. Unique or unusual habitats have been assessed as a moderate constraint to port expansion within the Wilmington ROI, and moderate primary and secondary adverse impacts are anticipated to this resource as a result of potential port expansion.

Essential Fish Habitat

EFH is found throughout the Wilmington ROI for a large assemblage of managed marine fishes and invertebrates, including various shrimp species, red drum, members of the snapper-grouper complex, and highly migratory managed species. Potential primary adverse impacts to EFH that could result from port expansion activities within the ROI include loss of nearshore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of nearshore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. Because of the widespread nature of EFH within the ROI, this resource has been assessed as a substantial environmental constraint, and substantial primary and secondary adverse impacts are anticipated to EFH as a result of potential expansion activities or consequences.

Cultural Resources

Few data are available regarding cultural resources within the Wilmington ROI. Significant concentrations of cultural resources are present on the left descending bank of the Cape Fear River in the vicinities of the City of Wilmington and Fort Fisher and on the right descending riverbank north of the Military Ocean Terminal at Sunny Point and in the vicinity of the town of Southport. Numerous historic shipwrecks are known to be present in the lower Cape Fear River. Although no maps of these resources were provided by state agencies, available literature on cultural resources indicates that many of these shipwrecks are located in the vicinity of Fort Fisher. Potential primary adverse impacts to cultural resources from port expansion activities within the ROI include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of nearshore cultural resources from wave action associated with increased commercial vessel traffic. Significant areas with low densities of cultural resource sites are present within the ROI, indicating that construction of new facilities may not pose a significant threat to cultural resources; however, the potential loss of nearshore sites from wave action remains a possibility. Because of the likely presence of significant numbers of submerged cultural resources within the Wilmington ROI and the vulnerability of these resources to the abovementioned secondary adverse impacts, cultural resources have been assessed as a substantial constraint to port expansion within the Wilmington ROI; minor primary adverse impacts and substantial secondary adverse impacts are anticipated for cultural resources as a result of potential expansion activities or consequences.

Hazardous, Toxic, and Radioactive Waste

HTRW may pose a constraint to port expansion activities. The presence of significant REC sites in a given area may render the given area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels.

Significant concentrations of potential REC sites in the Wilmington ROI are present on the left descending riverbank in the vicinity of the city of Wilmington, on the right descending riverbank in the vicinity of the town of Southport, and on both riverbanks in the vicinity of the Military Ocean Terminal at Sunny Point. Much of the remainder of the ROI, however, exhibits a low density of potential REC sites. Considerable potential for the avoidance of existing HTRW sites exists, and the likelihood of substantial primary adverse impacts resulting from port expansion activities is believed to be minimal. Secondary HTRW impacts are a substantial concern, however. Consequently, HTRW has been assessed as a minor constraint to port expansion within the Wilmington ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential port expansion.

Socioeconomic Profile

Expansion of port facilities in the Wilmington ROI would likely result in the creation of new jobs and new infrastructure within the ROI. Potential primary impacts to socioeconomic conditions within the Wilmington ROI include the acquisition of property from residents for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROI. Overall socioeconomic conditions are not believed to constitute a constraint to potential port expansion within the Wilmington ROI at this time, and no net primary or secondary adverse impacts to this resource are anticipated as a result of potential port expansion.

Environmental Justice

Areas with significant minority and/or poverty levels within the ROI include the left descending riverbank in the vicinity of the Port of Wilmington, the right descending riverbank between the U.S. Highway 74 Bridge and Town Creek, and both riverbanks in the vicinity of the river mouth. Construction of new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, ample areas exist within the ROI for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port

facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROI. Environmental justice has been assessed as a minor constraint to port expansion within the Wilmington ROI. Minor primary adverse impacts are anticipated as a result of potential port expansion. No net secondary adverse impacts are anticipated as a result of potential port expansion.

Transportation

The Wilmington ROI contains an extensive network of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. Potential primary adverse impacts to transportation resulting from port expansion activities include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses, and temporary disruption of vessel traffic in areas selected for channel modification. Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROI include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Consequently, transportation has been assessed as a substantial constraint to port expansion within the Wilmington ROI. Minor primary adverse impacts and substantial adverse secondary impacts are anticipated as a result of potential port expansion within the ROI.

Recreation

Common recreational activities in the vicinity of the Wilmington ROI include boating, fishing, and visiting the area's historic sites and natural preserves. Recreational boating and ecotourism are particularly popular recreational activities within the ROI. Actions or consequences of potential port expansion that could result in primary adverse impacts to recreation within the ROI include loss of nearshore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary adverse impacts associated with port expansion include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic. Because of the popularity and vulnerability of ecotourism and boating activities within the ROI, recreation has been assessed as a substantial constraint to port expansion within the Wilmington ROI. Moderate primary adverse impacts and substantial secondary adverse impacts are anticipated for the resource as a result of potential port expansion within the ROI.

NORFOLK REGION OF INTEREST

There is one ROI in the Norfolk area (Figure 6). Potential impacts to each environmental resource in the ROI are summarized in the following subsections.

Geology and Soils

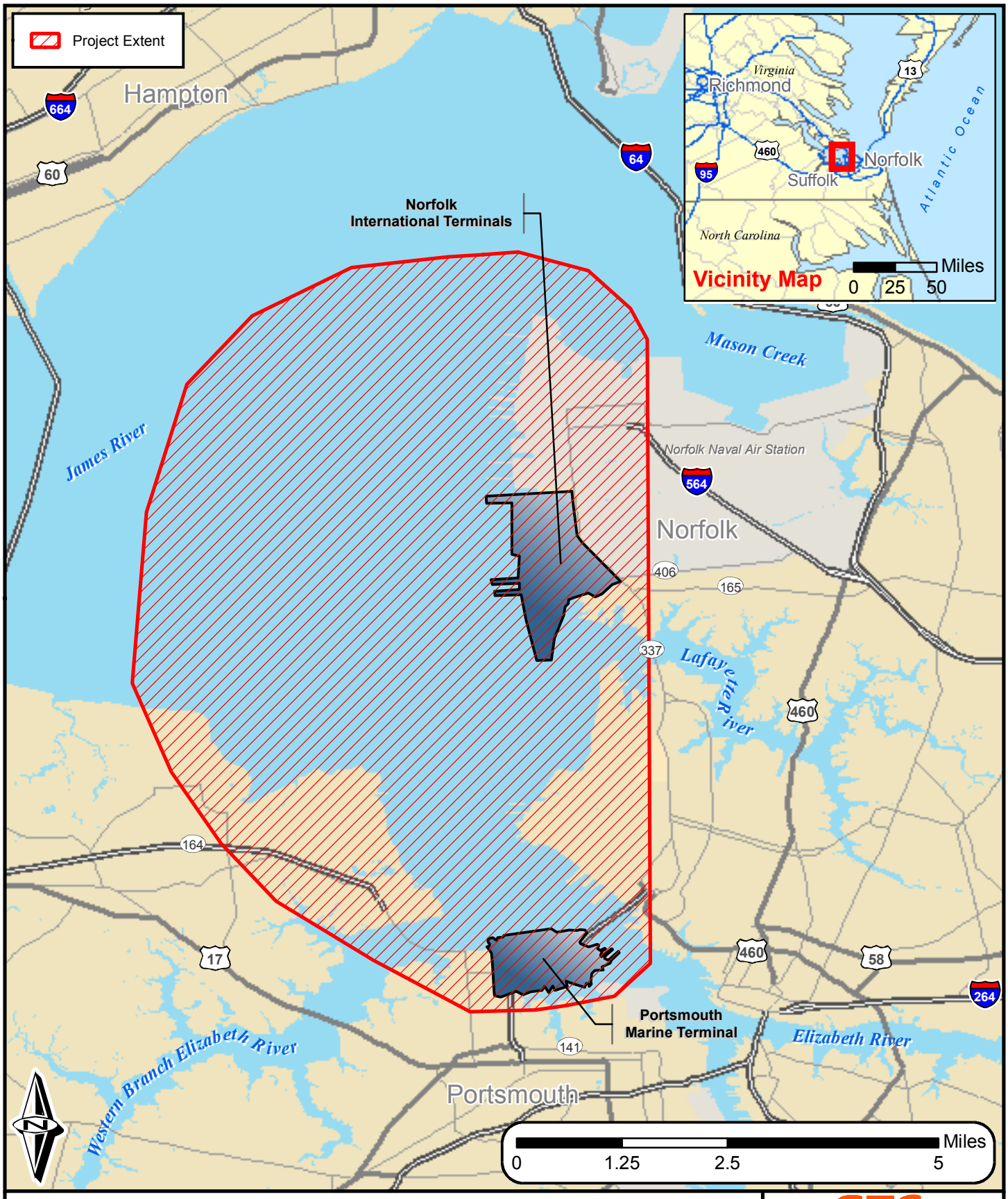
No rare or environmentally sensitive geologic features are present within the Norfolk ROI. No prime or unique farmland soils are present within the ROI. Consequently, geology and soils do not pose an environmental constraint for potential expansion activities within the Norfolk ROI, and no appreciable adverse primary or secondary environmental impacts to these resources are anticipated as a result of any expansion activities.

Air Quality

The ROI is within a nonattainment zone for ozone as defined by NAAQS and has been assessed as in Marginal attainment for this parameter since June 2004. Concentrations of particulate matter in the ROI are also near the NAAQS limit. Air quality in the ROI is generally good to moderate, with minimal periods in which air quality is classified as unhealthy for the general public or for sensitive groups. Potential primary impacts to air quality from port expansion within the Norfolk ROI include temporary increases in emissions from construction equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses and from dredging vessels during dredging operations. Potential secondary impacts to air quality resulting from potential port expansion activities within the ROI include air quality degradation from emissions caused by an increase in cargo vessel traffic and transportation vehicles at adjacent intermodal rail and surface road accesses. Because the ROI is currently near nonattainment status with regard to air quality, this resource has been assessed as a substantial constraint for port expansion within the Norfolk ROI. Primary adverse impacts to air quality from potential port expansion are anticipated to be minor and temporary in nature; however, substantial secondary adverse impacts to air quality are anticipated as a result of potential expansion activities or consequences.

Water Quality

Waterbodies within the Norfolk ROI are currently listed as impaired for their designated uses because of low dissolved oxygen, fecal coliform, enterococcus, and PCB contamination. Potential primary impacts to water quality within the Norfolk ROI that could result from port expansion activities include emissions from construction and dredging equipment, impairment from runoff at port facility or adjacent intermodal accesses, and temporary impairment from sediment disturbance during dredging operations. Actions or consequences associated with port expansion within the ROI that could result in secondary adverse impacts to water quality include increases in cargo vessel traffic and associated emissions, increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal rail and surface road accesses, and increases in salinity in coastal river systems associated with channel deepening. Water quality has been assessed as a substantial environmental constraint within the Norfolk ROI. Minor temporary primary adverse impacts and substantial secondary



Norfolk ROI

Savannah Harbor Expansion Project
Regional Port Analysis
Environmental Issues Survey

USA Street Map Data (2002), USGS National Hydrololgy Dataset

GEC

Figure: 6
Date: February 2007
Scale:1:100,000
Source: ESRI, USGS NHD
MapID: 22312115-672

adverse environmental impacts are anticipated for this resource as a result of potential port expansion.

Sediment Quality

Sediment quality may pose a potential constraint to some port expansion activities, particularly dredging operations. Significantly contaminated sediments may pose a concern for disposal, and dredging operations may resuspend and redistribute contaminated sediments that were previously restricted in areal extent. Primary adverse impacts to sediment quality within the Norfolk ROI that could result from potential port expansion activities include emissions and discharges from construction equipment during the construction of new port facilities and associated intermodal rail and surface road accesses and disturbance and redistribution of any contaminated sediments during dredging operations. Potential secondary adverse impacts to water quality from port expansion activities include increases in emissions and discharges associated with increased cargo vessel traffic and increases in point and nonpoint pollution sources associated with the operation of new port facilities and adjacent intermodal rail and surface road accesses.

Recent sediment quality studies in the vicinity of the ROI indicate that metals contamination is a concern for sediments within the ROI. PCB and PAH concentrations in exceedence of conservative SQGs were detected in several locations within the ROI, and one sample exhibited PAH exceedence of NOAA Effects Range-Median (ERM) standards. SQG exceedences for arsenic, cadminum, copper, mercury, nickel, lead, and zinc were documented in a number of sediment samples collected from the ROI. Mercury and zinc concentrations were in exceedence of NOAA ERM standards in several locations. Sediment quality has been assessed as a substantial constraint to potential port expansion within the Norfolk ROI. Minor primary adverse impacts and substantial secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Noise Environment

Ambient noise levels within the ROI appear to be within EPA and HUD recommended standards. Noise-sensitive areas within the ROI include the Craney Island Conservation Site and populated places such as the cities of Norfolk and Portsmouth. Actions associated with port expansion within the Norfolk ROI that could result in primary adverse impacts to the noise environment include construction of new port facilities and adjacent intermodal rail or surface road accesses; these impacts would be temporary in nature. Secondary adverse impacts to the noise environment associated with potential port expansion within the ROI could include increases in noise levels from equipment and facility operations at new port facilities and adjacent intermodal accesses and from an increase in cargo vessel traffic. Noise environment has been assessed as a moderate constraint, and moderate primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Coastal Zone Management Act Resources

The ROI is located entirely within the designated coastal zone for the state of Virginia. Potential primary adverse impacts to CZMA resources within the ROI resulting from port expansion activities include the loss of CZMA resources within the construction footprints of new or expanded port facilities and associated intermodal rail and surface road accesses. Potential secondary impacts to CZMA resources associated with port expansion include the degradation or loss of CZMA resources in the ROI from wave erosion associated with increased commercial vessel traffic and from increased emissions associated with increased vessel and surface vehicle traffic. Such impacts could be minimized by adhering to state coastal management policies as mandated by the Federal consistency provision (Section 307) of the CZMA. Because the ROI is located entirely within the designated coastal zone, CZMA resources have been assessed as a substantial constraint to port expansion activities within the ROI. With adherence to state coastal management policies, moderate primary and secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wetlands

Wetlands comprise a significant percentage of land surface within the Norfolk ROI. Primary impacts to wetlands that could result from potential port expansion include wetland loss from the construction of new port facilities and adjacent intermodal rail or surface road accesses. However, opportunities exist to mitigate these primary wetland impacts by wetland creation on upland or submerged lands in or adjacent to the ROI. Potential secondary impacts to wetlands resulting from port expansion include erosion of wetlands from increased wake action caused by an increase in cargo vessel traffic. Wetlands have been assessed as a moderate constraint to port expansion within the Norfolk ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Wildlife Resources

Invasive Species

At least 62 invasive species may be present within the Norfolk ROI. Potential primary adverse impacts associated with invasive species resulting from port expansion activities within the ROI include the introduction of new species to the ROI from fill material used in construction of new port facilities and adjacent intermodal rail and surface road accesses. Additionally, disposal of dredged material from channel deepening operations could result in the introduction of invasive species already present within the ROI to new areas. Secondary impacts associated with invasive species within the ROI resulting from port expansion activities could include the introduction of new species as a result of ballast water dumping from commercial vessels utilizing the new or expanded port facilities. Primary impacts associated with invasive species could be reduced or eliminated by using fill material already located within the ROI and disposing of any dredged material at locations within the ROI, preventing the offsite spread of invasive species. Secondary impacts associated with invasive species could be reduced by the enforcement of USCG ballast water management guidelines established in 33 CFR 151. Invasive species have been assessed as a moderate constraint to port expansion activities within

the Norfolk ROI. Minor primary adverse impacts and moderate secondary adverse impacts are anticipated as a result of potential expansion activities or consequences.

Natural Areas

Natural areas are not widespread throughout the Norfolk ROI. Managed conservation areas within the ROI include the Craney Island Conservation Site and portions of the U.S. Navy Craney Island Fuel Terminal and Norfolk Naval Station. Potential primary adverse impacts to natural areas that could result from port expansion within the ROI include loss of natural areas from construction of new port facilities and adjacent intermodal rail and surface road accesses. Secondary impacts to natural areas resulting from potential port expansion within the ROI include erosion of nearshore natural areas from increased wake action resulting from an increase in cargo vessel traffic and disturbance of natural areas caused by increases in cargo vessel traffic and surface transport vehicles at intermodal accesses. While it is unlikely that port expansion would occur in either of the designated preserves, the increase in cargo vessel traffic and surface transport vehicles associated with port expansion could result in adverse impacts to these resources. Natural areas have been assessed as a minor constraint to potential port expansion within the Norfolk ROI, and minor primary and secondary adverse impacts to this resource are anticipated as a result of potential expansion activities or consequences.

Threatened and Endangered Species

Several Federal and state listed species are present in the Norfolk ROI. Actions or consequences associated with potential port expansion within the ROI that could result in primary adverse impacts to threatened and endangered species include loss of terrestrial and nearshore habitat from construction of new port facilities and adjacent intermodal rail or surface road accesses and incidental or accidental takes of listed species during construction activities. Potential secondary adverse impacts include disturbance of terrestrial habitat from transport vehicles at adjacent intermodal accesses, disturbance of benthic habitat from dredging operations, and disturbance of terrestrial, nearshore, benthic, and pelagic habitat from increased cargo vessel traffic. Species of particular concern for the Norfolk ROI include the North Atlantic right whale, piping plover, sea turtles, least tern (*Sterna antillarum*), black-necked stilt (*Himantopus mexicanus*), and Atlantic sturgeon.

The NMFS SERO has stated that the species of greatest concern with regard to port expansion in the South Atlantic is the North Atlantic right whale (Habitat Conservation Division, personal communication). The SERO further stated that port expansion projects that result in increased vessel traffic threats to North Atlantic right whales will be subject to intense scrutiny by NMFS. The SERO explained that, because takes of this species cannot be authorized (due to small population size), for some port expansion actions (in or near right whale critical habitat) to proceed, it may be necessary for NMFS to impose reasonable and prudent alternatives on the Federal action agency to prevent the expansion project(s) from putting the right whales in a "jeopardy" situation. Although no critical habitat for the North Atlantic right whale is present within the ROI, the ROI is located immediately west of South Atlantic coastal waters that are used as a migration corridor by the species.

Because of concerns raised by environmental agencies over potential impacts to threatened and endangered species resulting from port expansion operations, threatened and endangered species have been assessed as a substantial constraint to port expansion within the Norfolk ROI, and substantial primary and secondary adverse environmental impacts are anticipated for this resource as a result of potential expansion activities or consequences.

Critical Habitat

No designated critical habitat is present within the ROI. Consequently, critical habitat is not considered to be a constraint for potential port expansion at this time, and no appreciable adverse environmental impacts to critical habitat are anticipated as a result of potential expansion activities or consequences.

Unique or Unusual Habitats

Three small oyster reefs are present within the ROI. Oyster communities within the greater Chesapeake Bay area are impaired because of degraded water quality and disease-causing microorganisms. No SAV communities or natural hardbottoms have been identified within the ROI. Because these resources are not present in significant quantities within the ROI, unique or unusual habitats have been assessed as a minor constraint, and minor primary and secondary adverse impacts are anticipated as a result of potential expansion activities within the ROI.

Essential Fish Habitat

EFH is found throughout the Norfolk ROI for a large assemblage of managed marine fishes and invertebrates, including bluefish (*Pomatomus saltatrix*), summer flounder (*Paralicthys dentatus*), red drum, butterfish (*Peprilus triacanthus*), black sea bass (*Centropristus striata*), members of the snapper-grouper complex, coastal migratory pelagic species, highly migratory managed species, and skates. Potential primary adverse impacts to EFH that could result from port expansion activities within the ROI include loss of nearshore EFH from construction of new port facilities and adjacent intermodal rail and surface road accesses and loss or disturbance of benthic EFH from dredging operations. Potential secondary adverse impacts from port expansion include disturbance of nearshore, benthic, and pelagic EFH from increased cargo vessel traffic and degradation or loss of EFH from increased point and nonpoint pollution sources associated with port operations. Because of the widespread nature of EFH within the Norfolk ROI, this resource has been assessed as a substantial environmental constraint, and substantial primary and secondary adverse impacts are anticipated to EFH as a result of potential expansion activities or consequences.

Cultural Resources

The ROI contains an abundance of cultural resource sites with a widespread distribution. The only area in the ROI without significant cultural resources is the Craney Island disposal site. Potential primary adverse impacts to cultural resources from port expansion activities within the

ROI include destruction of cultural resource sites from the construction of new port facilities and adjacent intermodal rail and surface road accesses. Potential secondary impacts include the damage or loss of nearshore cultural resources from wave action associated with increased commercial vessel traffic. Because significant opportunities for avoidance of sensitive areas may not be possible, cultural resources have been assessed as a substantial constraint to port expansion within the Norfolk ROI. Substantial primary and secondary adverse impacts are anticipated for cultural resources as a result of potential expansion activities or consequences.

Hazardous, Toxic, and Radioactive Waste

HTRW may pose a constraint to port expansion activities. The presence of significant REC sites in a given area may render the given area infeasible for port expansion because of HTRW concerns. Additionally, potential port expansion may pose an HTRW concern to the surrounding environment. Potential primary impacts associated with port expansion activities include discharges from construction or dredging equipment during the construction of new port facilities and adjacent intermodal rail and surface road accesses or dredging operations. Potential secondary impacts include increases in point and nonpoint pollution sources associated with the construction of new port facilities and adjacent intermodal accesses, as well as the potential increase in pollutant or contaminant discharges from accidents involving cargo vessels.

Significant concentrations of potential REC sites in the ROI are present in the vicinity of the Norfolk Naval Station, the U.S. Navy Craney Island Fuel Terminal, and the Portsmouth Marine Terminal. Because these areas comprise a significant portion of the total ROI, the potential for avoidance of cultural resource sites is problematic. Consequently, HTRW has been assessed as a substantial constraint to port expansion within the Norfolk ROI. Substantial primary and secondary adverse impacts are anticipated as a result of potential port expansion.

Socioeconomic Profile

Expansion of port facilities in the Norfolk ROI would likely result in the creation of new jobs and new infrastructure within the ROI. Potential primary impacts to socioeconomic conditions within the Norfolk ROI include the acquisition of property from residents for the construction of new port facilities and adjacent intermodal rail and surface road accesses. It is anticipated that compensation would be provided to any impacted residents or socioeconomic groups impacted by property acquisition, offsetting or mitigating the impacts. No secondary adverse impacts to socioeconomic conditions are anticipated as a result of port expansion activities. Port expansion would likely constitute a net benefit to socioeconomic conditions within the ROI. Overall socioeconomic conditions are not believed to constitute a constraint to potential port expansion within the Norfolk ROI at this time, and no net primary or secondary adverse impacts to this resource are anticipated as a result of potential port expansion.

Environmental Justice

Areas with significant minority and/or poverty levels within the ROI include the vicinity of the Norfolk Naval Station and Norfolk International Terminals, and the U.S. Navy Craney Island Fuel Terminal. The Craney Island disposal area is included within a U.S. Census

block characterized as having a high percent of minority and disadvantaged residents; however, this area is unpopulated, and population demographics are not applicable to this portion of the ROI. Construction of new port facilities and adjacent intermodal rail and surface road accesses in these areas could result in primary adverse impacts to minority or disadvantaged populations. However, areas exist within the ROI for port expansion that would not result in disproportionate impacts to such groups, and the construction of new port facilities and the associated increase in jobs and infrastructure could result in a net benefit to minority and disadvantaged populations within the ROI. Environmental justice has been assessed as a minor constraint to port expansion within the Norfolk ROI. Minor primary adverse impacts are anticipated as a result of potential port expansion. No net secondary adverse impacts are anticipated as a result of potential port expansion.

Transportation

The Norfolk ROI contains an extensive network of surface roads, railroads, and waterways with shipping channels that support residential and commercial traffic activity in the area. Potential primary adverse impacts to transportation resulting from port expansion activities include the temporary disruption of traffic on surface roads and railways in construction areas for expanded port facilities or adjacent intermodal rail and surface road accesses, and temporary disruption of vessel traffic in areas selected for channel modification. Additionally, the construction of landside features could result in the permanent loss of portions of surface roads or railroads within the construction footprint of the expanded facilities. Traffic disruptions from construction activities would likely be temporary in nature, however, and any permanent surface route closures from construction activities could be offset by construction of new nearby routes to replace the closed routes. Potential secondary impacts to transportation resulting from port expansion activities within the ROI include increased use of transportation routes from commercial vehicle, train, and vessel traffic associated with expanded port facilities. Such increases in traffic could require substantial additions to or modifications of the existing transportation infrastructures. Consequently, transportation has been assessed as a substantial constraint to port expansion within the Norfolk ROI. Minor primary adverse impacts and substantial adverse secondary impacts are anticipated as a result of potential port expansion within the ROI.

Recreation

Common recreational activities in the vicinity of the Norfolk ROI include boating, fishing, crabbing, and visiting the area's historic sites. Potential primary adverse impacts to recreation within the ROI associated with port expansion include loss of nearshore recreational space from the construction of new port facilities and adjacent intermodal rail and surface road accesses; secondary impacts include the disturbance of waterborne and ecotourist recreation activities from increased cargo vessel traffic. Fishing and crabbing in the ROI are currently not prominent activities because of impaired water quality. Recreational boating is a popular activity, however, despite the high volume of military and cargo vessel traffic in the area. Recreational boaters use the ROI primarily for transit rather than as a destination. Landside recreational activities appear to have adjusted to any disturbances caused by high military and cargo traffic volumes and would likely adjust to any increases without significant impairment.

Consequently, recreation has been assessed as a minor constraint to port expansion within the Norfolk ROI, and minor primary and secondary adverse impacts are anticipated for the resource as a result of potential port expansion.

III. INSTITUTIONAL ANALYSIS

OBJECTIVES

The scope of work included an Institutional Analysis (IA) task to address specific local critical factors that would affect different ports, marine terminals, and sites relative to their ability to expand as part of a regional port concept. The institutional constraints were drawn with a wide boundary to allow for unique local circumstances for particular ports, terminals, and communities to be considered. The stated purpose of the IA was to focus on "deal makers and breakers" that would affect expansion of capacity and regional port development. The IA was to effectively complement the capacity and expansion analyses at the local marine terminal and site levels and the associated environmental surveys by bringing into specific consideration other factors not expressly incorporated in these prior tasks that could enhance or negate other advantages to capacity expansion.

Similar to the environmental survey, the IA was perceived as being relatively port and site specific. The subsequent reorientation of the scope away from fieldwork among the ports (including existing, planned, and potential marine terminals) to desktop analysis through Corps District secondary resources and possible local port inputs did not enable local critical factors and deal makers/breakers specific to the ports, terminals, and sites to be identified as such.

METHODOLOGY

Similar to the capacity analysis (First Interim Report – July 2006) and environmental survey, the orientation of the IA shifted from a port, terminal, and site orientation to a desktop review of secondary materials that could be applicable to the expansion of South Atlantic container ports and marine terminals. The IA presented here deals with general critical factors affecting marine terminal capacity and development at the regional level. The IA applies to existing capacity of current facilities and new capacity of planned and potential facilities.

EXISTING CAPACITY

The capacity analysis in the First Interim Report indicated that marine terminal throughput was based on assumptions about key parameters that affect capacity, including: (1) gate access (hours and days of operations) between public roads and marine terminals; (2) labor practices and work rules; (3) storage and handling empty containers; (4) dwell time in the marine terminal for loaded containers; and (5) provision of highway truck chassis for container movements outside of the terminal. The institutional aspects of each will be discussed in the following subsections.

Gate Access

Marine container terminals are frequently represented as seamless logistical centers where cargo is swiftly transferred between vessels and land transportation. The terminals are assumed to work 24/7 with respect to hours of the day and days of the week, respectively. Although this 24/7 phenomenon is often the case for some parts of some of the terminals,

particularly vessel berth operations (ignoring some other constraints pertaining to labor overtime compensation that provide some disincentives for 24/7 staffing), in most instances the marine terminal public gates that allow ingress and egress of cargo from and to the local roads are limited to 8/5 with respect to hours of the day and days of the week, respectively. Effectively, the terminals typically operate with very limited hours for receipt and discharge of cargo by way of public roads.

There have been some movements to increase marine terminal gate operating hours, often by staffing during lunch and breaks when the gates have been otherwise customarily closed and by extended hours through a combination of early openings and late closings. Until several years ago, it was not uncommon to see marine container terminal public gates open at 7:00 A.M., close for a 15-minute break during the morning, close for a one-hour lunch break at noon, and close for a 15-minute break during the afternoon before closing for the rest of the day at 4:00 P.M. Effectively, the marine gates would be open about 37.5 hours per week during the five days from Monday to Friday.[1]

Today, most of the container terminal gates are operating more or less continuously during the eight-hour day, often with extended hours up to 10 hours daily for the South Atlantic ports. The Georgia Ports Authority (GPA) has regular Saturday gate hours that are still an anomaly for most of the other East Coast container ports. Extended gate operating hours are regarded as a precursor to improved marine terminal throughput in the absence of other changes such as container dwell time. This is particularly important if there are weekend sailings for which export cargo must be received at the terminal before gate closure on Friday and import cargo cannot be discharged from the terminal before gate opening on Monday.

However, extended gate operating hours are not a sufficient condition for improved throughput unless there are businesses that can be effectively served with deliveries and pickups outside of the traditional eight-hour workday timeframe for most shipments and related business hours. Extended marine terminal gate access by more operating days and/or longer hours have not been particularly successful where local business hours for shipments are limited to five days and eight hours. Extended gate operating hours have worked better when there are distribution centers that are more inclined to operate over longer hours for receipt of freight deliveries or non-local customers such that the transit time can still fit into a traditional five-day eight-hour window for delivery/pickup; but shipments can leave or arrive at the port with more flexibility under extended gate operations.[2]

The impact of extended gate operating hours will vary by port depending on the mix of local and non-local customers that can be effectively served by extended gate operating hours. Simulations of marine container box movements through gates with weekend operations that are

[1] In some instances, the gates would actually be open fewer hours when the longshoremen reported for duty at the hall and then had to be transported to and from the gates. The relatively small size of the South Atlantic container terminals does not present much of a problem for "floating" labor compared to larger terminals and congested urban areas on the West Coast, where gate openings and closures would often be delayed and accelerated by as much as 30 minutes for labor transportation.

[2] The paramount issue is the extent to which these businesses will receive cargo outside of the normal 8/5 practice. The businesses may be open for extended hours (for example, retailing), but may not receive freight concurrent with these extended hours.

not constrained by customers' abilities to receive freight outside of traditional hours indicate substantial improvements in terminal throughput (depending on the volume of weekend box movements).[3] The evolving development of major retail regional distribution centers locating in close proximity to major container ports such as GPA bodes well for supporting effective use of extended gate hours and possibly days of operation. Expanded gate operations have been gradually evolving on the West Coast in response to severe congestion affecting marine terminals. To the extent that the container port distribution centers operate longer hours and days than conventional 8/5 businesses, there should be a baseline level of traffic for longer gate hours.[4]

Although extended gate operating hours are widely perceived as a potential contribution to improved marine terminal throughput capabilities, there are a number of interrelated institutional issues that have limited the extent to which ports and/or steamship lines are willing to operate longer gate hours. The major limiting institutional issues affecting the use of extended gate hours to increase marine terminal capacity (throughput) are largely outside of the control of the ports and lines. The issues are:

- Extent to which local shippers, including intermodal terminals, can accept shipments (imports) outside of 8/5 hours and days per week framework.
- Labor flexibility and expense associated with extended gate operations.
- Willingness of steamship lines to absorb extra costs, primarily labor, of extended gate hours.
- Truck curfews and/or noise restrictions on adjacent local roads.

For these reasons, ports have not aggressively pursued extended gates. In many instances the use of extended gates is significantly lower than the traditional peak inflows at 7:00 A.M. and outflows at 4:00 P.M. Until there is a sufficient volume of local marine container traffic that is not limited to 8/5 hours per day and days per week for delivery (imports), most ports will probably continue with restricted gate operating hours compared to an unconstrained 24/7 phenomenon. Gate constraints are particularly applicable to U.S. East Coast ports because of the very high level of dependence on trucks (upwards to 80 percent of containers move exclusively by truck) for local movements up to 250 miles.

Labor Flexibility

Typical marine terminals staffed with union labor in the South Atlantic coast (International Longshoremen's Association and International Brotherhood of Teamsters) are under a master contract with local addenda for particular circumstances. Consequently, there are variations among the ports with respect to start times, shifts, etc. The discussion that follows is

[3] *Response Model to Disruption of Maritime Transportation Systems*, Maritime Administration (August 31, 1996).
[4] Drayage of marine containers by local trucks is normally compensated on a trip basis. To the extent that drayage firms can make more trips per day or make trips faster during the latter part of the day, there are other improvements in marine related productivity and costs.

intended to provide general guidance and may not exactly reflect the local labor situation with respect to work rules and practices at each of the five major container ports and terminals.[5]

Longshoremen labor work rules will typically reflect fixed start times for gangs to be ordered to work cargoes and other terminal staffing. Generally, the daytime shifts (typically 7:00 A.M. to 4:00 P.M.) will work at straight labor time compensation. Shifts outside of this timeframe will typically receive overtime compensation for the affected hours. Moreover, overtime will typically be paid for weekend work. Additional premiums may be paid for overtime work that extends past midnight, etc. Shift start times are usually fixed per the agreement and typically allow for minimum pay per call, often four hours, regardless of the duration.

Effectively, vessels can only work around the shift start times or pay for idle labor wait for ships (gangs ordered for a shift that begins before the vessel arrives) and/or overtime to extend shifts for cargo handling (gangs held beyond the eight-hour shift to work a vessel). Some cost-sensitive lines at smaller ports will seek to work vessels during daylight hours to minimize longshoremen costs of overtime. Similarly, lines might seek to work vessels at other than weekend periods to avoid overtime. However, for most large container ports, these preferences are more difficult to implement because the lines have schedules and often there are limited berth opportunities. Moreover, for large container vessels, the opportunity costs of delay are perceived as normally outweighing higher labor (longshoremen) costs from overtime hours, premium labor shifts, and days of operation.

Labor staffing has been a particularly sensitive issue for extending gate operating hours. Because there are fixed start times, opening gates earlier or closing them later has normally required special negotiations and labor overtime payments. Similarly, extending gate days of operation usually results in labor overtime payments. Extended gate hours or days of operation beyond the traditional workday timeframe should normally be regarded as requiring overtime payments. Gate staffing differs among the ports, but a typical "gate" portal will have a staff of three persons. Consequently, gate overtime can become very expensive for the convenience (as opposed to the necessity) of allowing cargo to enter or exit outside of the normal straight-time labor schedule.

Gate labor costs are commonly viewed as inflated by staffing and work rules that require a minimum number of persons per portal (gate) for the purposes of receiving and discharging equipment and cargo to and from the marine terminal. Gate automation of certain functions such as electronic data interchange (EDI), pre-cleared documentation, etc., has vastly reduced the labor time and staffing actually needed, but usually not without corresponding reductions in union work rules.[6]

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[5] In addition to differences among the ports with respect to unions (International Longshoremen's Association or International Brotherhood of Teamsters), there are differences within the ports with respect to unions, particularly when the International Brotherhood of Teamsters staff marine terminal gates rather than the International Longshoremen's Association.

[6] The labor unrest at the West Coast ports has partially reflected concerns about outsourcing of gate clerks as a result of automated data exchange, virtually eliminating the need for manual data entry by union clerks with a base rate in excess of $100,000 per year.

No effort to extend gate hours and days of operation can ignore the increased costs of overtime and fixed staffing dictated by traditional union work rules built around an 8/5 (hours and days) framework for port operations. The commodity-like nature of the container marine business has meant that steamship lines and ports have striven to minimize costs whenever possible. Expanded gate hours and days is regarded as an expensive alternative for increasing terminal capacity (throughput), particularly if there is a sharp decline in gate utilization outside of the normal hours and marked by overtime labor costs. Consequently, some ports or lines have extended gate hours only to discover that demand was insufficient to justify the additional expense.

The result is that changes in the work hours at the ports, particularly marine terminal gate access, cannot be viewed as a panacea for improved throughput if local businesses remain committed to a traditional 8/5 hours and work days when cargo will be received. Extending the gate hours and days adds little to productivity at the expense of substantially higher labor costs unless the adjacent shipping community likewise adopts more flexible operating practices.

Empty Containers

Steamship lines commonly maintain pools of empty containers at the ports to fill customer orders for shipments. The sizes of empty container pools vary by line, trade, and time of the year. Line contracts with the ports normally allow for a maximum free container storage time beyond which stowage charges are applicable to empty containers. For several reasons, lines have had incentives to maintain larger pools of empty containers than commonly required. Until the recent substantial increase in steel prices, it was usually assumed in the industry that it was cheaper to build new containers in China than to ship empty containers back to China for more loads (imports). Moreover, the West Coast port labor disruption and associated productivity issues led lines to move West Coast empty containers to East Coast ports. This exacerbated the storage problem to the extent that some East Coast ports (including Savannah) took action to embargo receipt of container empties other than what had previously been discharged (imported) through the port.

A common practice has been to seek to store excess empty containers off port in auxiliary lots. Some ports have considered this an alternative to on-site marine terminal storage. However, off-terminal stowage of empty containers involves some issues, which are largely related to responsibility for equipment control and gate inspection operations. It is not clear that off- terminal storage of empty containers other than to augment reduced on terminal stowage will be a supplement to the dispatch of empty containers from the marine terminal for loading. In addition to equipment liability issues, there is also the issue of union sector labor staffing for off-site terminal operations with regard to “gates” that would allow for empties to be picked up or dropped by truckers independent of the marine terminal or in conjunction with it as part of an equipment flow.

Consequently, other than long-term storage of excess empties, off-terminal siting of empty containers is not regarded as very practical without labor flexibility to staff and operate these facilities. Moreover, the ports have the ability to limit empty containers with respect to numbers of boxes and dwell times through existing tariff and contract provisions. In the past, the

ports have been reluctant to apply the penalties, but the recent trend is to tighten the supply of empties, particularly for low-volume lines, and enforce shorter dwell times.

As a practical matter, normal working inventories of empty containers do not have an appreciable effect on marine terminal capacity and throughput for several reasons. First, empty containers are often stowed in the least desirable portion of the yard with respect to berth access, which may not otherwise be suitable by layout, surface condition, or location for loaded containers. Second, because empty containers have substantially greater stowage density than loaded containers with respect to height and less row spacing, the yard space occupied is not equivalent. Third, most trades have seasonal fluctuations in commodities that lead to ebbs and flows of empties, including storage fluctuations, as lines can reposition them. Fourth, and perhaps most important, is that the empty container problem is quite limited in terms of the numbers of boxes and productive yard space that is effectively occupied. When viewed from the perspectives of other determinants of marine terminal capacity and throughput, the empty container problem is relatively modest.

Dwell Time

Dwell time is a measure of the days that loaded boxes of imports and exports stay in the marine terminal prior to discharge. Dwell time has a direct effect on yard occupancy and throughput capability. Shorter dwell times result in faster turns of the yard inventory of loaded boxes and therefore produce increased throughput. Conversely, longer dwell times result in slower turns of the yard inventory of loaded boxes and reduced throughput.[7]

Dwell time varies primarily by service and cargo. Less frequent services will tend to have larger dwell times (exports) as cargo accumulates. Lower-value cargo will also tend to have longer dwell time, particularly exports. The average dwell time days for containers in the marine terminal for a weekly service for nonperishable imports and exports will typically range from three to five days. However, the average dwell time does not tell the whole story from the perspective of the dwell time distribution. Typical dwell time distributions measured in days are skewed. For example, a four-day average dwell time might have the following distribution of days and boxes for imports in the yard before discharged out of the gates: 2 days – 5 percent; 3 days – 10 percent; 4 days – 35 percent; 5 days – 15 percent; 6 days – 10 percent; 7 days – 10 percent; 8 days – 5 percent; 9 days – 5 percent and 10 days – 5 percent. The weighted average dwell time would be 4.25 days as reflected in Table 2.

For illustration purposes, Table 2 includes three alternative container dwell time distributions to identify the impact on average dwell time. The five day maximum dwell time effectively eliminates any boxes in the yard over five days. The weighted average dwell time is 4.05 days, an improvement of 0.20 days. The accelerated dwell time shifts the entire dwell time distribution back one day and has a five-day limit on maximum dwell time. The resulting weighted average dwell time is 3.25 days, an improvement of one day over the status quo.

[7] Conceptually, it is useful to regard the marine container terminal as a warehouse and the stock of containers as inventory. The throughput of the warehouse is a function of the number of inventory turns. The average length of the dwell time is a reflection of the inventory turns and the throughput capability of the marine terminal.

Finally, a four day maximum dwell time that is also accelerated has a weighted average of three days, which is a 1.25-day improvement over the status quo.

Table 2. Effect of Container Dwell Time Distribution on Average Total Dwell Time (Days)

Dwell Days	Existing Percent	Dwell Average	Five Day Max Percent	Dwell Average	Accelerated Percent	Dwell Average	Four Day Max Percent	Dwell Average
1		0.00		0.00	0.05	0.05	0.05	0.05
2	0.05	0.10	0.05	0.10	0.20	0.40	0.20	0.40
3	0.10	0.30	0.20	0.60	0.40	1.20	0.40	1.20
4	0.35	1.40	0.40	1.60	0.10	0.40	0.35	1.40
5	0.15	0.75	0.35	1.75	0.25	1.25		0.00
6	0.10	0.60		0.00		0.00		0.00
7	0.10	0.70		0.00		0.00		0.00
8	0.05	0.40		0.00		0.00		0.00
9	0.05	0.45		0.00		0.00		0.00
10	0.05	0.50		0.00		0.00		0.00
Total	100%	4.25	100%	4.05	100%	3.25	100%	3.00

Source: G.E.C., Inc.

Several features of the different container dwell time distributions in Table 2 should be noted:

- Shifts in outlier dwell times in which a small percentage of boxes remain in the yard for disproportionate lengths of time up to ten days have little effect on average dwell time and yard capacity.[8] Although ports can track lagging boxes, the lines may have average dwell time agreements that allow for averaging of certain discretions between extremely short and long dwell times for boxes. Alternatively, not all laggard boxes will belong to the same lines and customers, which makes maximum dwell time enforcement costly relative to the yard space gained.

- Backward shifts (reductions) in days for dwell times produce substantial results in terms of the capability for increased yard throughput, but would likely require effective use of extended gate hours and days of operation to be achievable. The absence of weekend gate operations is probably a substantial impediment to significant shifts (improvements) in dwell time.

- Substantial improvements in average yard dwell time can lead to significant increases in yard throughput capacity. In the example cited in Table 2, a backward shift (reduction) in dwell time distribution by one day can lead to about a 30 percent increase in yard throughput, other things being equal. Most yard capacity models assume average dwell times. Reductions in average dwell time can result in vastly

[8] Accelerated shifts in dwell times wherein a small proportion of boxes leave the yard earlier during extended gate operations would have a similar minimal impact on weighted average dwell time and terminal throughput.

improved marine terminal throughput, but would likely require other institutional changes such as extended gate hours and days of operation.

Chassis Supply

The U.S. is reportedly the only major containerized shipping nation in which steamship lines provide chassis for highway movements of their containers by third-party trucks. The container chassis belong to particular steamship lines or are shared by them in a common user pool. The steamship lines are responsible for the provision of chassis that are suitable for public roads, including such things as safety features. The chassis issues are legion with respect to container port productivity and throughput and can be summarized as follows:

- Chassis take up yard space that could otherwise be used for containers. Some ports have stacked the chassis, but there are issues related to damage, particularly lighting systems that require repair before use by union labor.

- Truckers require port time and capacity at the gates and in the yard when picking up or dropping chassis in the marine terminal. There are also gate times for equipment inspection and, when necessary, repairs for road suitability (particularly lights).

- Lines sometimes have their own separate pools of chassis, effectively increasing the total number of chassis units at the marine terminal compared to a common user pool. Issues similar to off-site stowage of empty containers also apply to chassis. Chassis management pools can to some extent provide for better utilization of the equipment inventory with less equipment, but not all lines want to relegate control of their means of customer delivery of containers to third parties.

Steamship lines have long argued that the "chassis problem" can be solved by adopting the worldwide practice (other than U.S.) of requiring the trucker to provide the chassis for movements of marine containers. This would remove chassis storage, pickup, and dropoff from the marine terminals, creating more space in the yard and less gate traffic. The trucker would be responsible for the safety status of the chassis and would be able to make any repairs off site before coming to the terminal for containers. In recent years, there have been some incremental changes in chassis supply and management, primarily through equipment pools. However, this does not address the fact that unlike the rest of the developed world, U.S. marine container terminals are also chassis depots.

CRITICAL FACTORS AFFECTING EXPANSIONS AND NEW CAPACITY FOR MARINE CONTAINER TERMINALS

The generally perceived critical institutional factors affecting expansion of existing marine container terminals and development of new terminals are land, landside accesses (highway and rail), public/private participation and funding, and community acceptance. Other institutional factors may exist at particular sites, but these were not incorporated into the level of analysis for reasons outlined in the introductory section of this report.

Land

There is no apparent shortage of developable land for potential marine container terminal port sites. Rather, there are land utilization issues in conjunction with landside traffic flows and affected environmental resources. Evidence with respect to sites is limited to secondary materials other than in the case of the Georgia Ports Authority (GPA). Norfolk, for example, has noted that several sites were evaluated for marine terminal construction, including: (1) 400 acres along the Chesapeake Bay and Back River in Mapton, Virginia; (2) Crab Neck in York County – the site is located south of Goodwin Islands along Chesapeake Bay, Virginia; (3) Glouchester Point along the York River in Gloucester, Virginia; (4) sites along the James River in Newport News and Isle of Wright County, Virginia; and (5) sites along the Elizabeth River in Norfolk and Portsmouth, Virginia.[9]

Other ports have numerous potential sites, but it is conjectural to speculate on whether these could be developed without more specific information. These sites include alternatives to the proposed Charleston Navy Container Terminal at Charleston Harbor (Upper Cooper River), including Daniel Island and Drum Island; Savannah River sites potentially developable by GPA to augment capacity at a fully built out Garden City Terminal as well as Jasper County, South Carolina; and Jacksonville Harbor. In terms of developable sites, 200 acres appears to be the threshold for a large container terminal footprint. It is unlikely that smaller sites would be developed other than as additions to existing footprints.

Marine Terminal Landside Access

Marine container terminals are intermodal hubs where cargo is transferred between waterborne and surface modes. Marine container terminals do not originate or terminate cargo other than as a point of cargo accumulation and transfer. Consequently, all cargo transits the terminal. As a result, efficient landside connections with major highway and rail networks are deemed as important to facilitate the movement of containers.

Although considerable emphasis seems to be placed on rail access to marine container terminals, the common practice for U.S. East Coast ports (ECUS) is to rely predominantly on truck for movements of loaded containers up to distances of 500 miles (one-day truck trip). For most ECUS container ports, truck movements between gates and shippers/receivers account for about 80 percent or more of total container volumes.[10] Rail is usually for longer distance movements (exceeding 500 miles) and often for boxes characterized by overweight cargo (for highway movement), low value cargo, or repositioning of empty containers.

Although rail access is desirable for marine container terminals from a planning perspective, there is debate over whether access by two railroads is preferable to one railroad.

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[9] Draft Environmental Impact Statement for the Craney Island Eastward Expansion Norfolk Harbor and Channels, Hampton Roads, Virginia.

[10] Some of the more intensive rail intermodal ports such as Hampton Roads have assumed 25 percent rail usage. Rail intermodal average total marketshare of all marine containers handled is probably less than 10 percent for Jacksonville and less than 15 percent for Savannah and Charleston.

Two-railroad access is usually regarded as more effective for competition among the railroads from the perspective of ports. However, because the steamship lines typically directly negotiate the rail rates on behalf of their customers and do so with the same railroads calling different ports, there is considerable monopsony power.[11] Moreover, there may be advantages of single rail services to particular ports characterized by larger volumes and associated economies of scale and service frequency.

There is also debate from the steamship line perspective about what constitutes effective access by two railroads at ports and marine terminals, particularly when one railroad has near-dock location inside or adjacent to the terminal and one railroad is off-dock and requires public road access.[12] Off-dock railroad intermodal locations will encounter restricted marine terminal gate hours and potential gate queues and will also need to use highway tractors and licensed chassis as opposed to yard equipment for near-dock moves. On-dock or near-dock rail intermodal can avoid the public gate access restrictions and use cheaper container yard equipment to move containers, which is not subject to public road standards.

If two railroads are to serve the marine terminal, they will normally require separate independent access and terminals unless there is some trackage sharing among them or between a third party owner/operator of the port intermodal facility and access. These issues characterized the Intermodal Container Transfer Facility (ICTF) opened by GPA in 2001. Norfolk Southern (NS) had direct rail access to the GPA ICTF terminal, but CSX did not. NS and CSX were unable to reach an agreement to allow CSX direct access to the ITCF via NS. Consequently, CSX is unable to use the ICTF until GPA builds a separate access for CSX to reach the facility.

Similar rail intermodal issues characterize Blount Island at Jacksonville, which is served directly by CSX. Containers to be shipped by NS have to be drayed about 20 miles over public roads to the west side of Jacksonville to the NS intermodal facility located there. For all practical purposes, on-dock rail or near-dock rail intermodal facilities that are served equally by two major railroads such as NS and CSX are quite rare other than for new special-purpose built for joint use or shared use facilities such as the eventual completion of the ICTF at GPA. Most of the older ECUS marine container terminals do not have on-dock or near-dock rail access. When it exists, it is captive to one railroad and may be an operating extension of a larger general purpose public intermodal facility in the urban area.

There are marine container terminals that lack near-dock rail intermodal service, such as the Wando Welch facility at Charleston Harbor and the proposed Charleston Navy Container Terminal. The Jasper County potential site currently has no active rail connection. Similarly, the proposed/developing North Carolina Intermodal Port (NCIP) currently lacks rail access, and

[11] In economics, monopsony is a market form of imperfect comptition in which only one buyer, called a monopsonist, faces many sellers (compared to a monopoly in which there is only one seller facing many buyers). The market power of the steamship lines to whipsaw competing railroads at the same port or competing ports is legendary in an effort to obtain the lowest intermodal rates through "discounts" and volume incentive agreements not otherwise available to other buyers of similar services.

[12] Even a relatively short distance off-port drayage to a rail intermodal facility would likely add $75 to $100 more to the rail portion of the movement compared to an on-port rail intermodal terminal.

the nearest rail access is a U.S. government military installation that serves the Sunny Point munitions depot.

All of the ports and terminals in the scope of the RPA as previously indicated are heavily reliant on truck for movement of containers to customers or off-dock public rail intermodal terminals. Consequently, highway access and road connections are of critical importance to existing and developing marine container terminals. For example, the Craney Island marine container truck estimates expressed in average daily truck trips to and from the terminal and total trips rise from 858 and 1,502 per day, respectively, for 300,000 TEU annual throughput in 2017 to 1,697 and 2,341, respectively, for 600,000 TEU annual throughput, then to 2,089 and 2,833, respectively, for 782,500 TEU annual throughput, and continue to 5,964 and 7,608, respectively, for 2,500,000 TEU annual throughput in 2032.[13] Truck trips would decline after 2032 associated with an increased rail intermodal share of 2,500,000 annual TEUs.[14] Similar analyses for other ports and terminals, although with lower rail intermodal shares, would likewise reveal the large increase in truck traffic that is concentrated at the marine terminal public road accesses normally for limited periods of the day and days consistent with limited gate operations.

The primary measure of marine terminal highway access is the proximity to a four-lane limited access highway, normally part of the Interstate network. Otherwise, four-lane connectors exist or can be constructed, such as those proposed to Craney Island and the Charleston Navy Container Terminal. There is obvious specificity of local issues about marine terminal truck access with respect to proximity to four-lane highways and designated local truck roads. It should be noted that although the volume of marine container terminal truck traffic is substantial in terms of vehicles using the gates, once outside the gates on the local highway network the typical dispersion of routings adds very little traffic to the existing community base load of average annual daily traffic (AADT), except possibly for peak times of the day when most urban systems are typically congested. Therefore, most marine terminal truck access issues are "near gate" in nature, reflecting the general lack of immediate access to a four-lane highway of Interstate standards for the older ECUS marine container terminals. To the extent that local truck routes use public streets and share traffic with locals, there will be marine truck terminal issues, particularly near the terminals as the routes converge for the gates.

Financing

Most container ports in the U.S., particularly ECUS, were initiated on or near former general cargo multipurpose terminal sites that were owned by public agencies. Some of the public agencies have evolved from city or local ownership to a wider basis of public control (for example, consolidation of the locally owned terminals at Hampton Roads under the Virginia Port Authority). There is no prevailing model for public ownership of ports. For the South Atlantic, including Norfolk, there are four state agencies -- Virginia Port Authority (VPA), North Carolina State Ports Authority (NCSPA), South Carolina State Ports Authority (SCSPA), and Georgia

[13] Draft Environmental Impact Statement for the Craney Island Eastward Expansion Norfolk Harbor and Channels Hampton Roads, Virginia.

[14] The truck trip projections assume that approximately 63 percent of the container freight handled by the Craney Island Terminal would be transported by truck at the initiation of Phase I in 2017, declining to 40 percent by a projected full buildout in 2050.

Ports Authority (GPA) -- and one local authority, Jacksonville Port Authority (JPA). The port authorities operate a variety of marine terminals other than container facilities, but in recent years the focus of growth has generally been development of container facilities.

Until recently, container ports have been entirely publicly owned and financed. The major differences among the financing and ownership patterns is the control of daily cargo handling operations of the facility and related facility use payments to the public agency. Two basic public/private ownership and operating arrangements exist, with multiple variations for marine terminals. There is the standard public agency ownership and lease of all facilities to private sector steamship lines and/or terminal operators or public agency ownership and cargo operations with assistance from the private sector such as stevedores. The traditional model is the landlord port, wherein the public agency receives a fixed rental payment for the provision of the facility but does not engage in operations and associated expenses. The public agencies that own and also operate the ports on a daily basis are less prolific. However, in the South Atlantic, including Norfolk, two of the largest ports are terminal operators at their facilities -- GPA and Virginia International Terminals subsidiary of VPA.[15] The NCSPA is also the terminal operator of the Port of Wilmington, including the container terminal. The SCSPA is a landlord port, leasing its facilities to steamship lines and terminal operators. Similarly, JPA is a landlord port, although at one time it also had a small operation component that has been discontinued to make it entirely a landlord port.

There are various schools of thought about the advantages and disadvantages of public port authorities engaging in terminal operations. A landlord (non-operating) port has been regarded as doing what the public sector does best in providing the infrastructure and public (political) support for port financing and capital expenditures for economic development. The port operations are commonly regarded as left to commercial enterprises such as steamship lines and terminal operators that specialize in cargo movement and have a commercial enterprise for-profit orientation. Conversely, there is a distinct minority of public ports that are also terminal operators. Rather than lease the port infrastructure to third party terminal operators and/or steamship lines, the port authority will have a commercial operations element that performs this service. One argument in favor of the public operating port is that the agency has more control over the efficient use of the infrastructure through one owning and operating entity and as a result is better able to assess the short-term and long-term facility maintenance and capital needs. It is also contended that public operations will seek to maximize use of the facility rather than profit, which will provide greater spillover secondary benefits to the taxpayers subsidizing the facility.

The conventional historical model for public ports has been the landlord setup, wherein the public agency provides the marine infrastructure and leaves the commercial operations of the facility to a private sector for-profit enterprise. The model has worked well when ports are regarded as major avenues for economic development. State investment in the ports is viewed as a precursor to attracting industry and jobs. In recent years, there have been some challenges to the economic development paradigm, which has required substantial public investment to

[15] The Virginia International Terminals is the operating subsidiary of a public entity, VPA. VIT is authorized to enter into collective bargaining contracts.

develop increased capacity and is critically viewed by some as subsidizing the steamship lines because most public ports do not recover the cost of capital.

The major emerging port development issue is control of the terminal operations. Increasingly, steamship lines want to run their own terminals with respect to berth operations and cargo storage in the yard. A landlord operation has favored this form of control, where the steamship line will have leased terminal space, perhaps preferential berthing and possibly their own gates. The steamship line in turn may act as a terminal operator and allow other lines to use its space, for which it provides terminal services.

There are widely held views about the nature of the terminal operator and its relationship to vessel operators. A non-integrated terminal operator is regarded as more proprietary with respect to the commercial accounts of the different lines that it handles. Conversely, a steamship line that is integrated as a terminal operator is viewed more of a potential competitor that handles the accounts of other lines and is able to learn their commercial relationships.

Until recently, there was no alternative model to the landlord or public port terminal operator concept for container ports. The Maersk SeaLand marine terminal that is under development at Hampton Roads will be the first completely privately owned and financed marine container terminal in the U.S. Terminal operators have traditionally not looked with favor on making large capital investments in marine terminal infrastructure unless reimbursed by the lease operating agreement with the landlord port authority. The operators regard themselves as effectively competing with other publicly owned marine facilities that usually only cover operating costs and do not directly earn sufficient profit to provide a return of marine terminal capital investment (although the public ports would strongly argue that the port-induced economic development impacts, including such things as taxes, would represent indirect capital recovery of the public investments, or that the state investments have been such things as grants or forgiven loans).

The Maersk facility appears to be a notable exception to the prevailing paradigm that the public provides the infrastructure and the operator manages the commercial sector under a leasehold arrangement. The Maersk terminal at Hampton Roads would normally be regarded as a competitor to VPA's three other container terminals, except that the public agency's existing facilities are projected to run out of capacity (other than the Hampton Roads cargo that Maersk SeaLand will shift to its new facility) and need to be augmented by the proposed Craney Island facility (VPA owned and operated), which will probably not begin operations until about 2017.

The Maersk facility at Hampton Roads has broken new ground for a likely paradigm shift in the private sector provision of marine container terminal infrastructure, away from public sector domination and toward more total private investment and control beyond long-term leases of landlord facilities. The large steamship lines are looking for substantially more terminal space (upwards to 200 acres) that they can completely control from a landlord port operations perspective. Terminal operating companies have consolidated into an international industry with very few large players that provide multiple port services for groups of lines around the globe. The large players, which are steamship lines with their own captive terminal operations subsidiaries and independent global terminal operators, are looking for new Greenfield container

port sites as partners with existing public ports or as developers with nominal public entity participation and control.

It is entirely possible that new public ports may emerge in conjunction with sites and developers (steamship lines and terminal operators) that would augment the regional port concept. In conjunction with the worldwide trend to port privatization (other than in the U.S. except as noted), there is an emerging shift to container port development in less developed markets such as U.S. Gulf Coast. Developers are looking less for large local markets and more for regional access by rail and highway. Examples are the proposed container port development in Mobile (rail) and several sites in Texas (highway). Overall, it is clear that there are no regional monopolies on port development, as witnessed by the shift away from the West Coast that has favored East Coast ports and prospective emerging developments in the Gulf Coast.

Community Acceptance

Public ports appear to have a life-cycle of community acceptance as a function of other developments in the local community. Where ports are part of an industrial network in an otherwise commercial development and related transportation infrastructure, there is a community fit. However, where the ports are viewed as encroaching on non-industrial development, land use conflicts can arise.

Port economic development impacts in terms of such things as employment and sales are often quite large when viewed from a regional perspective. However, local impacts other than economic are often viewed as quite large in terms of community and environmental impacts. Ports are often less regarded as the primary regional engine for economic development in developed regions (primarily urban areas) compared to rural areas where there are fewer non-maritime opportunities.

Consequently, it is not unusual to see competing land uses and economic development scenarios emerge with controversy over the extent to which local container ports contribute to the local economy while handling a large volume of non-local cargo. The community may regard the port impacts of local development to be significant; but there is also the attendant impacts of non-local cargo, which has little direct positive impact on the local community other than the marine terminal throughput. It may be argued that from a local development perspective economies of scale of terminal development and efficient use require a substantial proportion of non-local cargo that is a natural byproduct of the local cargo. For example, container lines choose local ports based on the mix of local and non-local cargo. While the local cargo has visible economic development impacts, the non-local cargo is part of the successful mix of the marine terminal throughput.

The container port cargo geographic mix and the views of the local communities of interest will vary among the ports. It appears that port development is likely to shift more to rural areas where the local impacts of cargo flows, particularly rail and truck, will be less obtrusive than compared to non-industrialized urban areas. Moreover, as some urban areas de-industrialize and redevelop through restoration efforts, port industrial conflicts for traditional urban locations are likely to arise. This is analogous to residential land use that subsequently develops around a

commercial airport, creating land use conflicts not envisioned by the airport developers originally located in an undeveloped Greenfield.

Appendix A

SAVANNAH DISTRICT LETTER TO PORTS

DEPARTMENT OF THE ARMY
SAVANNAH DISTRICT, CORPS OF ENGINEERS
P.O. BOX 889
SAVANNAH, GEORGIA 31402-0889

REPLY TO
ATTENTION OF:
Civil Programs and Project Management

Mr. Rick Ferrin
Executive Director
Jacksonville Port Authority
Post Office Box 3005
Jacksonville, Florida 32206-0005

Dear Mr. Rick Ferrin:

The Savannah District Corps of Engineers is studying the deepening of Savannah Harbor in relation to other South Atlantic Coast marine container ports. The study includes a Regional Port Assessment that will address the capability of all major South Atlantic ports to absorb projected long-term increases in marine container traffic with existing and new facilities. The Regional Port Assessment will address alternatives to expanding the Savannah Harbor from a capacity perspective. The assessment uses a systems approach to port capacity that is likely to be applied to other major port deepening studies.

The regional assessment will determine the future capacity of existing or prospective new major container load center ports on the South Atlantic Coast as well as potential offshore hub ports. The capacity analysis will reflect existing facilities largely through publicly available information that can only be verified through site visits. The site visits will also be used to address the potential for Greenfield terminal expansions along the coast.

The Savannah District has contracted with Gulf Engineers and Consultants, Inc. (GEC) to assess the economic feasibility of deepening Savannah Harbor. The Regional Port Assessment is a part of this contract. GEC, through its Project Manager Kevin Horn, has collected website information relating to your port's marine container capacities. The next step is for Mr. Horn to contact your port for a site visit that will confirm existing capacity elements (berths, cranes, yard space, highway and intermodal connections), as well as expansion capability in the near and long term, including possible Greenfield sites.

The Regional Port Assessment will provide a long-term outlook consistent with the Corps' 50-year economic life for harbor deepening studies. Of particular interest will be the capability of the South Atlantic ports to enlarge existing facilities or provide new container facilities during the coming 50 years.

Your cooperation in this effort will enable the Corps to gain a regional perspective on the viability of Savannah Harbor deepening in the context of the capacities of competitive ports and will contribute to the rational allocation of public funds.

The US Army Corps of Engineers, Savannah District, Project Manager is Alan Garrett, who can be reached at (912) 652-5172. Kevin Horn, the GEC Project Manager, can be reached at (540) 364-0369. Please contact them if you have any questions about the nature of the study. Mr. Horn will be contacting you after Labor Day to arrange for a visit. A copy of this letter will be furnished to Ron Baker, David Kaufman and Robert Peek.

Sincerely,

PETE ODDI, P.E., PMP
Deputy District Engineer for Programs
and Project Management

Appendix B

SAVANNAH DISTRICT COMMUNICATION TO OTHER DISTRICTS

ATTACHMENT

Q: What is the status of the Savannah Harbor Expansion Project?

A: In the Water Resources Development Act (WRDA) of 1999, Congress authorized the Savannah Harbor Expansion Project based on a feasibility report prepared by the Georgia Ports Authority (GPA) per Section 203 of WRDA 1986. The authorization to deepen the Federal navigation project to 48 feet was conditioned on completing several evaluations that had not been conducted in the Feasibility phase and made available to decision-makers. The Chief of Engineers placed additional conditions on the project, including preparation of a General Re-evaluation Report (GRR). Savannah District is now in the process of conducting the GRR which includes additional hydrodynamic modeling, economic forecasts and modeling as well as the formulation of an environmental mitigation plan.

Q: Why specifically, was additional interest placed on the economic analysis?

In March 2000, environmental groups filed a lawsuit in Federal District Court challenging the Chief of Engineers' decision to approve the feasibility report. The lawsuit alleged that several issues were not addressed in the feasibility report and Tier I EIS. Among these issues was consideration of the project on a regional basis, i.e., determination of the feasibility of the proposed project in comparison with developments at competing ports, the existing and future conditions at competing ports, the cumulative impacts of other proposed deepening projects, the impacts, if any, of the proposed Savannah Harbor Project on its competing ports, the impacts of future expansion at competing ports on Savannah, the amount of projected trade, at both Savannah and competing ports, and the potential for oversupply of deep draft facilities in the South Atlantic region. On March 1, 2001, however, the District Court issued a decision for the Government dismissing the suit. Based on the Government's representations in the case, the court held that the Government assured that the plaintiffs' concerns regarding the Savannah Harbor Expansion Project may be raised during the GRR and Tier II process. The Court stated:

> "Plaintiffs' concerns are not precluded from review in the Tier II process and after the issuance of the final ROD. The Corps, in light of the negative review of the GPA's initial EIS and this lawsuit, are under significant pressure to ensure that all environmental concerns regarding this Project are addressed. Nothing precludes the Corps from evaluating the issues raised by the Plaintiffs in this case and ultimately declining to issue a final ROD stating that the Project should not go forward. *Most importantly, this court is confident that Plaintiffs' concerns, if meritorious, will have the opportunity to be raised and considered.* "(Emphasis added).

Q: Why perform a Regional Port Analysis?

A: The Regional Port Assessment will address alternatives to expanding the Savannah Harbor from a capacity perspective. The assessment is using a systems approach to port capacity that is likely to be applied to other major port deepening studies. The regional assessment will determine the future capacity of existing or prospective new major container load center ports on the South Atlantic Coast as well as potential offshore hub ports. The capacity analysis will reflect existing facilities largely through publicly available information that can only be verified through site visits. The site visits will also be used to address the potential for Greenfield terminal expansions along the coast.

Q: Is this in accordance with Corps' Policy?

A: Yes. Engineer Regulation (ER) 1105-2-100 requires "a systematic determination of alternative routing possibilities, regional port analyses, and intermodal networks". The scope of work for this Regional Port Analysis has been reviewed and approved by economists at the South Atlantic Division, the Institute of Water Resources, Headquarters USACE, and the Corps' Deep-Draft Navigation Planning Center of Expertise.

Q: What other ports have encountered similar issues?

A: The Charleston, South Carolina Daniels Island Marine Container Terminal Study (DIMCT) prepared by the South Carolina Ports Authority (SPA) in support of an application for a Department of the Army permit evoked the following response from the Environmental Protection Agency (EPA):

EPA has warned, in connection with the DIMCT, that "the relationship of how this particular construction will affect other competing facilities along the Atlantic coast which are subsidized by the federal government should be discussed in a multi-port analysis." No such analysis is contained in the DEIS, nor has the Corps or any other agency undertaken such an analysis through the NEPA process.

That document also evoked the following comment from the Southern Environmental Law Center:

The DEIS states that the DIMCT is needed to make SPA's Charleston operations "competitive" in the race to win the business of larger containerships. This essential rationale, however, is also being invoked in support of subsidized deepenings across the nation. For example, the ports of Savannah, Georgia; Jacksonville, Florida; Wilmington, North Carolina; Norfolk, Virginia; Baltimore, Maryland; Wilmington, Delaware and Newark/New York all have undertaken or are planning subsidized channel expansion projects to facilitate deeper draft containerships and bolster their competitive positions.

The resultant "race to the bottom" – with individual ports deepening their channels and expanding facilities to compete with each other for a limited fleet of mega-containerships – will likely end in an oversupply of subsidized deep draft capacity. The missing referee

for this wasteful competition is the Corps of Engineers. As the Corps is aware, the sum of individual local port traffic forecasts is often far greater than could be reasonably expected for the U.S. as a whole. The Corps is also aware that subsidized competition among individual ports encourages over-investment, facility duplication, expensive overcapacity, and unnecessary environmental degradation.

Before any port-related deepening or expansion can occur in the waters of the United States, the U.S. Army Corps of Engineers must issue a permit or a favorable Report and Recommendation for the project. Despite this broad regulatory and policy power, the Corps has not examined through the NEPA process the extent to which various deepening projects in the United States, on the east coast, and within the South Atlantic region could result in port overcapacity. In this case, for instance, the DEIS does not examine the expansion projects planned or ongoing in the South Atlantic or evaluate their comparative merit in accommodating expected deep draft containership traffic. Nor has the Corps of Engineers otherwise undertaken such an assessment through the NEPA process.

Expansion or deepening of the federal shipping channels and containership terminals in multiple major rivers on the eastern seaboard will cause cumulative or synergistic impacts on the nation's environment, including its riverine, estuarine and marine ecosystems. The Savannah, Charleston, Wilmington, Jacksonville and Norfolk deepening projects will impact endangered shortnose sturgeon, destroy rare tidal freshwater marsh or other valuable wetlands, diminish estuarine wildlife values and disrupt coastal sand flows. Terminal operations will present cumulative transportation impacts on coastal cities and their surrounding environments. Each terminal will have marked increases in ship, truck and train traffic, with concomitant impacts on the Nation's air and water quality in major river and estuarine systems.

Neither the DEIS nor the NEPA documentation for these other projects assesses the cumulative or synergistic impacts of multiple containership-related deepening and terminal expansion projects on the natural resources of the nation, the eastern seaboard or the South Atlantic region. Yet NEPA requires that, when proposals for related actions that will have cumulative or synergistic environmental impacts upon a region are pending concurrently before an agency, their environmental consequences must be considered together. Only through a comprehensive consideration of pending proposals can the agency evaluate different courses of action. See 40 C.F.R. §§ 1502.4; 1508.18(b)(3), (4); and 1508.25(a).

The need for a programmatic analysis under NEPA is especially clear where, as here, projects are being justified in terms of one another, presenting the danger of improperly "piggybacking" several related projects by justifying each on the assumption that the others are to be constructed, only to discover later that the overall combination of the projects may do more harm than good. NEPA also requires a comprehensive analysis when the various agency actions, taken together, will have an effect on the environment that might be overlooked if examined separately.

The Corps of Engineers, in conjunction with other federal agencies including the Department of Transportation's Maritime Administration, is permitting, promoting, recommending and subsidizing port expansion projects across the nation and in the South Atlantic region to accommodate new containerships with a draft equal to or greater than 40 feet. The various containership port expansions are related in at least three ways. First, each project claims to be a response to a technological innovation, the advent of a class of containerships with design drafts equal to or in excess of 40 feet. Second, each project is claimed to be necessary to enable individual ports to compete with their rival ports in the race to lure U.S. containership traffic. Third, in the South Atlantic region the projects impact related and connected ecological resources.

A comprehensive analysis would likely reveal that the subsidized expansion of some port facilities is unnecessary, inadvisable or otherwise not in the national interest and thus not deserving of federal funding, support, recommendation or a federal permit. Because NEPA requires the Corps to undertake a comprehensive examination of the nation's containerport expansion projects prior to concluding that such projects are in the public interest, the EIS must include that comprehensive examination before the Corps can complete its duties under NEPA and comply with the Section 404(b)(1) Guidelines on alternatives analysis."

Q: What has the Corps' contractor been asked to do regarding the assessment of environmental effects of future expansions of other ports in the region?

A: The Contractor will be responsible for preparing a spreadsheet listing all the environmental issues which would be evaluated during ***ANY*** (emphasis added) planned port/Federal deep-draft navigation channel expansion. No new data will be collected by the Contractor as part of this effort. Rather the contractor will base his assessment from publicly available information (web sites and existing reports) and discussions with Federal agency employees, including appropriate Corps District planning and regulatory staff. The Contractor may contact the port authorities to confirm the data collected and what is reported via this contract. All data used will be properly referenced and documented as to when and where collected.

The Contractor will display this information in the above mentioned spreadsheet in the following manner:

'+'	Major issue or large impact expected
'0'	Minor issue, small impact expected, or of some concern
' '	Not an issue at the present time

The spreadsheet will also reflect the importance of the issue and the extent of the expected impact. The Contractor's report addressing the environmental analysis will be qualitative in nature and will include enough information that the government can make an assessment of the level of impacts that may be associated with future expansion at any of the ports evaluated as compared with the level of impacts that might be associated with development of a regional port(s).

Appendix C

MEMORANDUM CONCERNING SECONDARY INFORMATION SOUGHT

Memorandum January 6, 2006

TO: Kenneth Classman/Thomas A. Garrett
FROM: Kevin Horn
SUBJECT: Savannah Harbor Expansion Program Regional Port Analysis – kickoff

We have exchanged e-mails about personal kickoff meeting with the Corps Districts covering the ports for the Regional Port Analysis (RPA) (Norfolk, Wilmington, Charleston, Savannah and Jacksonville). The purpose of the kickoff meetings would be to establish the points of contact at the District offices for capacity and related expansion and environmental issue data related to the RPA. It is my understanding that we will rely exclusively on secondary (existing) information related to ports and marine terminals existing and projected capacity, other expansions, and environmental issues related to capacity expansions at South Atlantic ports/marine terminals. The focus of the RPA will be on marine container capacity and environmental issues related to increased volume and expansions to meet future demand. We will not be concerned with other cargo terminals other than they may be used in whole or part for marine containers.

Capacity of marine terminals in general and container terminals in particular is a somewhat nebulous concept. Any data that exists that pertains to capacity (cargo volume throughput) of the terminal or its constituent components (access gates, yard storage and cargo handling, and berths (lengths) etc. would be useful. We have collected descriptive data for the existing marine terminals from the respective port web sites and Port Series and such as yard size, berths, etc. and would seek to have this data checked by what current data that the districts may have (other than the Port Series which we already have used).

Here is the "capacity" (marine container terminal) information we would seek to check or collect from local Districts:

1. Container "capacity" throughput of existing facilities for an annual basis in TEUs
   1.1 Container yard size (acres), container stacking heights.
   1.2 Container berths and lengths
2. Currently planned "capacity" enhancements at existing and new sites/marine terminals
3. Future potential "capacity" at existing and new (Greenfield) sites/marine terminals from full build out.
4. Railroad intermodal access to existing, planned or potential marine terminals
   4.1 Rail on terminal
   4.2 Rail adjacent to terminal (but controlled access via local or private roads)
   4.3 Rail outside of terminal (access via public roads)

For the environmental issues related to capacity expansions we would seek baseline information from existing conditions from documents such as:

- Port Master Plans

- NEPA documents for any port expansion/deepening projects (most common documents for ports are Dredged Material Management Plans [DMMPs] and Environmental Assessments [EAs] or Environmental Impact Statements [EISs] done in conjunction with DMMPs)

- Biological Surveys (onshore or offshore) in the vicinity of the ports and/or proposed expansion areas

- Hazardous, Toxic, or Radioactive Waste (HTRW) Investigations in the vicinity of the ports and/or proposed expansion areas

- Wetlands Surveys in the vicinity of the ports and/or proposed expansion areas

- Sediment Sampling Reports in the vicinity of the ports and/or proposed expansion areas

- Cultural Resource Surveys (onshore or offshore) in the vicinity of the ports and/or proposed expansion areas

We need to meet with the District persons familiar with port/marine terminal conditions and environmental conditions. Naturally, the capacity will be our first priority then the baseline environmental conditions.