CAMBRIDGE SYSTEMATICS

Florida Waterway System Plan

draft final

report

prepared for

Florida Department of Transportation, Seaport Office

prepared by

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June 2008

www.camsys.com

draft

Florida Waterway System Plan

submitted to

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Date

June 2008

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Executive Summary

Background

The Florida Department of Transportation (FDOT), like its counterparts throughout the United States, is responsible for the development and implementation of a balanced, integrated, and multimodal transportation system. Important but often overlooked links in this system are the waterway corridors that serve the seaports in Florida as well as the coastal communities including private marine industries. Effective integration of the waterway system into the state's overall transportation system is critical because it will position the state to best compete for available transportation funds. It also offers alternatives to the increasingly congested rail and highway networks.

Waterborne commerce plays an important role in Florida. It ranked fifth in the nation for total waterborne tonnage moved, carrying over 128 million tons in 2006. Over 66 million of these tons were in foreign trade with the top five foreign trading partners being Brazil, Japan, Germany, Venezuela, and China (Mainland). In the same year, more than 61 million tons in domestic trade were transported with the top five domestic trading partners being Louisiana, Texas, Alabama, Mississippi, and Puerto Rico.[1]

This report focuses on Florida's 1,540 navigable miles of intracoastal and inland waterways, many that could potentially be used for commercial activity. This report does not include the approximately 825 miles of Florida's coastal shipping lanes. Florida's geographic location positions it well for waterborne movement with a coastline of 1,350 miles, the longest of the continental states outside of Alaska. Florida has 14 deepwater seaports, eleven of which have container operations. Florida is also the center of the growing cruise industry leading the world in domestic and international embarkments for multi-day cruises.

Purpose

This report provides an update to the trends and conditions of the waterway system in Florida. It focuses on the inventory and condition of the entire system providing an updated geographic representation of the waterway system as a part of Florida's Strategic Intermodal System. It also identifies the current condition of transportation activities and how this impacts the potential use of the waterway system. Opportunities and challenges

[1] U.S. Army Corps of Engineers. Institute for Water Resources. *2006 Waterborne Commerce of the United States.* http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcusnatl06.pdf

of the waterway system are identified with thought towards increasing the importance of waterway corridors within a multimodal transportation system.

Approach

This report reviewed existing studies documenting waterborne transportation, collected new data from available literature and interviews, studied current trends in waterborne transportation, identifies opportunities and challenges for waterborne transportation, and summarizes the findings and recommendations. Key findings address the driving forces impacting the success of Florida's waterways, including opportunities and challenges both physical and economic, and other factors. The summary of all the research led to recommendations for the effective management of Florida's waterways.

Report Overview

This report details the results of the waterway system plan update profiling Florida's waterway system, documenting current conditions for waterborne activity, and identifying opportunities and challenges for the waterway system.

Florida's Waterway System Profile

Florida's Waterway System Profile includes an inventory of Florida's intracoastal and inland waterways and provides recent and historical commercial activity and geographic data for the waterway network. This effort takes a holistic look at the waterway system summarizing statewide activities and then profiling the characteristics of each type of waterway. The waterways were categorized and organized into sections by type of waterway including the Atlantic Intracoastal Waterway [AIWW] (Section 2.1); the Gulf Intracoastal Waterway [GIWW] (Section 2.2); Harbors, Bay and Bayous (Section 2.3); Inlets and Passes (Section 2.4); Canals and Channels (Section 2.5); and Rivers and Creeks (Section 2.6).

Current Transportation Conditions for Waterborne Activity

This report considered the current conditions of waterborne transportation from an international, national, state, and regional perspective. International trends including foreign commerce, foreign commodities, the impacts of increased trade with trade Asia, and the integration of global economics through trade agreements are described in Section 3.1. Domestic trends including domestic commerce, domestic commodities, and the impacts of added security measures, the slowing economy, and domestic vessels are discussed in Section 3.2. Trends in Florida including Florida commerce, Florida's commodities, and the impact of Florida's Strategic Intermodal System are detailed in

Section 3.3. Finally, regional trends in waterborne transportation planning are described in Section 3.4.

Opportunities and Challenges for the Waterway System

This report considers opportunities for the waterway system in Florida identifying benefits to enhancing the current system. It also discusses the challenges of maintaining the waterway system, and it identifies policy issues that impact the advancement of waterway corridors as part of a multimodal approach to transportation planning.

Opportunities identified to enhance the waterborne transportation system include maximizing on the efficiency of waterborne transportation which impacts capacity, the environment, and safety; acknowledging the economic impacts of marine transportation related businesses; and exploring other economic impacts of waterway transportation. (Section 4.1) Challenges identified for waterborne transportation include maintaining navigable channels, dealing with environmental concerns, and addressing waterway congestion. (Section 4.2)

In addition to the opportunities and challenges listed above, two policy issues were identified – short sea shipping and the Jones Act – that should be addressed because of their potential impact on the advancement of waterway corridors as part of a multimodal approach to transportation planning. (Section 4.3)

Findings

The following presents a list of findings resulting from the analysis of Florida's intracoastal and inland waterway system:

- **Florida's intracoastal and inland waterway system is well established where it ranks fifth in the nation for total waterborne tonnage moved.** Florida's waterways carried over 128 million tons of cargo in 2006 which traveled the AIWW, the GIWW, 18 harbors, bay, and bayous; two canals; and eight rivers and creeks. The overwhelming majority of tonnage, about 90 percent, is moved through the harbors. The intracoastal and inland waterways move only a small percentage of the total tonnage moved in Florida due to the depth requirements that limit large ships, boats, and vessels from accessing the waterways.
- **Florida's intracoastal and inland waterways are not a reliable means of transporting goods.** The depth level of these waterways is not sufficient to carry the tonnage needed to make full use of these waterways. Most of the waterborne commerce is moved on large vessels and ships that require deep draft navigation, and an increase in water depth is unlikely to occur in the near future due to environmental constraints, funding, and dredging limitations. Despite this, the waterways should at a minimum be maintained at current levels as they do provide numerous economic and recreational opportunities to the local and regional economy.

- **Over the last five years, total waterborne commerce on intracoastal and inland waterways in Florida has fluctuated and overall is below the national average change for the same period.** Florida's total waterborne tonnage slowly increased through 2005 but decreased slightly in 2006. When compared to neighboring states as well as other states that utilize the AIWW, the GIWW, and inland waterways, Florida's percentage growth in tonnage over the last five years is among the lowest. To secure Florida's position in waterborne commerce, more attention should be focused on controlling factors such as necessary infrastructure and facility improvements as global trade is expected to grow substantially presenting further opportunities for Florida's waterways.
- **Most of Florida's metropolitan areas are dependent upon trucks for the movement of the majority of freight, despite the numerous rivers, lakes, and water bodies found throughout the state.** Marine transportation is an essential, but often overlooked component in the transportation system. Florida has to overcome this perception with appropriate planning and management to improve and develop the waterways.
- **Opportunities exist for Florida to take advantage of enhancing waterborne transportation**. Some key opportunities for Florida to realize are the efficiency of waterborne transportation, the economic impacts of marine transportation related businesses in regional and local communities and in turn Florida, and the possible growth of domestic cruising.
- **Studies by the Florida Inland Navigation District (FIND) conclude that the AIWW provides regional economic benefits to its surrounding counties**. Analyses conducted by FIND found that maintaining navigation and keeping the waterways at their design depth allows for the waterway related businesses to contribute more to the local economy. There is additional spending by businesses and persons that utilize the waterway which generates more money for the local economy. This money increases the annual sales of the area, creates more jobs, and adds more personal income to the local economy.
- **The intracoastal and inland waterways are a source of economic development, vitality and growth for the counties and areas that they serve.** These waterways contribute socioeconomic benefits that are measured in value by business activity, personal income, employment, recreational opportunities, environmental appreciation, and many other aspects important to the counties and areas that these inland waterways serve. A major challenge will be how to appropriately monetize these socioeconomic benefits of intracoastal and inland waterways to secure funding for improvements and maintenance.
- **There are several challenges that Florida must address to adequately handle the projected demand on waterborne commerce and passenger movement.** Florida must work toward maintaining navigable channels, mitigating environmental concerns, and alleviating potential waterway congestion.
- **Geographical constraints, funding and environmental issues are major problems for intracoastal and inland waterways.** Capacity and the physical structure of Florida's waterways greatly impact access and multi-modal transport options to

expand waterborne commerce. Most of these waterways carry low tonnage that does not qualify them for the SIS designation, and they receive little funding to improve and maintain their physical infrastructure.

- **Short Sea Shipping, operated on a statewide-level, is one approach to reduce land side congestion**. Short sea shipping, as described on page 4-22, is looked at as a viable mode of domestic trade travel that can help reduce road congestion and save fuel. Short sea shipping is not uncommon to Florida. There are currently some short ship shipping operations in place that distribute fuel, and some feeder ships that move between the larger ports to the smaller ports and intracoastal and inland terminals. Currently, there is no statewide effort to advance the use of this transportation option.

Recommendations

The following recommendations should be considered in the effective management of Florida's waterway corridors. The FDOT Seaport Office should:

- **Provide leadership and regularly update the plan.** The FDOT Seaport Office should continue to be the lead office for monitoring waterway corridors in Florida and should prepare an update of the waterway system plan on a two year cycle. This will help FDOT better integrate the waterway system in the state's overall transportation system.
- **Maintain a database of Florida's intracoastal and inland waterway system.** To maintain and manage Florida's waterways, an extensive record of all Florida's commercial and recreational waterways should be compiled in a database. Tonnage should not be the only factor that determines a waterway's significance, more focus should be on the regional impact that a waterway brings.
- **Reevaluate waterway corridors in the SIS Comprehensive Update.** The criteria for waterway corridors as part of the SIS should be revisited in the upcoming SIS Comprehensive Update. The AIWW and the GIWW currently do not carry a significant portion of Florida's waterborne tonnage. However, the intracoastal as well as inland waterways provide numerous economic and recreational opportunities to the local and regional economy.
- **Coordinate with seaport planning activities.** Most of Florida's waterborne tonnage is carried through its harbors. More attention should be focused on enhancing and improving the problems that the ports are currently facing with waterway congestion. There should be coordination with Seaport Master Plans, Intracoastal Plans, and the local Comprehensive Plans in planning waterway corridor improvements. This will be further defined in the Seaport System Plan which is currently under development.
- **Partner with local waterway sponsors.** FDOT should partner with local sponsors of the waterway systems in Florida to keep an open dialogue of the issues concerning waterways. Taking an active role in waterway corridors will keep the FDOT abreast of current conditions and better able to address issues as they relate to the overall

transportation system. Statutorily created partners include the Florida Inland Navigation District and the West Coast Inland Navigation District.

- **Quantify the economic impact of the waterway system.** FDOT should further quantify the economic impacts of the intracoastal and inland waterway system. Based on current research, it would be valuable, at a minimum, to maintain the waterways at the current level and where feasible increase the waterways to the design water depth for the potential added economic profit to the local and regional economy. Additional research is recommended to investigate a more in-depth understanding of the recreational benefits of Florida's waterways for economic purposes and to gain a more accurate assessment of Florida's natural resources.
- **Study impacts of using waterway corridors to relieve land side congestion**. It is recommended that FDOT pursue further study into the relief waterway corridors could potentially provide to the increasing land side congestion and gridlock. Other states and Europe have found success in using waterway corridors to relieve highway and rail congestion.
- **Evaluate the feasibility of domestic cruising.** Further study is recommended to understand the economic impact domestic cruising might have and how the maintenance of the waterway system could assist in pursuing this economic engine in Florida.
- **Understand the environmental impacts of waterway enhancements.** FDOT should further explore and fully understand the environmental impacts of waterway enhancements. Understanding the issues and engaging environmental partners with open communication could potentially further the goals of both parties.
- **Evaluate the potential impacts of Short Sea Shipping.** Implementation of short sea shipping should be further studied to evaluate the possible benefits to Florida and its transportation system. Jones Act laws, as described on page 4-26, should be studied for their implications on short sea shipping and other domestic movements. Despite the many challenges, Florida could potentially benefit from implementing a short sea shipping program throughout the state and to nearby states, Mexico, and its Latin America trading countries.

1.0 Introduction

1.1 Background

The Florida Department of Transportation (FDOT), like its counterparts throughout the United States, is responsible for the development and implementation of a balanced, integrated, and multimodal transportation system. Important but often overlooked links in this system are the waterway corridors that serve the seaports in Florida as well as the coastal communities including private marine industries. Effective integration of the waterway system into the state's overall transportation system is critical because it will position the state to best compete for available transportation funds. It also offers alternatives to the increasingly congested rail and highway networks.

Waterborne commerce plays an important role in Florida. It ranked fifth in the nation for total waterborne tonnage moved, carrying over 128 million tons in 2006. Over 66 million of these tons were in foreign trade with the top five foreign trading partners being Brazil, Japan, Germany, Venezuela, and China (Mainland). In the same year, more than 61 million tons in domestic trade were transported with the top five domestic trading partners being Louisiana, Texas, Alabama, Mississippi, and Puerto Rico.[2]

Florida's geographic location positions it well for waterborne movement with a coastline of 1,350 miles, the longest of the continental states outside of Alaska. In addition, Florida has 1,540 navigable miles of intracoastal and inland waterways, many that could potentially be used for commercial activity. This report does not include the approximately 825 miles of Florida's coastal shipping lanes. Florida has 14 deepwater seaports eleven of which have container operations. Florida is also the center of the growing cruise industry leading the world in domestic and international embarkments for multi-day cruises.

In 2003, the first Florida Intracoastal and Inland Waterway Study was conducted. This study documented the importance of the navigable waterways and the intracoastal system to the state's commercial activities. It also inventoried the operators and commodities that were currently using the system, identified primary commodities transported by the system, highlighted existing major impediments that restricted commercial use of the state's intracoastal and navigable waterways, documented key waterside connection points of the shallow draft network with the land side transportation system, and mapped the key features of Florida's intracoastal and inland waterway system.

[2] U.S. Army Corps of Engineers. Institute for Water Resources. *2006 Waterborne Commerce of the United States.* http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcusnatl06.pdf

This report provides an update to the trends and conditions of the waterway system in Florida. It focuses on the inventory and condition of the entire system providing an updated geographic representation of the waterway system as a part of Florida's Strategic Intermodal System. It also identifies the current condition of transportation activities and how this impacts the potential use of the waterway system. Opportunities and challenges of the waterway system are identified with thought towards increasing the importance of waterway corridors within a multimodal transportation system.

1.2 Research Objectives

This update of Florida's Intracoastal and Inland Waterway System Plan is designed to assist the FDOT Seaport Office in the effective management and investment in Florida's waterways. Key objectives of this plan include:

- Collect, review, and summarize all available data sources and policies;
- Organize collected data to develop and enhance waterway specific geographic representation of the intracoastal and inland waterway system;
- Review the prior waterway plan, the data developed through the Strategic Intermodal System and other regional programs and incorporate the material into an updated waterway system profile;
- Summarize driving factors impacting the success of Florida's waterways including key opportunities and challenges; and
- Summarize data collection and analysis and develop recommendations to drive future waterway system development and improvements.

1.3 Approach

In order to accomplish the objectives of this study, the following tasks were completed:

- **Task 1. Collect and Review Available Waterway Data**. This task provided a review of available literature on Florida's intracoastal and inland waterway system. This review identified where additional information was needed and set the understanding of existing policies and data.
- **Task 2. Review Waterway System Data to Develop and/or Enhance Waterway Specific GIS**. This task focused on the collection of geographic and attribute data available for Florida's waterways. This included reviewing Geographic Information Systems (GIS) data as well as a limited number of stakeholder interviews to determine current conditions of the waterway system.

- **Task 3. Develop Updated Waterway System Profile**. This task, through the collection and assessment of data from Task 2, developed an updated waterway system profile. This included identifying all intracoastal and inland waterways that moved tonnage in the last five years according to the U.S. Army Corps of Engineers.

- **Task 4. Identify Opportunities and Challenges for the Waterway System**. This task identified the opportunities and challenges both physical and economic that exist for the waterway system. This included reviewing policy issues that have implications on the advancement of the waterway system in Florida.

- **Task 5. Summarize Key Findings and Develop Recommendations for System Improvements**. This task summarized the work completed in Tasks 1 through 4, highlighting key findings and recommendations.

1.4 Organization

This report documents the results of all tasks of the waterway system plan update and is organized as follows:

- **Chapter 2, Florida's Waterway System Profile**. This chapter takes inventory of Florida's waterway system, providing recent and historical commercial activity and geographic data for the waterway network. It starts with a holistic look at the waterway system summarizing statewide activities and then discusses each type of waterway, profiling its characteristics.

- **Chapter 3, Current Transportation Conditions for Waterborne Activity**. This chapter presents at the current conditions of waterborne transportation from an international, national, state, and regional perspective.

- **Chapter 4, Opportunities and Challenges for the Waterway System**. This chapter focuses on opportunities for the waterway system in Florida identifying benefits to enhancing the current system. It also discusses the challenges of maintaining the waterway system, and it identifies policy issues that impact the advancement of waterway corridors as part of a multimodal approach to transportation planning.

- **Chapter 5, Findings and Recommendations**. This chapter summarizes the key findings from the data collection during the inventory, mapping enhancements, and waterway profile; provides findings of ongoing waterway system improvements; and provides recommendations to support FDOT in the effective management of the waterway system.

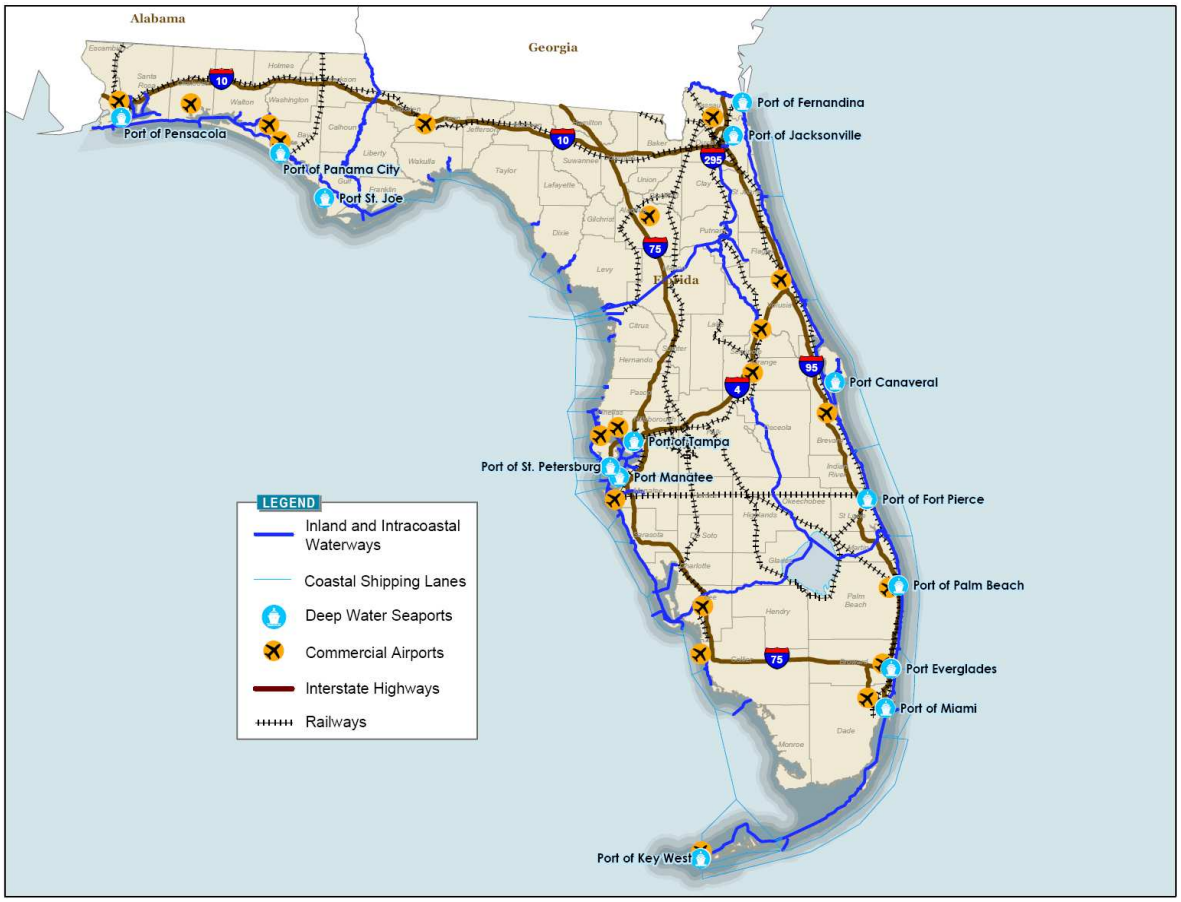
- **Appendix A, Websites Visited.**
- **Appendix B, Stakeholder Interview List and Interview Guide.**
- **Appendix C, Strategic Intermodal System Maps for Waterways and Seaports.**
- **Appendix D, Glossary/List of Acronyms**

2.0 Florida's Waterway System Profile

This chapter takes inventory of Florida's waterway system providing recent and historical commercial activity and geographic data for the waterway network. It starts with a holistic look at the waterway system summarizing statewide activities and then profiles the characteristics of each type of waterway. Figure 2.1 displays Florida's navigable intracoastal and inland waterways. The waterways were categorized and organized into the following sections:

- Section 2.1 Atlantic Intracoastal Waterway
- Section 2.2 Gulf Intracoastal Waterway
- Section 2.3 Harbors, Bay, and Bayous
- Section 2.4 Inlets and Passes
- Section 2.5 Canals and Channels
- Section 2.6 Rivers and Creeks

Figure 2.1 Florida's Intracoastal and Inland Waterways



Statewide Activity

Florida's water transportation activities are served by 14 deepwater seaports and several harbors, canals, channels, and rivers. The U.S. Army Corps of Engineers (USACE) monitors and maintains the majority of Florida's navigable harbors, intracoastal, and inland waterways. For the purposes of this study the tonnage data for 2006 reported by the USACE was used to determine commercially significant waterways. It should be noted that the USACE monitors other waterways that did not have tonnage activity in 2006. However, many of these other waterways did provide recreational opportunities in their region.

Commercial

The USACE defines a waterway to be commercial when it carries any amount of freight for commerce. Generally, the USACE gives harbor and inland waterway projects that have high commercial use greater priority for operational and maintenance financial resources than those waterways that have low commercial use. It is the practice of the USACE to "de-emphasize" low commercial use waterways so that scarce financial resources can be available for navigation of waterways with higher commercial use. In Florida, the waterway segments that carry high commercial traffic are the harbors, bays, and bayous; they carried over 92 percent of total waterborne tonnage in 2006. It should be noted that Florida's waterways generate economic revenue from other commercial activities including fishing fleets, recreational boating, dive tours, and other water related excursions. For the purposes of this report, these types of activities will be considered even though data are not readily quantifiable.

Recreational

Florida is known for the aesthetic beauty, fun, and relaxation that its many recreational waterways provide. A recreational waterway can be utilized for a variety of purposes such as boating, swimming, fishing, and natural appreciation. Waterways that are only used for recreational purposes usually have some form of state or local protection to preserve the water quality of the water body. These waterways are generally not dredged through projects sponsored by the USACE. However, organizations such as the Florida Inland Navigation District aid local communities in obtaining funding for small dredging projects that help keep recreational waterways and inlets passable.

Due to the recreational opportunities that these waterways provide, the local area receives economic benefits from tourists and local residents that are attracted to the area. These benefits come from businesses that are dependent on the waterway (terminals, marinas, and marine related businesses) and the revenue from the increased purchases of goods and services by those that utilize the waterway. Overall economic benefits of recreational waterways to their community were considered in Chapter 4 of this report.

The commercial waterways that will be profiled in this report are listed in Table 2.1, with the reported tonnage for the period 2002-2006.

Table 2.1 Florida's Commercial Waterway Tonnage 2002-2006, (000 Short Tons)

Waterway	2002	2003	2004	2005	2006
Apalachicola, Chattahoochee, Flint River System	18	36	8	6	-
AIWW, Fernandina to Jacksonville	353	290	310	292	233
AIWW, Jacksonville to Miami	565	933	722	641	234
AIWW, Miami to Key West	393	635	619	611	276
Bayou Chico	180	199	234	669	483
Canaveral Barge Canal	*	*	*	*	*
Canaveral Harbor	3,981	4,752	4,630	4,944	4,072
Charlotte Harbor	10	-	164	277	22
Cross Florida Barge Canal	38	135	144	114	-
Escambia River	2,331	3,229	3,007	2,861	3,426
Fernandina Harbor	315	578	578	618	567
Fort Pierce Harbor	45	56	106	108	130
Gulf County Canal	-	273	576	100	-
GIWW, Apalachee Bay to Panama City	1,831	2,014	1,889	1,313	995
GIWW, Caloosahatchee River to Anclote River	69	13	6	2	2
GIWW, Panama City to Pensacola Bay	3,477	3,936	4,318	3,704	3,635
GIWW, Pensacola Bay to Mobile, AL	7,474	8,511	8,289	7,523	7,873
Jacksonville Harbor	17,906	21,731	21,454	21,777	22,210
Key West Harbor	69	72	24	6	9
LaGrange Bayou	412	315	475	217	553
Miami Harbor	8,421	8,638	9,098	8,559	7,573
Miami River	506	527	657	489	557
New River	**	**	**	**	**
Okeechobee Waterway	36	12	0	2	2
Palm Beach Harbor	4,022	4,363	4,147	3,965	2,765
Panama City Harbor	2,427	2,576	2,701	3,105	3,550
Pensacola Harbor	1,243	1,276	696	616	849
Port Everglades Harbor	21,280	23,040	24,900	24,684	24,824
Port Manatee	4,233	4,861	4,428	4,470	4,119
Rice Creek	131	125	116	121	111
St. Johns River	264	222	171	186	121
St. Marks River	364	462	260	205	145
St. Petersburg Harbor	28	18	128	18	19
Tampa Harbor	48,385	48,282	48,289	49,174	46,231
Watson Bayou	51	46	51	48	14
Weedon Island	1,354	1,403	1,000	740	807
Florida Total	**122,516**	**131,570**	**132,913**	**133,281**	**128,737**

Source: Waterborne Commerce Statistics Center

** Tonnage reported as part of Canaveral Harbor data collection*

*** Tonnage reported as part of the Port Everglades data collection.*

Geographical Characteristics

Water depth is an important tool in assessing the potential economic impact of a waterway. The depth of a waterway can limit or enhance the type of ship that can use it. According to the USACE, most inland waterways can handle barges at 8 feet. At that level, tugboats can handle from 1 to 4 barges on the inland waterways. A ship canal generally carrying large container ships, cruise liners, and/or barges has a designated minimum of 16.4 feet. Table 2.2 details the various types of commercial ships and the minimum depth requirements that those ships can operate in.

Table 2.2 Ship Type and Minimum Depth Requirements

Vessels	Depth, ft
Recreational vessels, shallow draft barges, tugs, and seaplanes	6 to 12
Cruise and general cargo ships	35
Container ships	40
Note: These depths are based on MLW statistics	

Source: *USACE*

Within Florida, most commerce is moved on large vessels and ships that require deep draft navigation. By USACE standards at the national level, if the depth of the waterway corridor is less than or equal to 12 feet it is considered a shallow draft corridor which typically carries only domestic freight traffic. If the depth of the waterway corridor is greater than 12 feet then it is identified as a deep draft corridor which moves both domestic and international freight.

According to the USACE, Florida's waterborne domestic trade totaled nearly 40 percent in 2006. By the definition given above, shallow draft waterways carry primarily domestic traffic. However, Florida's shallow draft waterways do not carry a substantial amount of tonnage. Many shallow draft waterways can not compete with the harbors and other waterways that carry the majority of total domestic waterborne freight. This is due to a variety of reasons. The most important is that many times the vessel capacity is limited in Florida's shallow draft waterways due to project depth, width, and shoaling. Other limiting factors include reduced road networks, inadequate infrastructure, wildlife impacts, bridge clearance restrictions, and recreational traffic. Most of the harbors are located near a heavily populated metropolitan area that has an extensive road network that can meet the demand of waterborne freight transfers to trucks. The built infrastructure of the areas that the shallow draft waterways serve do not contain many terminals or cargo loading areas that can support high volumes of domestic waterborne freight. In many sections of shallow draft waterways, wildlife slows the commercial traffic (i.e., slow wake zone for manatees). Low clearance, fixed bridges pose restrictions on many shallow draft waterways impeding commercial traffic. Finally, many shallow draft waterways tend to have recreational boaters that must share the waterway with commercial traffic. At times, this may hinder the speed at which commercial traffic can move. Table 2.3 identifies Florida's shallow and deep draft waterways.

Table 2.3 Florida's Shallow and Deep Draft Waterways

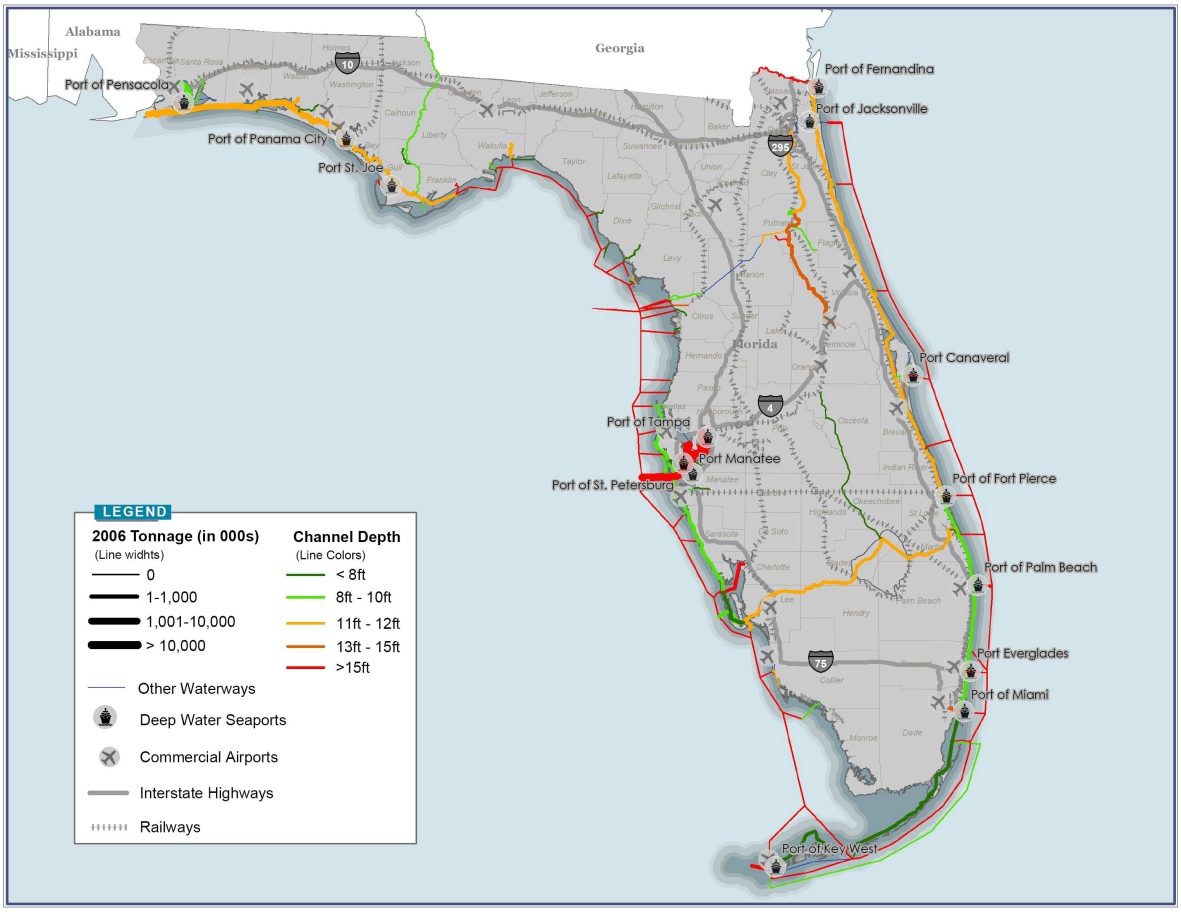
Shallow Draft Waterways	Authorized Depth at MLW*
Apalachicola, Chattahoochee, and Flint Rivers	9 feet
Atlantic Intracoastal Waterway, Fernandina to Ft. Pierce	12 feet
Atlantic Intracoastal Waterway, Ft. Pierce to Miami	10 feet
Atlantic Intracoastal Waterway, Miami to Key West	7 feet
Canaveral Barge Canal	12 feet
Cross Florida Barge Canal	12 feet
Escambia River	10 feet
Gulf County Canal	12 feet
Gulf Intracoastal Waterway, Apalachee Bay to Panama City	12 feet
Gulf Intracoastal Waterway, Caloosahatchee River to Anclote River	9 feet
Gulf Intracoastal Waterway, Panama City to Pensacola Bay	12 feet
Gulf Intracoastal Waterway, Pensacola Bay to Mobile, AL	12 feet
LaGrange Bayou	12 feet
New River	8 feet
Okeechobee Waterway	8 feet
Rice Creek	9 feet
St. Johns River, Palatka to Sanford	12 feet
St. Marks River	12 feet
Watson Bayou	10 feet
Deep Draft Waterways	
Bayou Chico	15 feet
Canaveral Harbor	44 feet
Charlotte Harbor	32 feet
Fernandina Harbor	40 feet
Ft. Pierce Harbor	30 feet
Jacksonville Harbor	42 feet
Key West Harbor	18 feet
Miami Harbor	44 feet
Miami River	15 feet
Palm Beach Harbor	33 feet
Panama City Harbor	32 feet
Pensacola Harbor	35 feet
Port Everglades Harbor	45 feet
Port Manatee (entrance channel)	40 feet
St. Johns River, Jacksonville to Palatka	13 feet
St. Petersburg Harbor	24 feet
Tampa Harbor	42 feet
Weedon Island	33 feet

** Authorized Depth at MLW is the federally authorized depth of the waterway at mean low water. The actual depth may vary due to shoaling or other strong currents and changing wave action along the waterway.*

The remainder of this section provides information on the commercially significant waterways in Florida although recreational activities are pointed out where applicable. For the purposes of this study, we used the geographic information systems (GIS) data for location identification and the Waterborne Commerce of the U.S. report for recorded activity. Both data sources were collected and provided by the USACE. It should be noted that while USACE's data was used to identify significant waterways and harbors, other waterways were considered for their recreational use because of the economic impact they have on Florida's economy.

Figure 2.2 shows a statewide map displaying all intracoastal and inland waterway tonnage and depth (as listed in Tables 2.2 and 2.3, respectively). In this map, as shown in the legend, the width of the line indicates the total tonnage in 2006 and the color of the line indicates the authorized depth of the waterway. Authorized depth is the federally authorized depth at mean low water (MLW) as identified by the USACE and does not necessarily indicate actual depth. The legend in this map and other maps in this section provide a consistent comparison between maps because all elements are not applicable for each waterway group.

Figure 2.2 Tonnage and Depth of Florida's Intracoastal and Inland Waterways



Other organizational notes for this section include:

- Each section provides an overview of each group of waterways; applicable maps; a brief description of each waterway including, when available, length, depth, tonnage, and the top commodity for that waterway; a table listing total tonnage for the waterway group, and the list of the overall type of commodity moved on that group of waterways.

- In addition, the map for each section shows location, tonnage, and depth. For Sections 2.1 and 2.2, the overall maps highlight only the Atlantic Intracoastal Waterway and the Gulf Intracoastal Waterway, respectively with zoom-level views of these waterways. For Sections 2.3, 2.4, 2.5, and 2.6, the overall map points to inset maps highlighting each waterway discussed in that section.

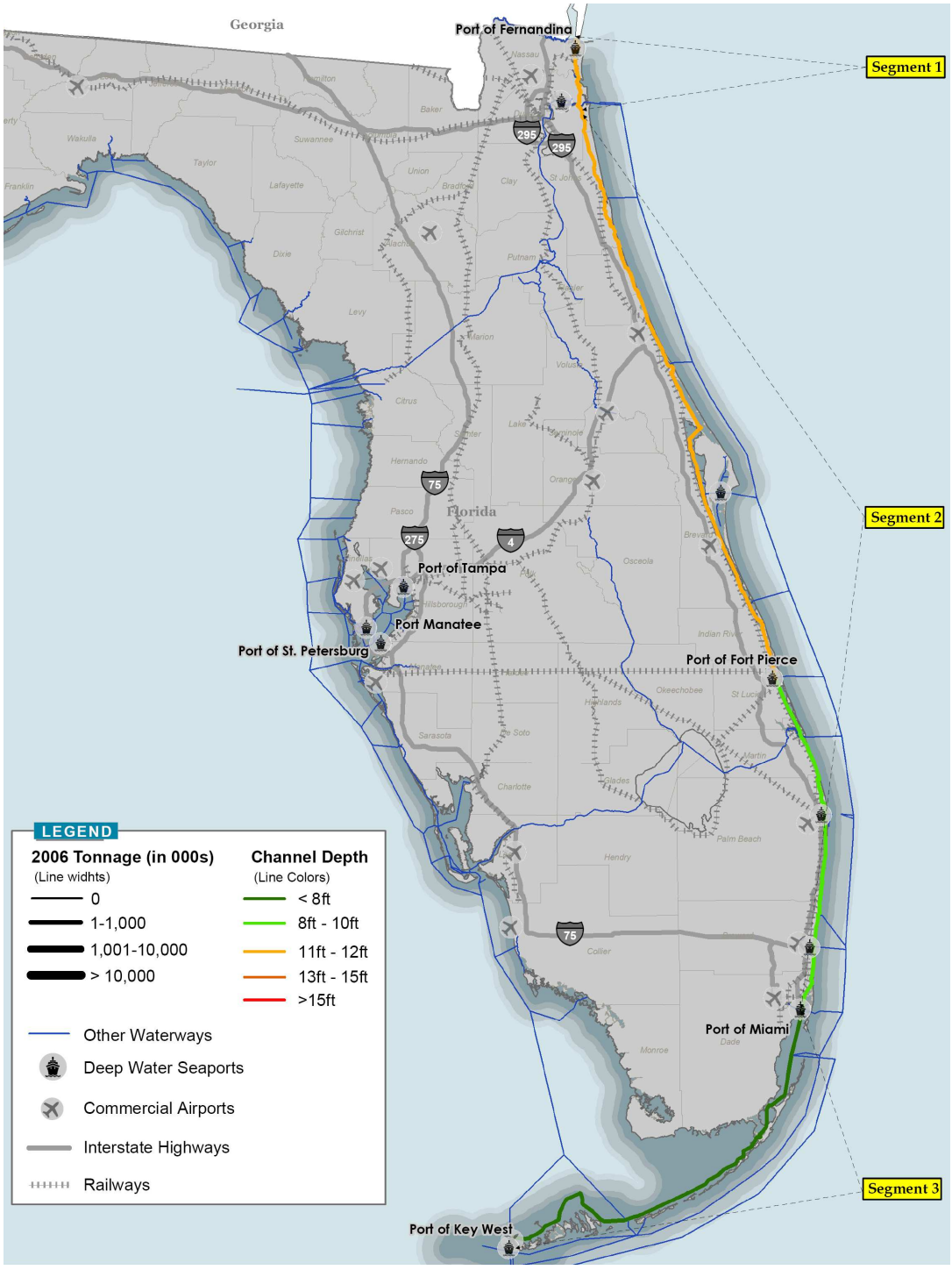
- The list of commodities for each group of waterways provides a look at the top three commodities for each waterway in the group and the associated tonnage. If the same commodity was listed in the top three for more than one waterway it was only shown once in the table.

2.1 Atlantic Intracoastal Waterway

The portion of the Atlantic Intracoastal Waterway (AIWW) that is within Florida is a total of 540 miles. It is described in three segments: *Segment 1* is from Fernandina Harbor in Nassau County to Jacksonville (26 miles), *Segment 2* is from Jacksonville to Miami (348 miles), and *Segment 3* is from Miami to Key West (166 miles). The authorized depth for the AIWW in Florida is 12 feet from Fernandina to Ft. Pierce, 10 feet from Ft. Pierce to Miami, and 4 to 7 feet from Miami to Key West with many sections being deeper or shallower than the project depth due to the status of maintenance programs.

Along the entire length of the corridor, the AIWW moved 743,000 tons of cargo in 2006, with Segment 1, Segment 2, and Segment 3 having 233,000, 234,000, and 276,000 tons, respectively. Figure 2.3 highlights the AIWW by the amount of tonnage carried in 2006 and the depth along the corridor.

Figure 2.3 Florida's Atlantic Intracoastal Waterway



This Florida portion of the AIWW is operated and maintained by the USACE's Jacksonville District in conjunction with the local state sponsor, the Florida Inland Navigation District (FIND). FIND was statutorily created by the Florida Legislature to provide all lands required for the AIWW project and to assist the USACE in the maintenance and management of the waterway. FIND also serves in this same capacity

for the portion of the Okeechobee Waterway that is within Martin and Palm Beach Counties. This river will be discussed in Section 2.6

FIND has estimated that the maintenance of the AIWW in Florida requires $12-16 million annually. While this expense in the responsibility of the Federal government, due to their current and projected continuing budgetary shortfalls, FIND has been providing approximately 75 percent of the expense amount so that the channel is properly maintained.[3]

Despite the annual management and maintenance of the AIWW, this waterway system did not carry a significant portion of the total reported tonnage activity in Florida for the periods of 2002-2006. There has been a steady decline in the amount of cargo tonnage reported since 2003. In 2006, the reported amount was less than half that of the prior year. Table 2.4 shows a detailed view of the entire AIWW system for the years of 2002-2006 compared to total reported tonnage for the state in the same time period.

Table 2.4 Total Waterborne Commerce for the AIWW, 2002-2006 (000 Short Tons)

Total Waterborne Commerce	2002	2003	2004	2005	2006
Florida*	122,516	131,570	132,913	133,281	128,737
AIWW	1,311	1,858	1,651	1,544	743
Annual Percent in Traffic Flow	1.07%	1.41%	1.24%	1.16%	0.58%

** Total excludes duplication*
Source: Waterborne Commerce Statistics Center

The AIWW carries relatively few commodities. Table 2.5 identifies the main commodities carried on the AIWW and their associated tonnage, as reported and classified by the USACE Waterborne Commerce Statistics Center in 2006.

Table 2.5 Major commodities for the AIWW, 2006

Commodity	Type	Total Short Tons (thousand)
Petroleum and Petroleum Products	• residual fuel oil	634
Chemical and Related Products	• sodium hydroxide	68
Primary Manufactured Goods	• miscellaneous mineral products	7

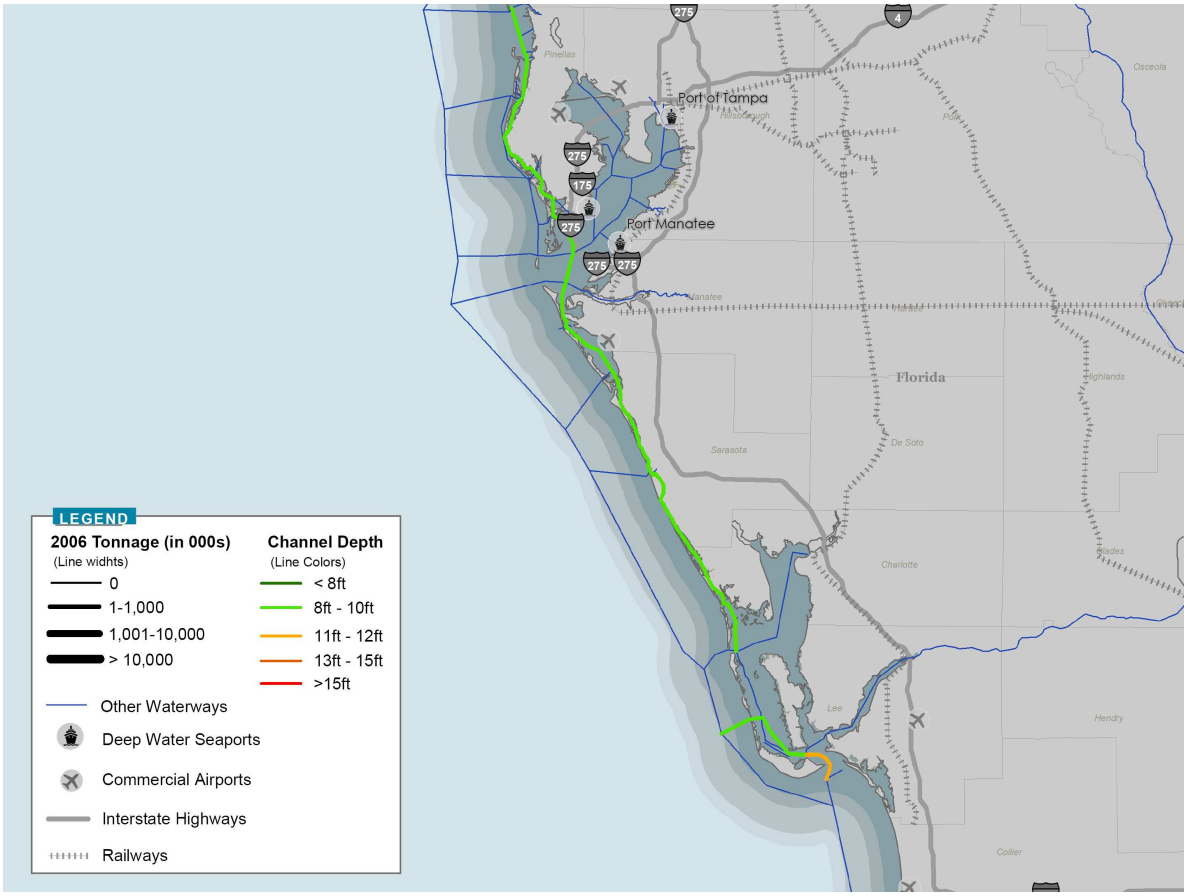
[3] Florida Inland Navigation District. *Executive Summary "An Economic Analysis of the district's Waterways in Nassau County"* http://www.aicw.org

2.2 Gulf Intracoastal Waterway

The portion of the Gulf Intracoastal Waterway (GIWW) that is within Florida is a total of 374 miles. The GIWW lines the west and northwest coast of Florida in two sections.

One section extends from Fort Myers near the Caloosahatchee River north to the Anclote River just north of Tampa Bay (168 miles). This waterway corridor moved only 2,000 tons of cargo in 2006. This section of the GIWW is operated and maintained by the USACE's Jacksonville District. Figure 2.4 details the GIWW by tonnage carried in 2006 and depth along the corridor for the western portion of the GIWW.

Figure 2.4 Florida's Gulf Intracoastal Waterway (Western Coast)

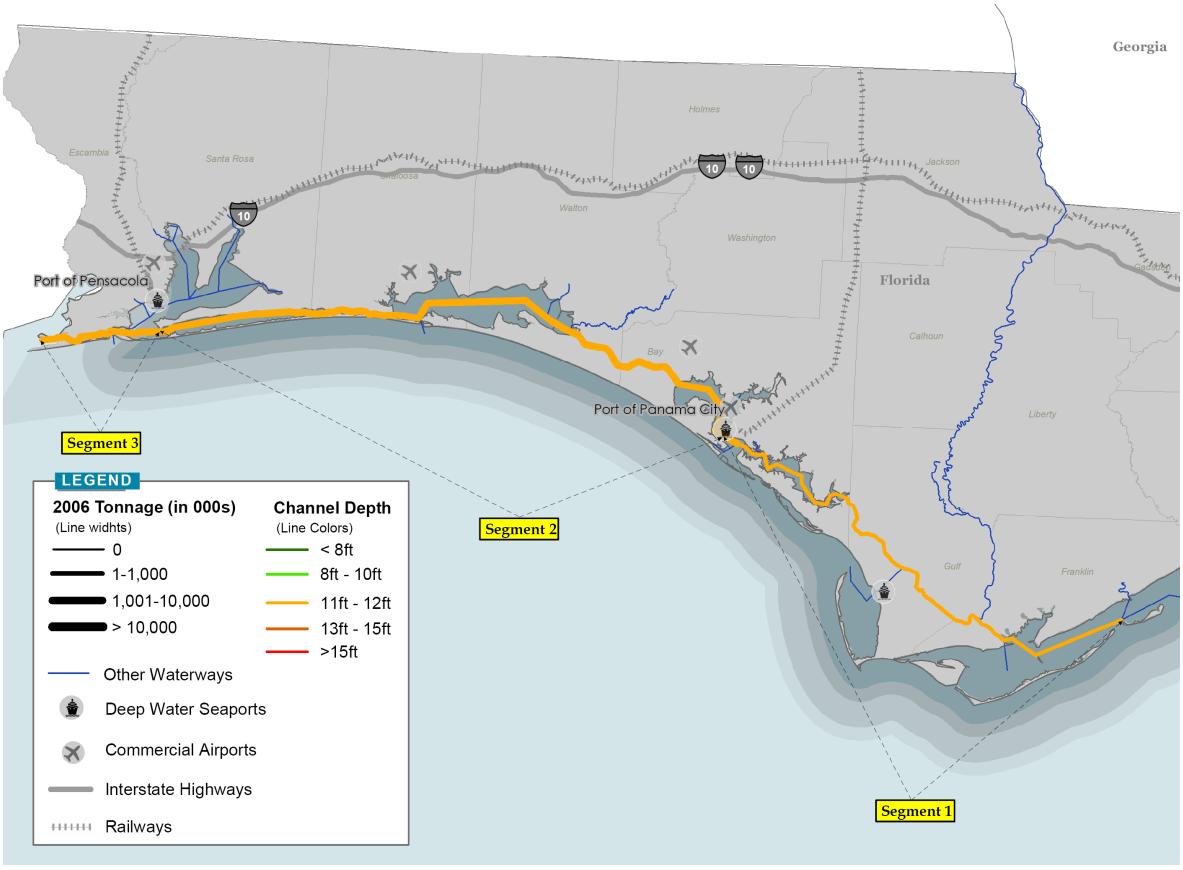


The local sponsor for the western coast of the GIWW is the West Coast Inland Navigation District (WCIND). The WCIND serves Manatee, Sarasota, Charlotte, and Lee counties. The WCIND manages and maintains the waterway for commercial, recreational, and ecological benefits and values. The main values are to enhance public navigation support boating safety, enhance recreational outlets like waterfront parks, and promote environmental sustainability. The GIWW is an integral component to the economic viability of these Gulf Coast counties. The maintenance of the GIWW helps to increase

the commercial, recreational, and regional economic base of Southwest Florida. Due to the reduced federal funding, more financial responsibility has been placed upon the local counties to maintain the waterways and accomplish WCIND's duties and responsibilities.

The other section of the GIWW is divided into three segments: *Segment 1* is from Apalachee Bay to Panama City (83 miles); *Segment 2* is from Panama City to Pensacola Bay (112 miles); and *Segment 3* is from Pensacola Bay to Mobile, AL (12 miles). Along the entire length of the corridor, the GIWW moved 12,503,000 tons of cargo in 2006, with Segment 1, Segment 2, and Segment 3 having 995,000, 3,635,000, and 7,873,000 tons, respectively. This is the mostly heavily used portion of the Intracoastal Waterway in Florida in terms of freight cargo. This section of the GIWW is operated and maintained by the USACE Mobile District. Figure 2.5 details the GIWW by tonnage carried in 2006 and depth along the corridor for the northwestern portion of the GIWW.

Figure 2.5 Florida's Gulf Intracoastal Waterway (Northwestern Coast)



There is no local state sponsor for the northwestern portion of the GIWW; however the Gulf Intracoastal Canal Association provides oversight and guidance for the GIWW in five states: Texas, Louisiana, Mississippi, Alabama, and Florida. This non-profit corporation focuses their attention on the northwestern portion of the GIWW in Florida. They identify their purpose as protecting, operating, maintaining, and improving the Gulf Intracoastal Waterway including Florida.

Even though the GIWW did not carry a significant portion of the total reported tonnage in Florida, for the periods of 2002-2006, it carried over ten times as much as the AIWW during the same period. This is impressive because the AIWW often gets more attention and is able to obtain more financial resources for improvement than the GIWW section in Florida. Regardless, there has been a slight decline in the amount of cargo tons reported since 2004. Table 2.6 shows a detailed view of the entire GIWW system for the years of 2002-2006 compared to total reported tonnage for the state in the same time period.

Table 2.6 Total Waterborne Commerce for the GIWW, 2002-2006 (000 Short Tons)

Total Waterborne Commerce	2002	2003	2004	2005	2006
Florida*	122,516	131,570	132,913	133,281	128,737
GIWW	13,188	14,474	14,502	12,542	12,505
Annual Percent in Traffic Flow	10.76%	11.00%	10.91%	9.41%	9.71%

**Total excludes duplication*
Source: Waterborne Commerce Statistics Center

The GIWW is reported as carrying machinery on the southwestern portion however many other commodities travel the GIWW on the northwestern portion. Table 2.7 identifies the major commodities carried by the GIWW and their associated tonnage, as reported and classified by the USACE Waterborne Commerce Statistics Center in 2006.

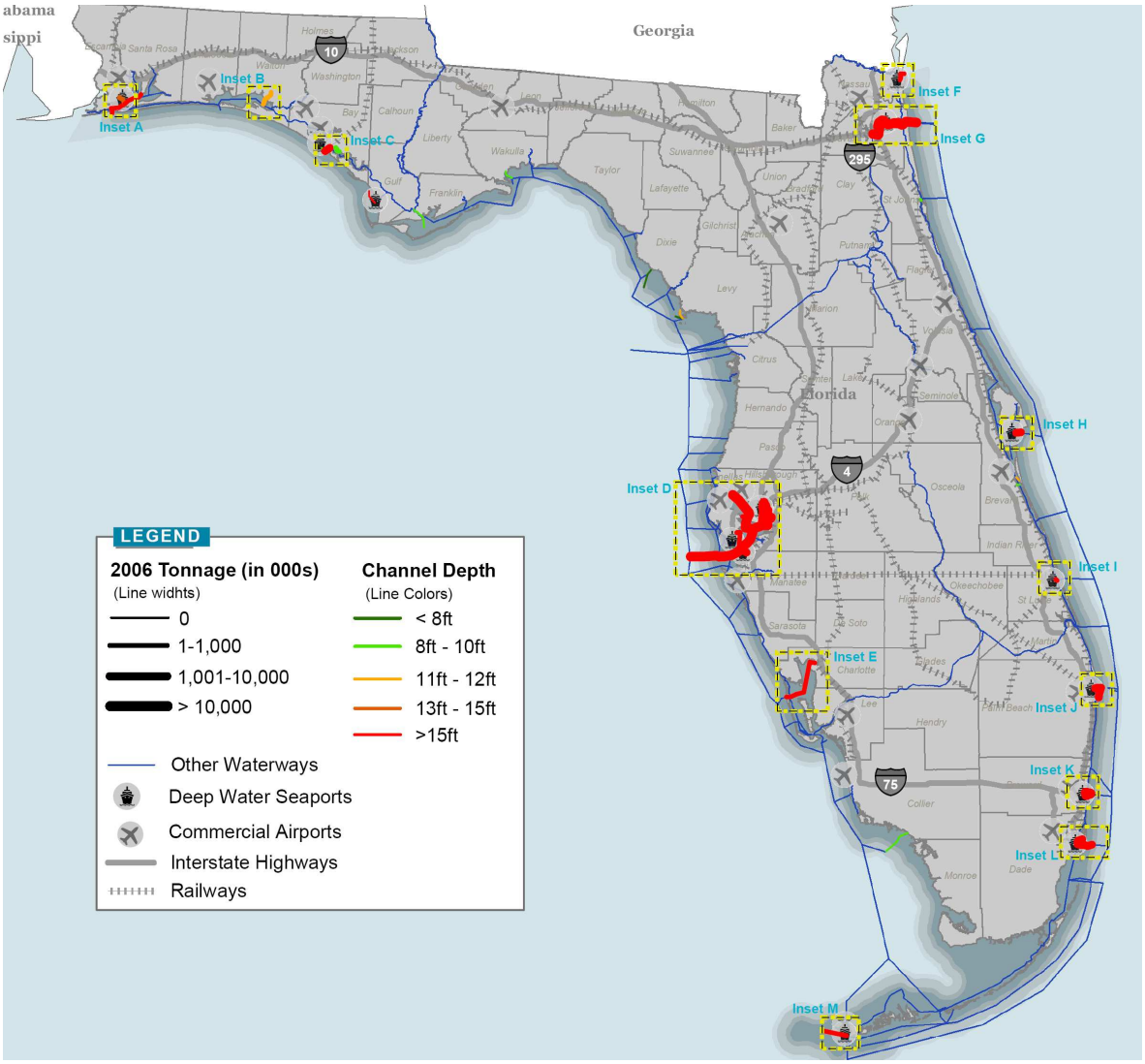
Table 2.7 Major Commodities for the GIWW, 2006

Commodity	Type	Total Short Tons (thousands)
Coal	• coal and lignite	5,335
Petroleum and Petroleum Products	• gasoline	3,345
	• distillate fuel oil	486
Crude Materials, Inedible Except Fuels	• limestone	611
Manufactured Equipment, Machinery and Products	• machinery (not-electric)	1
	• electrical machinery	4

2.3 Harbors, Bays, and Bayous

Harbors, bays, and bayous are the workhorses of the waterway system in Florida carrying the majority of all tonnage. Harbors generally provide access to seaports, the destination of most vessels on the coastal shipping lanes. Although these water bodies include channels and turning basins needed for movement at the seaport, the GIS data provided by the USACE depicts harbors as linear geographic elements as shown in the maps below. Bays and bayous act as corridors moving tonnage through the waterway system. The harbors, bays, and bayous of Florida mentioned in this report are those that have reported tonnage activity from the period of 2002-2006 as indicated by the USACE. Figure 2.6 displays the harbors, bays, and bayous by tonnage carried in 2006 and related depth.

Figure 2.6 Florida's Harbors, Bays, and Bayous



The harbors, bays, and bayous in this section are listed in order of their inset letter. While Inlets and Passes not associated with a seaport are discussed in Section 2.4, the access for each harbor is shown and discussed in this section.

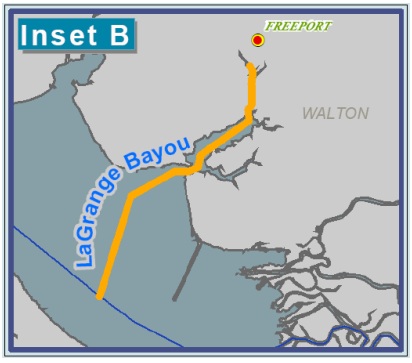
Inset A: Bayou Chico and Pensacola Harbor
Inset B: La Grange Bayou
Inset C: Panama City Harbor and Watson Bayou
Inset D: Port Manatee, St. Petersburg Harbor, Tampa Harbor, Weedon Island
Inset E: Charlotte Harbor
Inset F: Fernandina Harbor
Inset G: Jacksonville Harbor
Inset H: Canaveral Harbor
Inset I: Ft. Pierce Harbor
Inset J: Palm Beach Harbor
Inset K: Port Everglades Harbor
Inset L: Miami Harbor
Inset M: Key West Harbor

Inset A: Bayou Chico and Pensacola Harbor

Bayou Chico is an industrialized waterway situated in southwestern Pensacola. It is four miles long and has an authorized depth of 15 feet. The bayou offers convenient access to shipping lanes in its location between the Gulf of Mexico and the GIWW. The bayou can handle sea-going barges and small cargo vessels. In 2006, it reported 483,000 tons of cargo. The top commodity was petroleum and petroleum imports.

Pensacola Harbor is located in Escambia County. The harbor is home to the Port of Pensacola and Naval Air Station Pensacola. This harbor is accessed via the Pensacola Bay entrance to the southwest of the seaport. The harbor has 17 miles of channel and an authorized depth of 35 feet. In 2006, 849,000 tons of cargo was reported and the top commodity was petroleum and petroleum products.

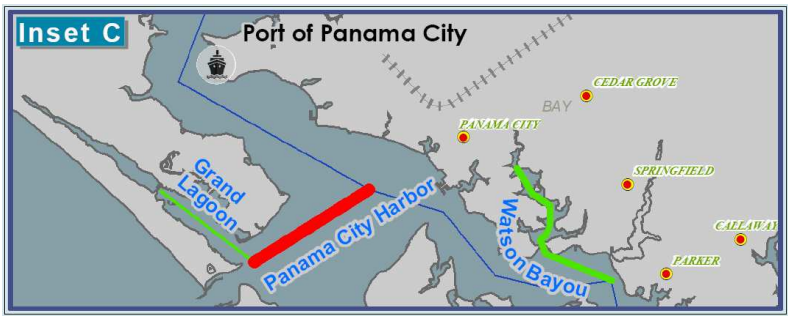
Inset B: LaGrange Bayou



LaGrange Bayou is a natural water body located near the Choctawhatchee Bay in Walton County. It connects the city of Freeport with the GIWW. It is seven miles long and has an authorized depth of 12 feet. In 2006, it reported 553,000 tons of cargo and the top commodity was petroleum and petroleum products.

Inset C: Panama City Harbor and Watson Bayou

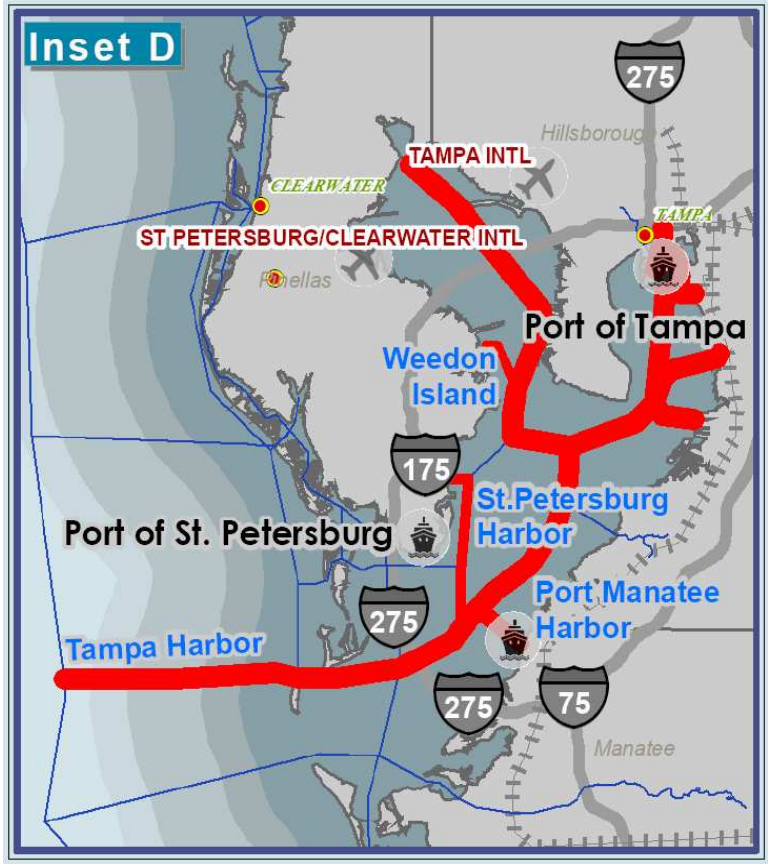
Panama City Harbor is a deep draft harbor that is located near the GIWW in Bay County. The harbor houses the Port of Panama City and is accessed through the St. Andrews Bay channel entrance connecting to the GIWW. The harbor's channel is two miles long and has an authorized depth of 32 feet. In 2006, 3,550,000 tons of cargo was reported and the top commodity was coal.



Watson Bayou flows in to St. Andrews Bay in Bay County. The bayou is home to many boat slips and marinas due to its recognition of being one of the safest harbors in Northwest Florida. This bayou is three miles long and has an authorized depth of 10 feet. In 2006, it carried 14,000 tons of cargo and the top commodity was hydrocarbon and petrol gases.

Inset D: Port Manatee, St. Petersburg Harbor, Tampa Harbor, Weedon Island

Port Manatee entrance channel is located in northern Manatee County. It is the closest seaport to the Panama Canal. The entrance channel is three miles long and has an authorized depth of 40 feet. In 2006, 4,119,000 tons of cargo was reported and the top commodity was primary manufacturing products.



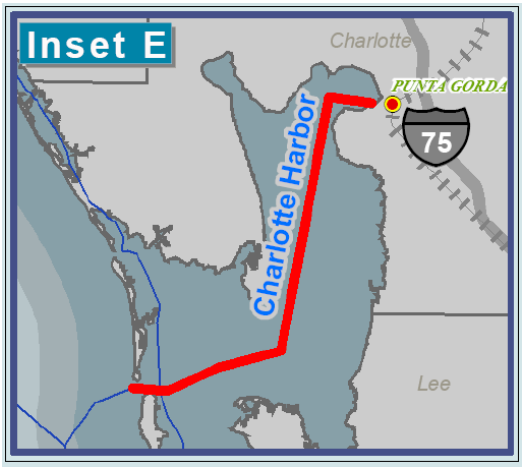
St. Petersburg Harbor is a deep draft harbor located in Pinellas County. The harbor is situated on the peninsula between the Gulf of Mexico and Tampa Bay and is accessed via the entrance to Tampa Bay at the Gulf of Mexico. It houses the Port of St. Petersburg. The harbor's channel is 9 miles long and has an authorized depth of 24 feet. In 2006, only 19,000 tons of cargo was reported and the top commodity was distillate fuel oil.

Tampa Harbor is a deep draft harbor located in Hillsborough County. The harbor houses the Port of Tampa which transported the largest volume of freight by tonnage in the state in 2006 according to the USACE. The harbor has 87 miles of channels that service multiple terminals. The main channel has an authorized depth of 42 feet. It is accessed via the entrance to Tampa Bay at the Gulf of Mexico. In 2006, 46,231,000 tons of cargo was reported and the top foreign commodity was chemicals and related products while the top domestic commodity was petroleum and petroleum products.

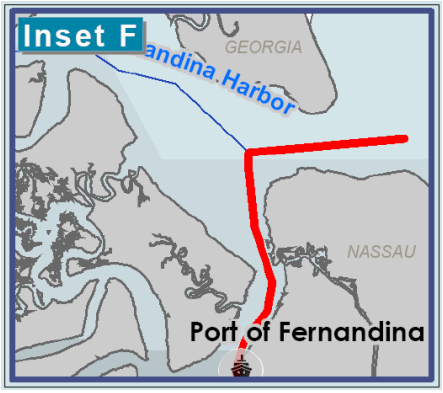
Weedon Island has the largest estuarine preserve in Pinellas County. This area offers numerous recreational activities and accrues a great deal of socioeconomic benefits to the region. Weedon Island is home to an archaeological area, Weedon Island Preserve Cultural and Natural History Center. This bay's channel is three miles long and has an authorized depth of 33 feet. In 2006, it carried 807,000 tons of cargo and the top commodity was residual fuel oil.

Inset E: Charlotte Harbor

Charlotte Harbor is a natural deep draft harbor located in Charlotte County. The harbor is the 17th largest estuary in the nation and the 2nd largest estuary in the state with over 84 percent of the harbor preserved. This harbor does not house a working port. It's channel is 24 miles long and has an authorized depth of 32 feet. In 2006, it reported only 22,000 tons of cargo and the top commodity was residual fuel oil.



Inset F: Fernandina Harbor

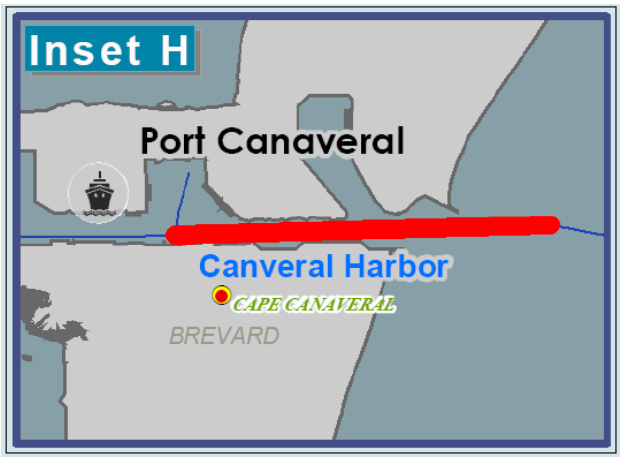


Fernandina Harbor is a natural deep draft harbor in Nassau County. The harbor is home to the Port of Fernandina. It is accessed via the entrance to the St. Marys River connecting to the AIWW. Its channel is two miles long and its authorized depth is 40 feet. In 2006, it reported 567,000 tons of cargo and the top commodity was primary manufacturing goods mainly foreign export.

Inset G: Jacksonville Harbor

Jacksonville Harbor is a natural deep draft harbor located in the heart of Duval County. It is home to JAXPORT which has four public seaport terminals and 20 privately-owned terminals. It is accessed via the entrance to the St. Johns River. Its channel is 32 miles long and has an authorized depth of 42 feet. In 2006, 22,000,000 tons of cargo was reported and the top commodity was petroleum and petroleum products.

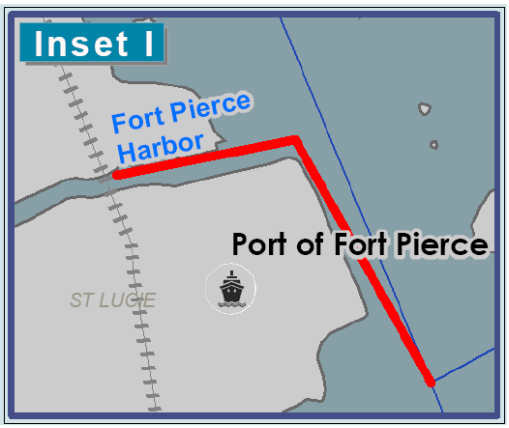
Inset H: Canaveral Harbor



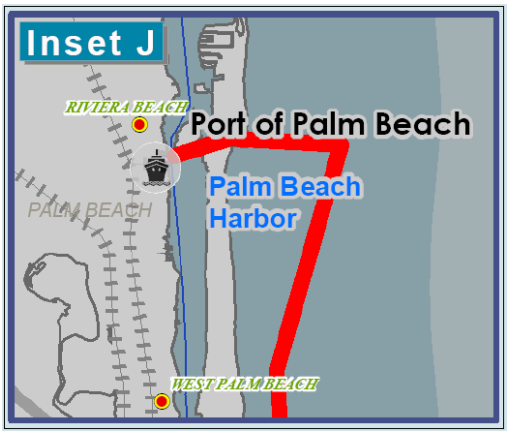
Canaveral Harbor is a man-made harbor located mid way between Jacksonville and Miami on the Atlantic Coast. This harbor is home to Port Canaveral. It is accessed via the Canaveral Inlet. Its channel is two miles long and has an authorized depth of 44 feet. The harbor was initially created to provide a turning basin in the Banana River. The harbor contains the largest navigation lock in Florida built to secure safe passage of vessels to the Canaveral Barge Canal (detailed on page 2-28). In 2006, the harbor reported 4,072,000 tons of cargo and the top commodity was foreign primary manufacturing good imports.

Inset I: Fort Pierce Harbor

Fort Pierce Harbor is a man-made harbor. It is accessed via the Fort Pierce Inlet through the Indian River Lagoon. The harbor is located in St. Lucie County and houses the Port of Ft. Pierce. Its channel is one mile long and has an authorized depth of 30 feet. In 2006, 130,000 tons of cargo was reported for this harbor and the top commodity was fruits and nuts.

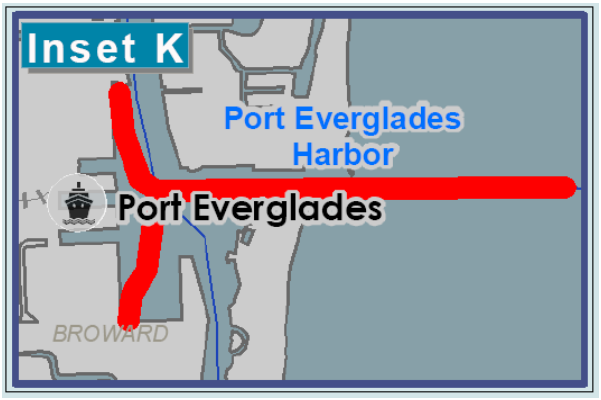


Inset J: Palm Beach Harbor



Palm Beach Harbor is a deep draft harbor located in Palm Beach County. The harbor is located 80 miles north of Miami and 135 miles south of Port Canaveral. It is accessed via the Palm Beach Inlet. The Port of Palm Beach is located within the harbor. Its channel is seven miles long and has an authorized depth of 33 feet. In 2006, 2,765,000 tons of cargo was reported and the top commodity was food and farm products with approximately half as foreign exports.

Inset K: Port Everglades Harbor



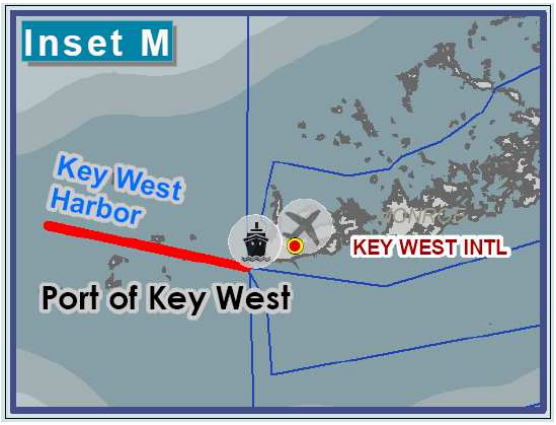
Port Everglades Harbor is a man-made deep draft harbor located between Fort Lauderdale and Hollywood in Broward County and houses Port Everglades. It is accessed via the Port Everglades Inlet. The harbor has three miles of channel and has an authorized depth of 45 feet. It is currently the deepest harbor in the Southeast United States. In 2006, 24,824,000 tons of cargo was reported and the top commodity was petroleum and petroleum products.

Inset L: Miami Harbor

Miami Harbor is a deep draft harbor on the east coast of Florida in the heart of Miami. It is accessed via the Miami Harbor Inlet (also knows as Government Cut). It is home to the Port of Miami. The harbor has 13 miles of channel and has an authorized depth of 44 feet. In 2006, it reported 7,573,000 tons of cargo and the top commodity was foreign manufacturing equipment, machinery, and products.

Inset M: Key West Harbor

Key West Harbor is a natural deep draft harbor located in the southernmost part of the state in the Florida Keys. The harbor houses the Port of Key West and is mainly used for turning of large vessels especially cruise ships. It has ten miles of channel and has an authorized depth of 18 feet. In 2006, there were 9,000 tons of cargo reported and the top commodity was gasoline.



Others

Other smaller harbors, bay, and bayous include Apalachicola Bay, Grand Lagoon, Horseshoe Cove, Panacea, Cedar Keys Harbor, Eau Gallie Harbor, Melbourne Harbor, Port St. Joe Harbor, and St. Augustine Harbor. In 2006, these waterways carried an insignificant amount of cargo if any at all.

Overall

These harbors, bays, and bayous provide considerable regional economic benefits from their commercial and trade activities. They act as gateways to Florida because of their connection with the seaports. Even more financial benefits are generated from indirect consumption spending. Overall, these waterways carried a significant portion of the total tonnage reported in Florida in the last five years. Table 2.8 shows a detailed view of all harbors, bays, and bayous for the years of 2002 - 2006 compared to the total reported tonnage for the state in the same time period.

Table 2.8 Totals Waterborne Commerce for Harbors, Bays, and Bayous, 2002-2006 (000 Short Tons)

Total Waterborne Commerce	2002	2003	2004	2005	2006
Florida*	122,516	131,570	132,913	133,281	128,737
Harbors, Bays, and Bayous	111,146	118,370	119,613	124,295	118,797
Annual Percent in Traffic Flow	90.72%	89.97%	89.99%	93.26%	92.28%

** Total excludes duplication*
Source: Waterborne Commerce Statistics Center

Harbors, bays, and bayous as a whole carry a variety of commodities. Table 2.9 identifies the major commodities carried by these waterways and their reported tonnage, as reported and classified by the USACE Waterborne Commerce Statistics Center in 2006.

Table 2.9 Major Commodities for Harbors, Bays, and Bayous, 2006

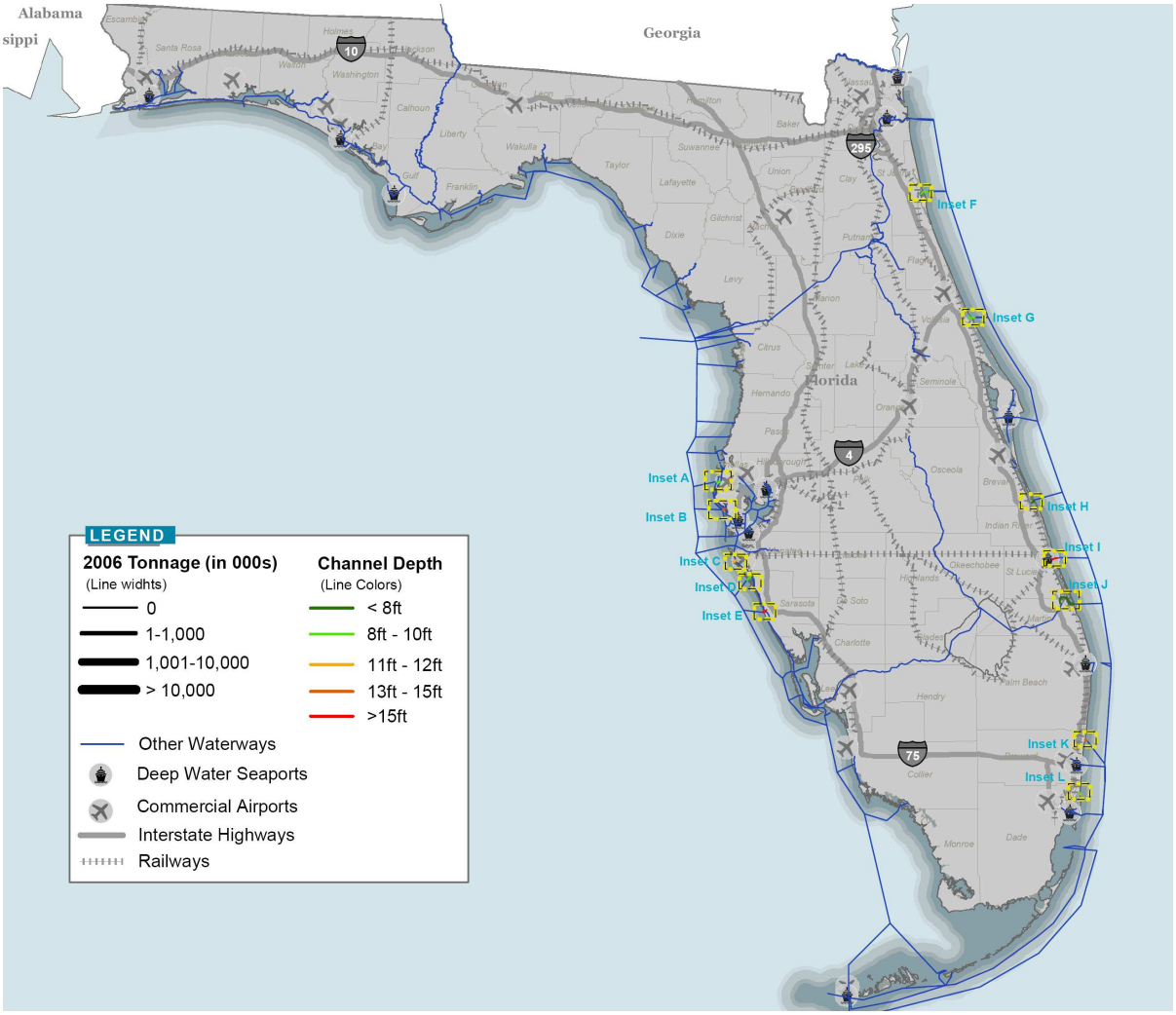
Commodity	Type	Total Short Tons (thousands)
Coal	• coal and lignite	8,225
Petroleum and Petroleum Products	• gasoline	30,497
	• residual fuel oil	5,141
	• distillate fuel oil	9,993
	• crude petroleum	120
	• hydrocarbon and petrol gases	356
Chemicals and Related Products	• sodium hydroxide	532
	• fertilizers	7,879
Crude Materials, Inedible Except Fuels	• limestone	4,236
	• cement and concrete	5,231
	• sand and gravel	1,585
	• iron and scrap metal	175
	• pulp and wastepaper	581
Primary Manufactured Goods	• paper and paperboard	1,085
	• fabricated metal goods	934
	• other manufactured products	4,661
	• mineral products	1,734
	• copper	467
Food and Farm Products:	• fruit and nuts	794
	• sugar	424
	• other food products	1,302
Manufactured Equipment, Machinery and Products	• textile products	1,686

2.4 Inlets and Passes

Inlets, or Passes as some are called, are points of entry or egress between the ocean and the intracoastal or inland waterways. These entry and exit points provide ships coming from the coastal shipping lanes access to the harbors that serve each seaport. They also provide recreational boaters access to the ocean. Inlets can be difficult to navigate especially because of their changing nature caused by strong currents and changing wave action. The USACE does not report tonnage on these connectors to the intracoastal and inland waterway system but recognize their importance through dredging projects to help maintain their passibility. In addition, there are many inlets that are used regularly that are not USACE maintained facilities. Local communities sometimes have locally funded dredging programs for these facilities. Figure 2.7 illustrates the main inlets and

passes excluding harbors. Harbor inlets are identified with their respective harbor in Section 2.3.

Figure 2.7 Florida's Inlets and Passes

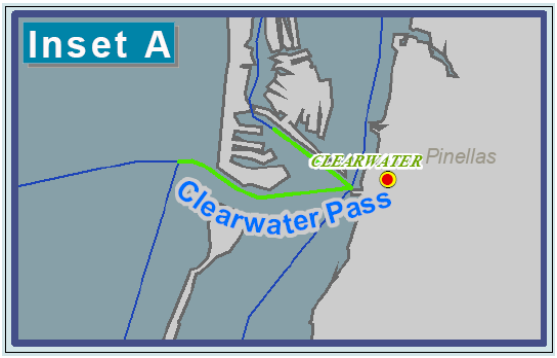


The inlets and passes in this section are listed in order of their inset letter.

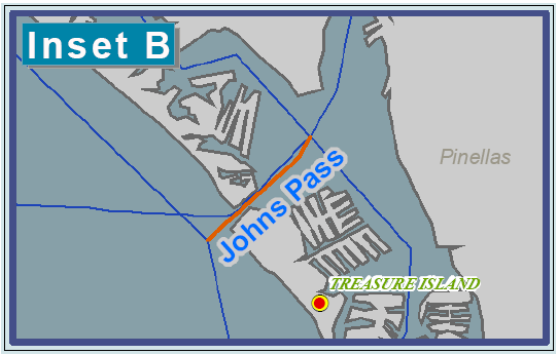
Inset A: Clearwater Pass
Inset B: Johns Pass
Inset C: Longboat Pass
Inset D: New Pass
Inset E: Venice Inlet
Inset F: St. Augustine Inlet
Inset G: Ponce de Leon Inlet
Inset H: Sebastian Inlet
Inset I: Fort Pierce Inlet
Inset J: St. Lucie Inlet
Inset K: Hillsboro Inlet
Inset L: Bakers Haulover Inlet

Inset A: Clearwater Pass

Clearwater Pass is a natural channel located in Pinellas County. The pass connects the GIWW to the Gulf of Mexico. The pass is five miles long and has an authorized depth of ten feet. This pass is used extensively by recreational boaters.



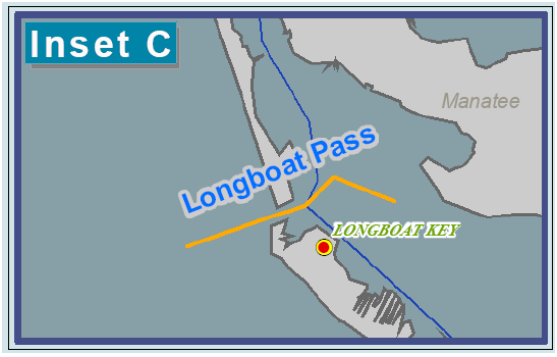
Inset B: Johns Pass



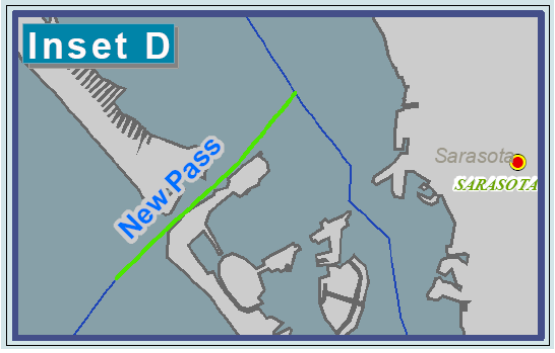
Johns Pass is a natural pass created after a hurricane split Madeira Beach in 1848 and is located in Pinellas County. The pass connects the GIWW to the Gulf of Mexico. It is two miles long and has an authorized depth of 13 feet.

Inset C: Longboat Pass

Longboat Pass is located in Manatee County. It connects Sarasota Bay and the GIWW to the Gulf of Mexico. The pass is two miles long and the authorized depth of the channel is 12 feet.



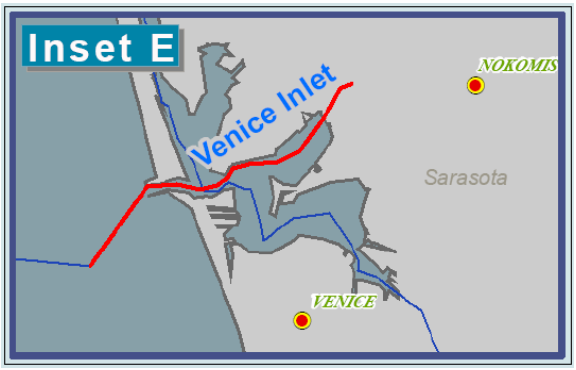
Inset D: New Pass



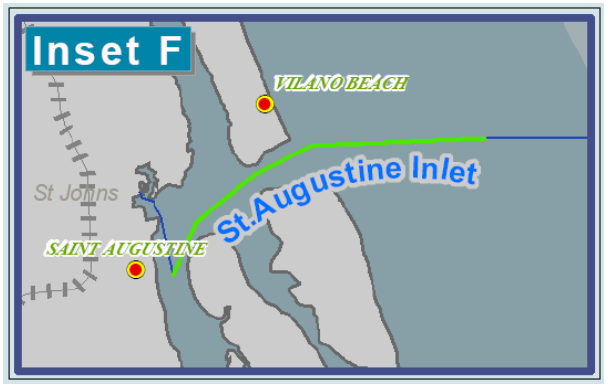
New Pass is located in Manatee County and connects the GIWW to the Gulf of Mexico. The pass is three miles long and the authorized depth is ten feet.

Inset E: Venice Inlet

Venice Inlet is a natural inlet originally named Casey's Pass and separates Casey Key and Manasota Key from Venice Beach. The inlet is located in Sarasota County and connects Sarasota Bay and the GIWW to the Gulf of Mexico. The inlet is two miles long and has an authorized depth of 17 feet. The inlet helps protect the estuary located in Venice by maintaining the salinity levels.



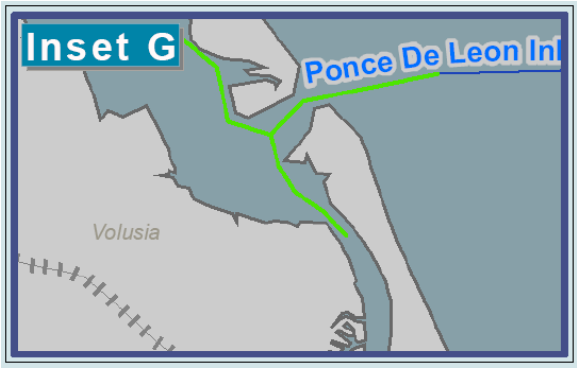
Inset F: St. Augustine Inlet



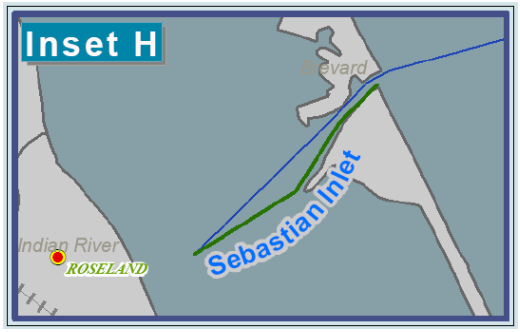
St. Augustine Inlet was originally a natural inlet that was relocated to its current location in 1940. The inlet is located in St. Johns County and connects the Tolomata and Matanzas Rivers and the AIWW to the Atlantic Ocean. The inlet is the entrance channel to the St. Augustine Port. It is four miles long and has an authorized depth of 16 feet.

Inset G: Ponce de Leon Inlet

Ponce de Leon Inlet is located in Volusia County and connects the Indian River and the AIWW to the Atlantic Ocean. The pass is four miles long and has an authorized depth of 15 feet. The inlet is used primarily for recreational purposes such as boating and fishing.



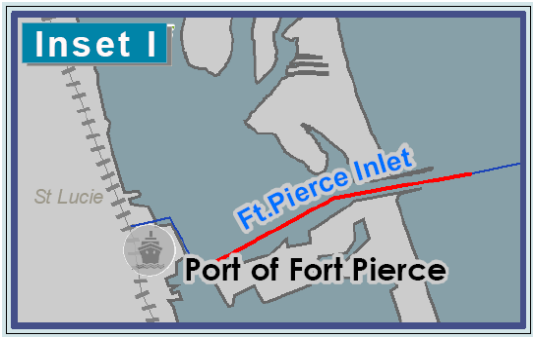
Inset H: Sebastian Inlet



Sebastian Inlet is located in southern Brevard County and connects the Indian River Lagoon and the AIWW to the Atlantic Ocean. It is two miles long and eight feet deep. This inlet is known for its surfing and fishing activities.

Inset I: Fort Pierce Inlet

Ft. Pierce Inlet is a man-made inlet located in St. Lucie County. The inlet connects the Indian River Lagoon and the AIWW to the Atlantic Ocean. It also provides access to the Ft. Pierce Harbor. It is three miles long and has an authorized depth of 30 feet.

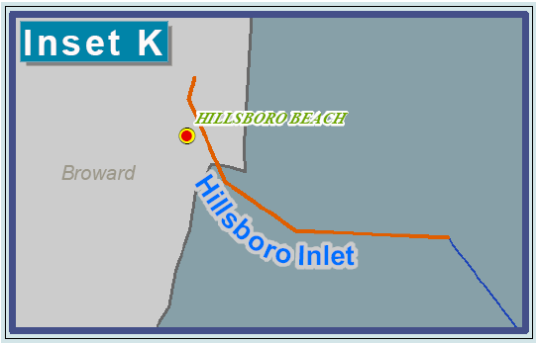


Inset J: St. Lucie Inlet

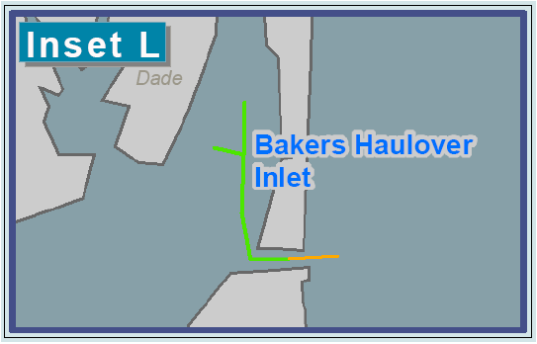
St. Lucie Inlet is located in St. Lucie County and connects the Okeechobee Waterway and the AIWW to the Atlantic Ocean. This inlet is one of six that is linked to the Indian River Lagoon. The inlet is used for navigation, commercial and recreational use but also has environmental benefits. The inlet is the core of the estuarine system that joins the Indian River Lagoon, the St. Lucie River, and the Hobe Sounds Narrow. It is 11 miles long and has an authorized depth of six feet.

Inset K: Hillsboro Inlet

Hillsboro Inlet is a natural channel located in Pompano Beach in Broward County. This channel connects the AIWW to the Atlantic Ocean. It is one mile long and has an authorized depth of 13 feet.



Inset L: Bakers Haulover Inlet



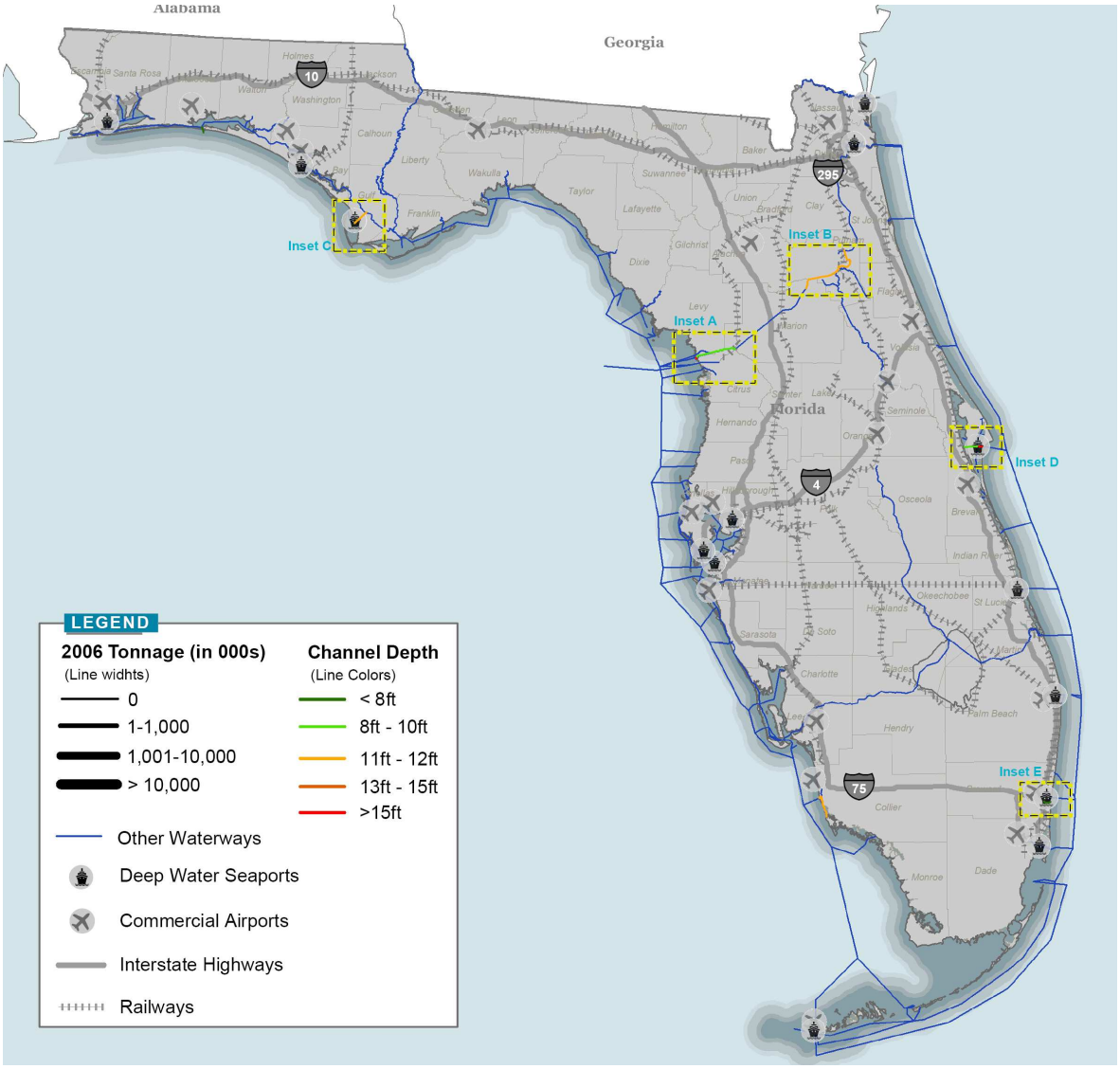
The Bakers Haulover Inlet is a man-made channel located in Miami-Dade County. It connects Biscayne Bay and the AIWW with the Atlantic Ocean. The inlet is used for recreational activities primarily boating and sailing. The inlet is one mile long and has an authorized depth of 8 to 11 feet.

There was no commerce reported for the inlets and passes as reported by the USACE Waterborne Commerce Statistics Center in 2006.

2.5 Canals and Channels

Canals are artificial channels for water. They often connect to rivers, lakes, or oceans. Channels are narrow bodies of water and generally connect two larger bodies of water. The canals and channels of Florida mentioned in this section are the ones that have reported tonnage activity from the period of 2002-2006, as indicated by the USACE. Figure 2.8 displays the canals and channels by tonnage carried in 2006 and related depth.

Figure 2.8 Florida's Canals and Channels

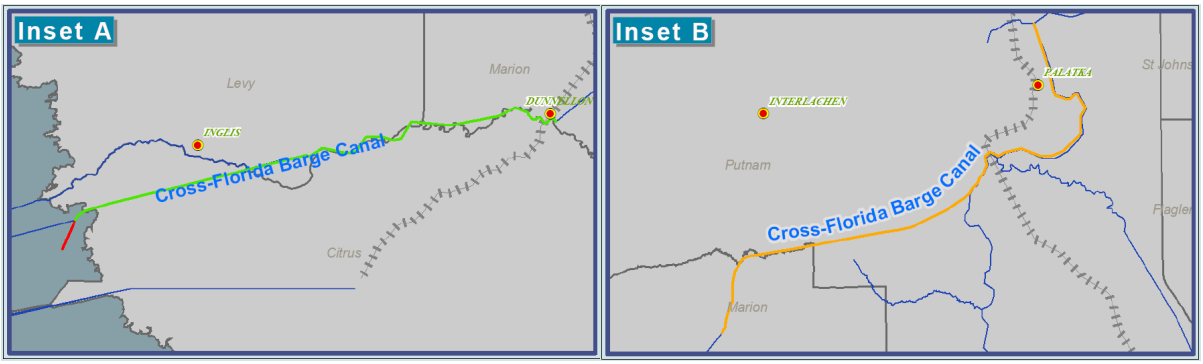


The canals and channels in this section are listed in order of their inset letter.

Inset A, B: Cross Florida Barge Canal
Inset C: Gulf County Canal
Inset D: Canaveral Barge Canal
Inset E: Dania Cut-Off Canal

Inset A and B: Cross Florida Barge Canal

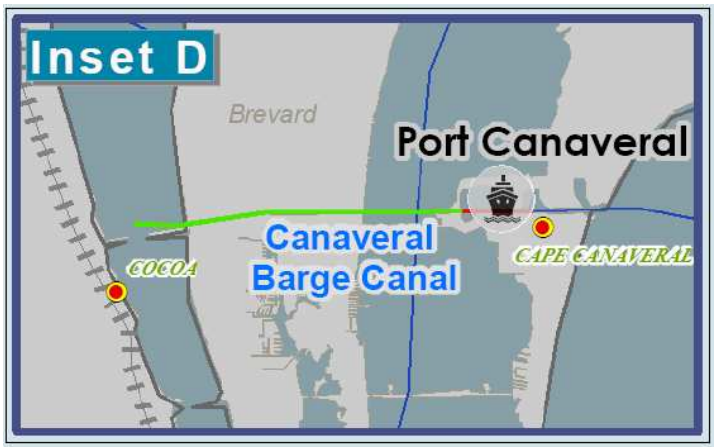
The Cross Florida Barge Canal was a project that was meant to cross the state of Florida to connect the northern Atlantic and Gulf coasts with a barge canal. The project was planned to extend from the St. Johns River to the Gulf of Mexico through the Oklawaha and Withlacoochee River valleys. The entire project was not finished for environmental reasons but portions that were constructed are used today. The two portions comprise 98 miles and have an authorized depth of 8 to 12 feet. While this waterway has moved cargo in the past, there was no recorded tonnage for 2006.



Inset C: Gulf County Canal

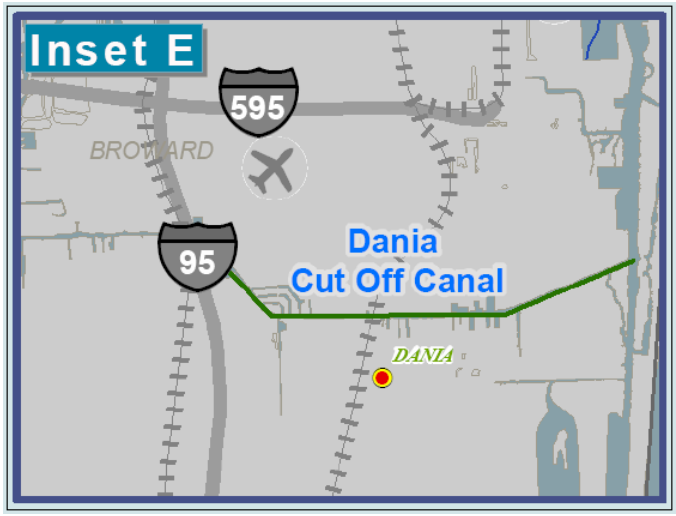
The Gulf County Canal connects the Port of St. Joe Bay shipping channel to the GIWW and the Gulf of Mexico in Gulf County. This canal is mainly used for commercial purposes as there are limited opportunities for recreational activity. This is because the canal is centrally located near the local highway and rail and is home to a thriving commercial fishing community. The canal is eight miles long and has an authorized depth of 12 feet. While this waterway has moved cargo in the past, there was no recorded tonnage for 2006.

Inset D: Canaveral Barge Canal



The Canaveral Barge Canal is a man-made canal that connects the Indian River and the Banana River to the Atlantic Ocean. The canal also connects Canaveral Harbor with the AIWW. The canal has a lock managed by the USACE. It is used mostly for recreational purposes however barges use the canal to move fuel north to Reliant and FPL power plants in Titusville from fuel tank farms at Port Canaveral. The canal is eight miles long and has an authorized depth of 12 feet. The recorded tonnage for this canal according to Port Canaveral is 35,324 tons of petroleum.

Inset E: Dania Cut Off Canal



The Dania Cut-Off Canal is located in Broward County intersecting the South Fork of the New River. It connects Port Everglades to the AIWW. The Dania Cut-Off Canal is a working waterfront home to many marine companies, marinas, and small boat terminals. This canal is three miles long and 6.5 feet in depth. The recorded tonnage for this canal is included as part of the tonnage reported for Port Everglades Harbor.

Others

Other channels include the Channel from Naples to Marco Pass and East Pass Channel. In the past these waterways have carried an insignificant amount of cargo if any at all.

Overall

Generally, these canals and channels have more regional impact from their recreational and environmental activities. These activities improve the socioeconomic benefits to their regional areas, which are difficult to measure in dollars. Due to the recreational and

environmental values that these waterways have on their regions, they did not carry a significant portion of the total reported tonnage in Florida in the last five years. Table 2.10 shows a detailed view of all canals and channels for the years of 2002-2006 compared to total reported tonnage for the state in the same time period.

Table 2.10 Total Waterborne Commerce for Canals and Channels, 2002-2006 (000 Short Tons)

Total Waterborne Commerce	2002	2003	2004	2005	2006
Florida*	122,516	131,570	132,913	133,281	128,737
Canals and Channels	38	408	720	214	-
Annual Percent in Traffic Flow	0.03%	0.31%	0.54%	0.16%	0.00%

** Total excludes duplication*
Source: Waterborne Commerce Statistics Center

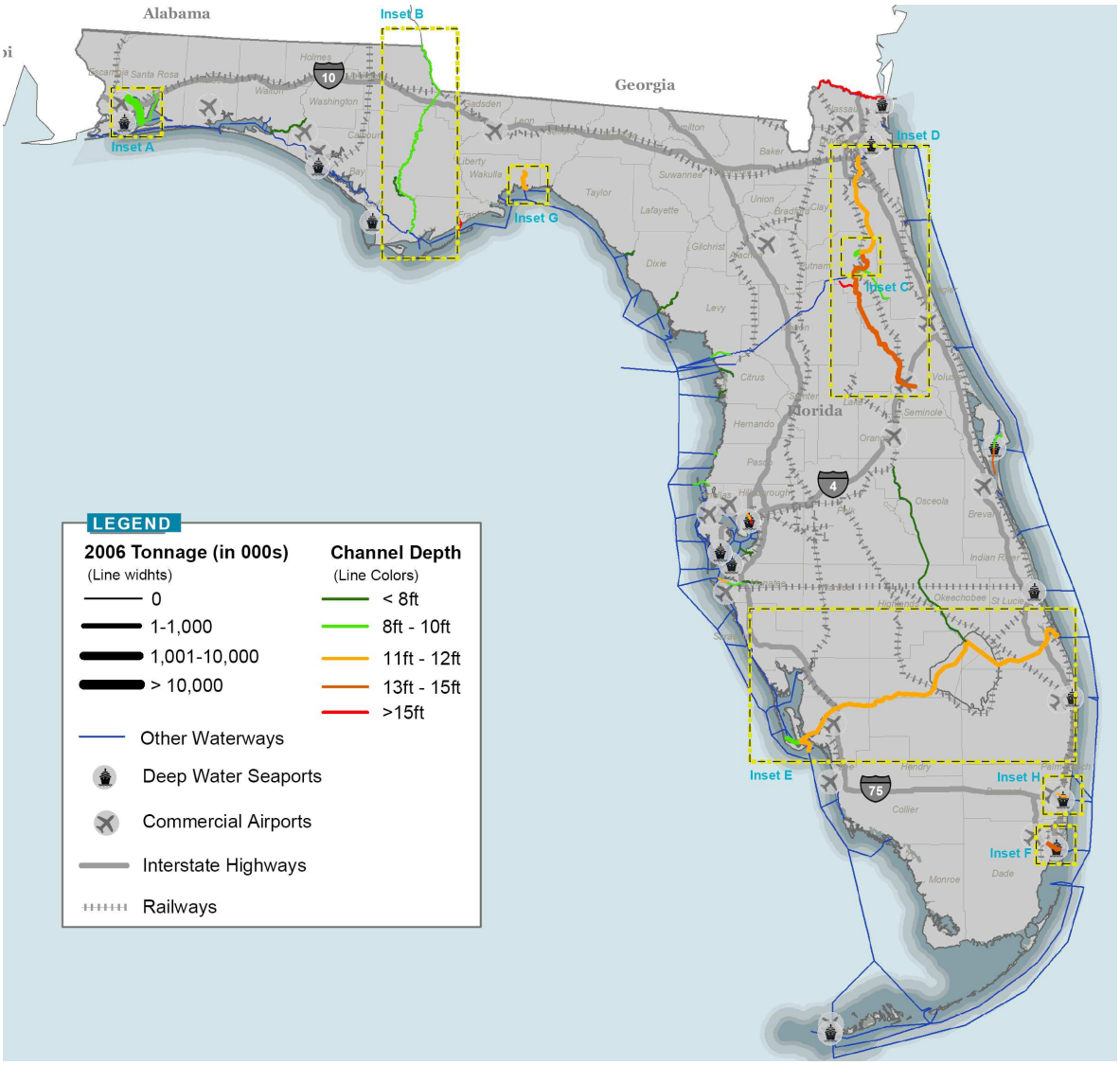
There was no commerce reported on the canals and channels as reported by the USACE Waterborne Commerce Statistics Center in 2006. The tonnage from the Canaveral Barge Canal and the Dania Cut-Off Canal is included in the amount reported for Canaveral Harbor and Port Everglades Harbor, respectively. In the past, major commodities moved on the above canals and channels include petroleum; hydrocarbon and petrol gases; and coal.

2.6 Rivers and Creeks

A river is a natural stream of water flowing toward a large body of water such as a lake or the ocean. A creek is also a body of water with a current often flowing toward a larger body of water. Rivers and creeks were grouped together in this study because they have similar characteristics.

The rivers and creeks of Florida mentioned in this report are the ones that have reported tonnage activity from the period of 2002-2006, as indicated by the USACE. A further discussion of other rivers and creeks that generate economic and socioeconomic benefits will be further discussed in Section 4. Figure 2.9 displays the rivers and creeks by tonnage carried in 2006 and related depth.

Figure 2.9 Florida's Rivers and Creeks



The rivers and creeks in this section are listed in order of their inset letter.

Inset A: Escambia River

Inset B: Apalachicola, Chattahoochee, and Flint Rivers

Inset C: Rice Creek

Inset D: St. Johns River

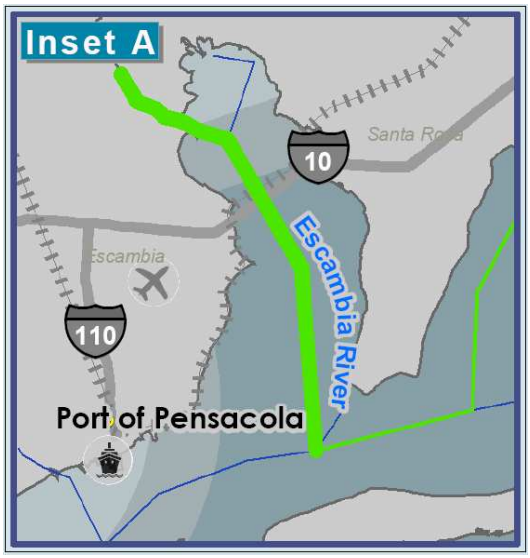
Inset E: Okeechobee Waterway

Inset F: Miami River

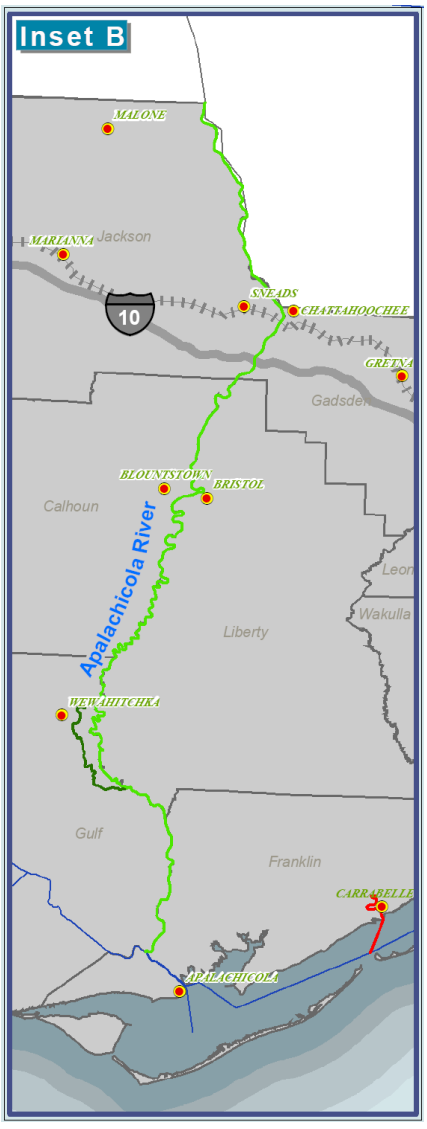
Inset G: St. Marks River

Inset H: New River

Inset A: Escambia River



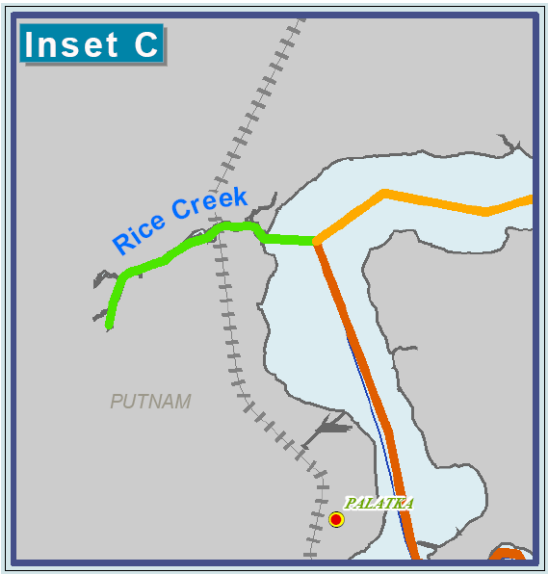
The Escambia River flows into the Pensacola Bay system. The Escambia River is part of a river system that includes the Conecuh River located in Alabama. The portion of this river system in Florida is operated by the Escambia River Water Management Area under the North West Florida Water Management District. The river is dredged only in Florida which is the lower portion of the river close to the opening of Pensacola Bay. The portion of the river in Florida is 17 miles long and has an authorized depth of ten feet. In 2006, it carried 3,426,000 tons of cargo and the top commodity was coal.



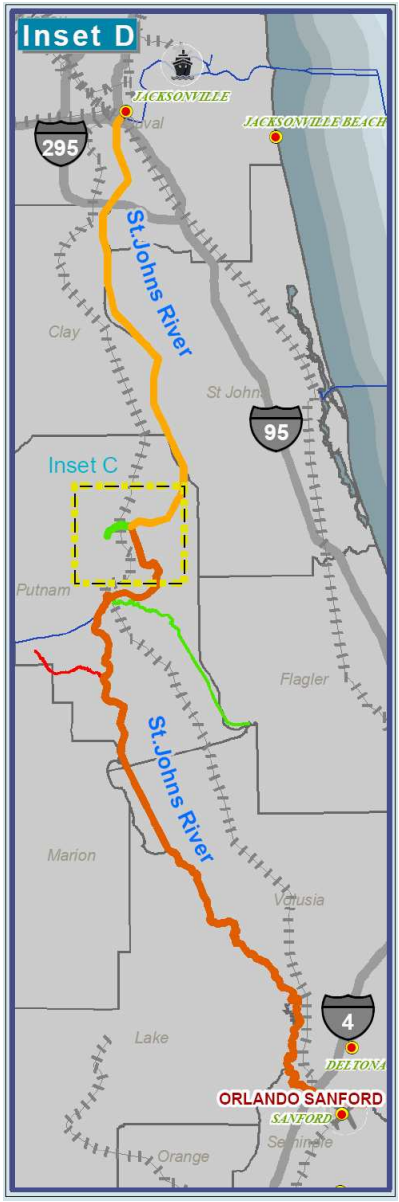
Inset B: Apalachicola, Chattahoochee, and Flint Rivers

The Apalachicola, Chattahoochee, and Flint Rivers make up a three river system that runs from Georgia through Florida to the Gulf of Mexico. The Apalachicola River is formed from the convergence of the Flint and Chattahoochee Rivers. The area is managed by the Northwest Florida Water Management District. The Apalachicola River is nearly 128 miles long through Florida and has an authorized depth of nine feet. While this waterway has moved cargo in the past, there was no recorded tonnage for 2006.

Inset C: Rice Creek



Rice Creek is a tributary of the St. Johns River in Putnam County. The creek is formed from the confluence of Rice Creek Swamp, Palmetto Branch, Oldtown Branch, and Hickory Branch in a man-made channel that cuts through the swamp. The Rice Creek Wildlife Management Area is managed under the St. Johns River Water Management District and offers many recreational activities and opportunities. The creek is three miles long and has an authorized depth of nine feet. In 2006, it carried 111,000 tons of residual oil fuel.

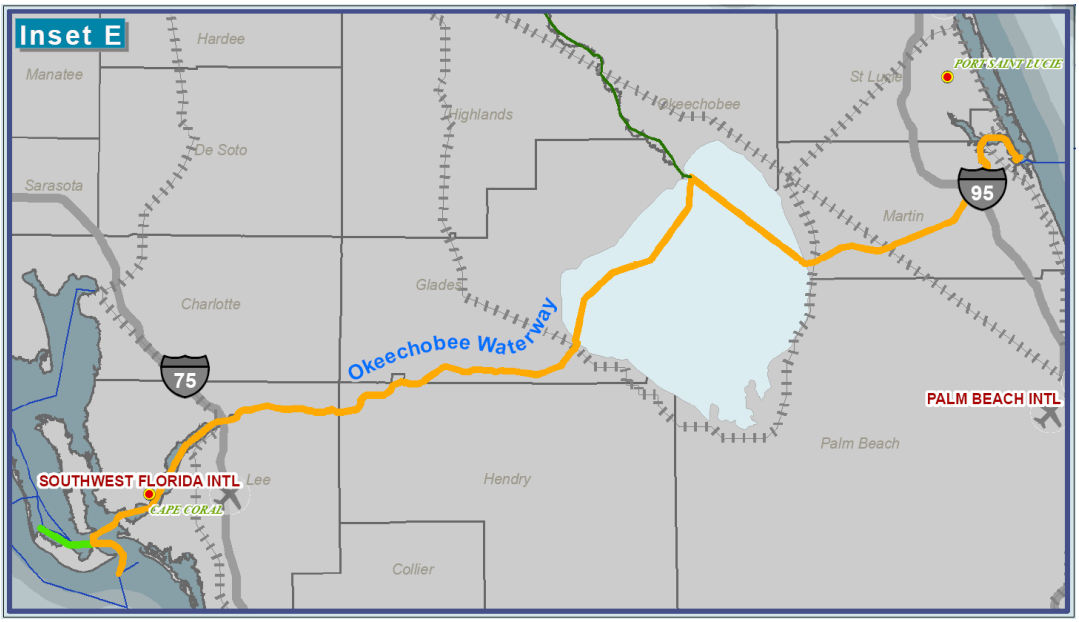


Inset D: St. Johns River

The St. Johns River starts in Indian County and flows out to Jacksonville Harbor. It is also one of the few rivers in the United States that flows north. The river has three main tributaries; Ockalawaha, Wekiva, and Econlockhatchee. The river is 142 miles long and has an authorized depth of 13 feet from Jacksonville to Palatka and 12 from Palatka to Sanford. In 2006, it carried 121,000 tons of residual fuel oil.

Inset E: Okeechobee Waterway

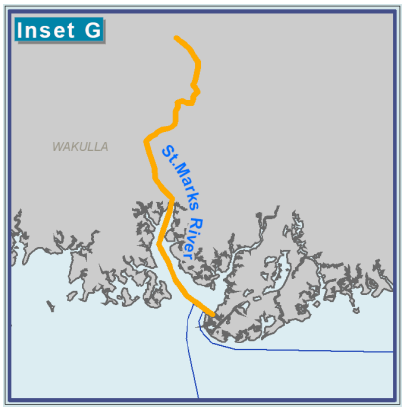
The Okeechobee Waterway started off as a project meant to drain the Everglades in Central and South Florida for agriculture, farming, and settlement. The waterway is made up of the Caloosahatchee River to the west and the St. Lucie Canal to the east connected by Lake Okeechobee. The USACE manages and operates 5 navigations locks and dams on this waterway. The waterway is 172 miles long and has an authorized depth of eight feet. In 2006, only 2,000 tons of cargo was reported for the movement of machinery. It should be noted that the decrease in tonnage in recent years is because of the multi-year drought which has closed the channel section through Lake Okeechobee.



Inset F: Miami River

The Miami River is a natural river that was deepened for navigation and future commercial prospects. The river extends from the Miami International Airport to Biscayne Bay. The Miami River has 32 private terminals and is separated into three distinct zones: the Upper River, the Middle River, and the Lower River. The Upper River is typically known for its industrial business centers, primarily marine and shipping. Many of the shipping terminals are located here. The Middle River is known for its huge residential district, parks and historic neighborhoods. The Lower River is where downtown Miami is located. The river is 5.5 miles long and has an authorized depth of 15 feet. In 2006, it carried 557,000 tons of cargo and the top commodity was manufacturing equipment, machinery, and products.

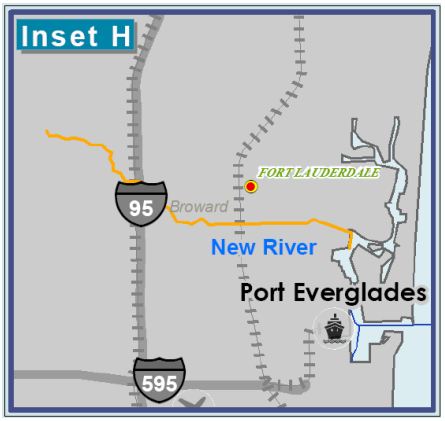
Inset G: St. Marks River



The St. Marks River is located in the Big Bend region of Florida. The portion maintained by the USACE is located in Wakulla County. It is a popular recreational river. This portion is ten miles long and has an authorized depth of 12 feet. In 2006, it carried 145,000 tons of cargo and the top commodity was residual oil fuel.

Inset H: New River

The New River is part of a system of canals in Ft. Lauderdale located in Broward County. Ft. Lauderdale is a major yachting center where mega yachts and other pleasure craft use the New River. It is six miles long and has an authorized depth of eight feet. For 2006, the recorded tonnage for this canal is included as part of the tonnage reported for Port Everglades Harbor.



Overall

Rivers and creeks did not carry a significant portion of the total reported tonnage in Florida for the periods of 2002-2006, due to many limiting factors. Except for the Escambia River and the Miami River, the rivers and creeks are hindered by locational disadvantages, limited infrastructure, and low intermodal accessibility. The ports and terminals on these rivers and creeks are located further away from more profitable markets, which make these areas unattractive for high volume stops. The infrastructure around these rivers and creeks were not built to accommodate high capacity cargo and shipments. Much of the equipment needed to handle high capacity cargo are missing from the smaller ports and terminals located on the rivers and creeks. Finally, most of the rivers and creeks have low accessibility to intermodal and landside access connections other than roadways. This limits most of the tonnage received by trucks, which reduces the efficiency of the shipping process that has become more seamless due to intermodalism. However, these rivers and creeks do generate regional economic impacts from their recreational and environmental activities. These activities improve the socioeconomic benefits to their regional areas, which are difficult to measure in dollars. Table 2.11 shows a detailed view of all rivers and creeks for the years of 2002-2006 compared to total reported tonnage for the state in the same time period.

Table 2.11 Total Waterborne Commerce for Rivers and Creeks, 2002-2006 (000 Short Tons)

Total Waterborne Commerce	2002	2003	2004	2005	2006
Florida*	122,516	131,570	132,913	133,281	128,737
Rivers and Creeks	3,519	4,488	4,103	3,770	4,251
Annual Percent in Traffic Flow	2.87%	3.41%	3.09%	2.83%	3.30%

** Total excludes duplication*
Source: Waterborne Commerce Statistics Center

Table 2.12 identifies the major commodities carried by the rivers and creeks and their reported tonnage, as reported and classified by the USACE Waterborne Commerce Statistics Center in 2006.

Table 2.12 Major Commodities for Rivers and Creeks, 2006

Commodity	Type	Total Short Tons (thousands)
Coal	• coal and lignite	2,989
Petroleum and Petroleum Products	• residual fuel oil	352
Chemicals and Related Products	• sodium hydroxide	65
	• other hydrocarbons	239
Primary Manufactured Goods	• textiles	169
	• vehicles and parts	36
Manufactured Equipment, Machinery and Products	• machinery (not electric)	17
	• electrical machinery	30

3.0 Current Transportation Conditions for Waterborne Activity

This chapter will look at the current conditions of waterborne transportation from an international, national, state, and regional perspective. This chapter is organized as follows:

- Section 3.1 will describe international trends including foreign commerce, foreign commodities, the impacts of increased trade with Asia, and the integration of global economics through trade agreements.
- Section 3.2 will describe domestic trends including domestic commerce, domestic commodities, and the impacts of added security measures, the slowing economy, and domestic vessels.
- Section 3.3 will describe Florida trends including Florida commerce, Florida's commodities, and the impact of Florida's Strategic Intermodal System.
- Section 3.4 will describe regional trends in water transportation planning.

3.1 International Trends

The World Shipping Council reported that the United States is the largest trading nation in the world, accounting for over 12 percent of total world trade in 2005. As of 2007, 11 percent of global container traffic is moved through the United States, meaning that every one in nine containers throughout the world has either departed from or is headed to the United States.

Foreign Commerce

According to the 2006 USACE Waterborne Commerce of the United States data report, waterborne commerce in the U.S. totaled almost 2.6 billion tons. Foreign commerce represented 60 percent of the total reported tonnage amount, up from 56 percent five years earlier in 2002. This increase is due partly because of the decline in the Alaska crude oil trades that were previously moved to the contiguous states. This resulted in the

increased shipments of foreign tankers that substituted for those domestic shipments.[4] In addition, import tonnage was more than 2.6 times that of export tonnage in 2006 up from 2.3 times five years earlier.

A major emphasis in the U.S. waterborne industry is trade with foreign markets. In 2006, foreign trade was 2.2 times higher than domestic trade. Table 3.1 shows the relationship of foreign trade to domestic. In the last five years, foreign shipping and receiving increased 16 percent while there was a net increase of only four percent for domestic and intrastate shipping and receiving. Intrastate commerce even though it is reported separately from domestic trade captures trade within the boundaries of the individual states to signify the differences in trade sectors throughout the U.S.

Table 3.1 Waterborne Tonnage in the United States, 2002- 2006 (000 Short Tons)

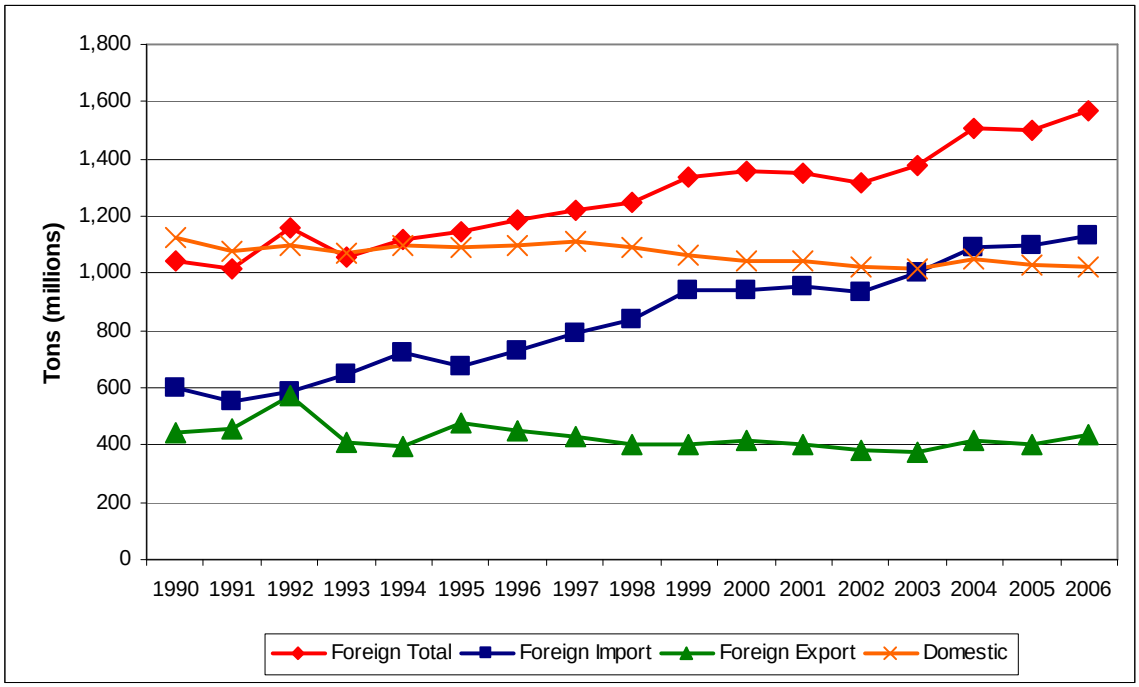
Shipping/ Receiving	2002	2003	2004	2005	2006	% change over 5 years
Domestic	722,714	710,835	733,708	716,496	703,814	-3%
Foreign	1,319,291	1,378,115	1,504,851	1,498,712	1,564,944	16%
Intrastate	298,287	305,248	313,379	312,414	319,682	7%
Total*	2,340,292	2,394,199	2,551,939	2,527,622	2,588,440	10%

**** Total excludes duplication***
Source: Waterborne Commerce Statistics Center

Waterborne freight has been increasing due to rapid growth in U.S. imports. Figure 3.1 indicates that between 1990 and 2006, foreign imports increased over 47 percent while foreign exports slightly decreased by about two percent and domestic waterborne tonnage fell over nine percent. Overall, total waterborne freight tonnage has increased 16 percent since 1990, due to the vast increases of imports.

[4] U.S. Department of Maritime Administration. "Tank Vessel Market Indicators", 2006, www.marad.dot.gov

Figure 3.1 Waterborne Freight Activity, 1990-2006



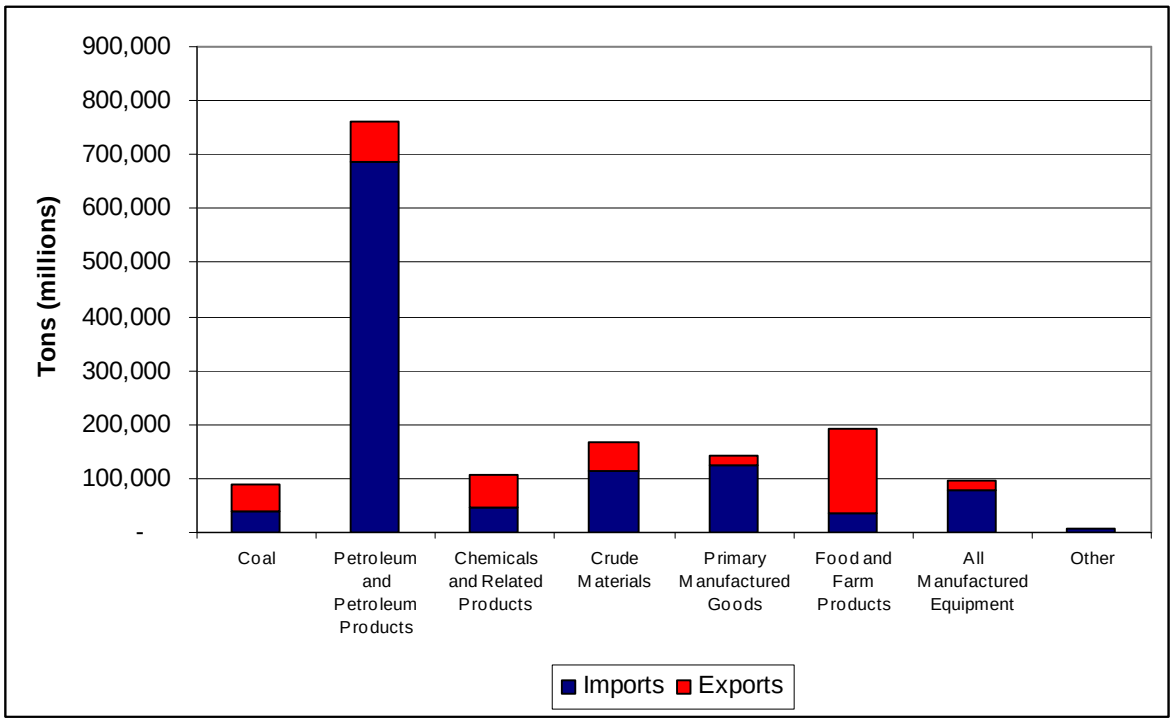
Source: Waterborne Commerce of the United States

Foreign Commodity Trends

In 2006, the USACE reported that foreign waterborne commerce in the U.S. totaled 1.565 billion tons with the top five commodity types being petroleum and petroleum products, food and farm products, crude materials, primary manufactured goods, and chemicals and related products in that order.

For the same year, 1.130 billion tons of foreign imports and 434 million tons of foreign exports were moved on waterways in the U.S. Petroleum and petroleum products are by far the leading commodity for foreign imports with an almost 6 to 1 margin over the next leading import, primary manufactured goods. Food and farm products are the largest foreign export with a sizeable lead over all other exports. Figure 3.2 shows foreign imports and exports by major commodity type in 2006.

Figure 3.2 Foreign Imports and Exports by Major Commodity Type, 2006



Source: Waterborne Commerce Statistics Center

Other Impacts on Foreign Trade

Waterborne activity on the international front has endured global changes. Some impacts, as described below, include increased trade with Asia and the integration of global economics through trade agreements.

Increased Trade with Asia

Asia has recently become a worldwide leader in trade. This is due to their steadily growing population and their rising personal income. Many of the countries within Asia are becoming more industrialized, which has caused more energy consumption in natural gas, oil, and coal. Several countries mainly China, Japan, South Korea, and India all have rapidly increased their commercial fleet, outpacing vessel production in the United States. Some of the largest shipbuilders in the world are located in China, South Korea, and Japan with the world's largest shipyard set to open in 2015 in Shanghai, China. With lower prices due to cheaper labor and less stringent construction codes, it will prove challenging for the U.S. to compete in this area.

Integration of Global Economics through Trade Agreements

Many countries worldwide have acknowledged the need for trade by signing agreements promoting free and open trade for individual countries, aiming to increase their national economy. These agreements impact the movement of waterborne commerce. Some examples of trade agreements are listed below:

- North American Free Trade Agreement (NAFTA) - The world's largest free trade agreement between Canada, Mexico, and the U.S. This agreement was signed in 1992 and became effective on January 1, 1994.

- Dominican Republic–Central America Free Trade Agreement (DR-CAFTA) - A free trade agreement with the U.S., Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the Dominican Republic. The U.S. apporved participation in this agreement on August 2, 2005 with the other countries following suit over the next two subsequent years.

- European Union (EU) - A community of 27 member states (Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the United Kingdom) that have agreed to a common trade policy and standardized system of laws. It was established by the Treaty of Maastricht in 1993.

- Central European Free Trade Agreement (CEFTA)- A trade agreement with 8 countries and nations (Albania, Bosnia and Herzegovina, Croatia, Macedonia, Moldova, Montenegro, Serbia and UNMIK (on behalf of Kosovo)) that are not in the EU. While the CEFTA was formed in 1992, the current member countries joined between 2003 and 2007.

- ASEAN Free Trade Area (AFTA)- This trade agreement is with 10 member nations (Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam, Laos, Myanmar, and Cambodia) that aim to eliminate tariffs and non-tariff barriers between member nations to increase manufacturing, support the local economy and attract foreign investment. The original agreement was signed in January 1992 however the last country to join was in 1999.

3.2 Domestic Trends

Domestic waterborne activity in the United States has fluctuated in the last five years and is down a half a percent from 2005. Some factors that affect domestic trends are discussed below.

Domestic Commerce

In 2006, the USACE reported that domestic trade accounted for about 40 percent of the waterborne tonnage. Table 3.2 shows that 61 percent of all domestic waterborne freight moved in the U.S. is internal meaning the traffic moves within the contiguous U.S. or within the boundaries of Alaska. About 19.7 percent moves across the coastal lanes which includes traffic moving over the ocean or the Gulf of Mexico between domestic ports. Lakewise refers to traffic moving on the Great Lakes System, Intraport is traffic moving within the confines of a single port, and Intra-territory is traffic moving between Puerto Rico and the U.S. Virgin Islands.

Table 3.2 Domestic Waterborne Freight Tonnage, 2006

	Coastwise	Lakewise	Internal	Intraport	Intra-territory	Total
Short Tons (millions)	202	97	628	91	6	1,023
% of total	19.7%	9.5%	61.0%	8.9%	0.6%	100%

Source: Waterborne Commerce Statistics Center

The United States has seventeen states that have navigable internal waterways utilizing waterborne commerce.[5] In 2006, the inland waterways handled over 627 million tons of freight valued at over $70 billion[6]. According to a study by the Texas Transportation Institute, Texas and Louisiana each ship over $10 billion worth of cargo annually while Illinois, Pennsylvania, West Virginia, Kentucky, Mississippi, and Alabama each ship between $2 billion and $10 billion annually. They also found that the inland waterway system moves over half the nation's grain and oilseed exports. This speaks to the value that inland waterways provide to the economic condition of freight movement in the U.S.[7]

Domestic Commodity Trends

In 2006, domestic waterborne commerce totaled 1.023 billion tons. The top three commodity types were petroleum and petroleum products, coal, and crude materials, making up 79 percent of all domestic commerce. Crude materials include wood and lumber, sand, gravel, stone, and metals. The other 21 percent includes food and farm products, chemicals and related products, primary manufactured goods, all manufactured equipment, and others.

Of nearly 360 million tons of petroleum and petroleum products moved domestically, 44 percent traveled internally and 40 percent traveled coastwise. Almost 230 millions tons of

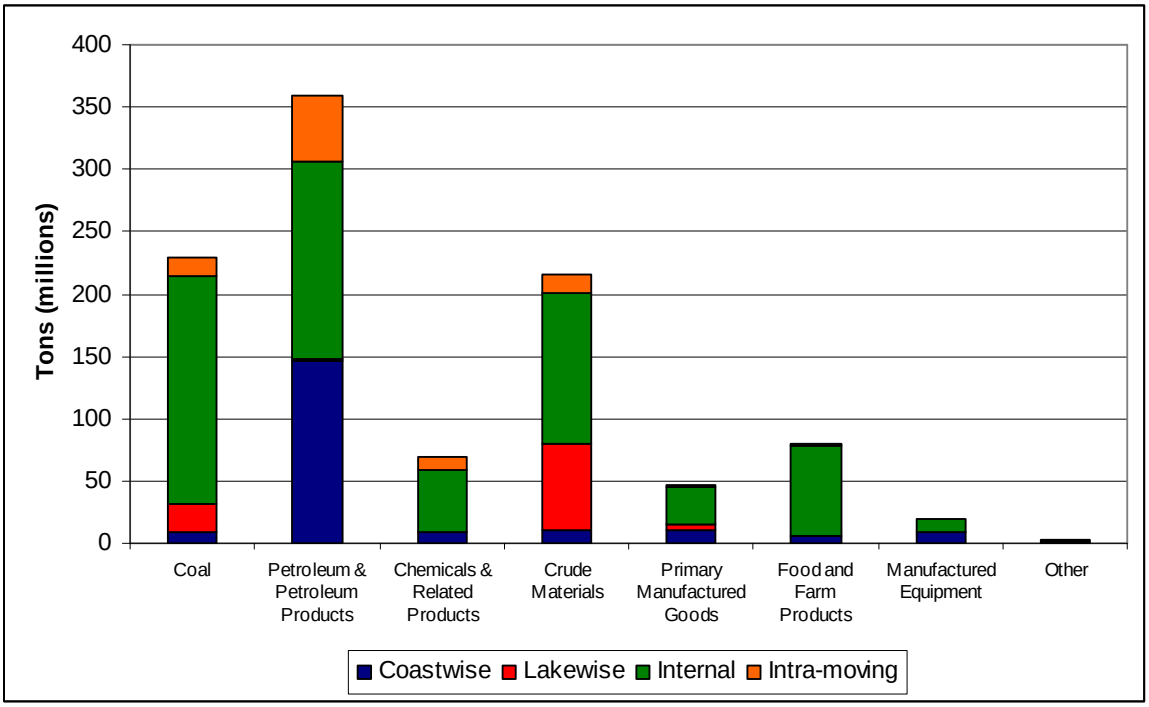
[5] U.S. Department of Maritime Administration. "Tank Vessel Market Indicators", 2006, www.marad.dot.gov

[6] Waterways Council Inc. "Advocating for a World Class Inland Navigation System", 2008. www.waterwayscouncil.org

[7] Texas Transportation Institute. "A Modal Comparison of Domestic Freight Transportation Effects on the General Public", November 2007. www.nationalwaterwaysfoundation.org

coal were transported with the majority, about 80 percent, traveling internally. Ten percent of coal moved lakewise. The 215 million tons of crude materials mainly traveled internally however 32 percent also moved within the Great Lakes System. Of the remaining commodities, 75 percent traveled internally. Figure 3.3 show domestic tonnage by major commodity type and traffic type in 2006.

Figure 3.3 Domestic Tonnage by Major Commodity Type and Traffic Type, 2006



Source: Waterborne Commerce Statistics Center

Other Impacts on Domestic Trade

Waterborne activity within the United States has been affected by several prevalent trends and policies in recent years. Some of these, as discussed below, include added security measures, the slowing economy, and changes in the use of domestic vessels.

Security Measures

Ports and inland waterways are economic gateways into the United States. The 9/11 attacks revealed potential weaknesses in the port infrastructure across the U.S. Since then federal and state legislation has been passed to protect the nation's economic centers. The Maritime Transportation Security Act (MTSA) was enacted in November 2002, to help protect the ports and waterways from terrorist attacks by mandating many security initiatives. The Security and Accountability For Every Port Act of 2006 (SAFE Port Act) was enacted and covered more security issues for ports and waterways including the

creation of special identification cards for workers, additional requirements and inspection of facilities, and enhancing container security. Many ports have cut back on structural improvements of their facilities to fund these additional security requirements. This could have impacts on the cost of waterborne trade because the waterways link to the port facilities.

Slowing Economy

Another impact on domestic trade is the slowing economy which has led to the weakening dollar in trade. The weakening dollar has caused a shift in the U.S. import-export ratio, most notably in the coal industry, which is one of the main domestic commodities. According to the Energy Information Agency, in the Quarterly Coal Report, the weaker dollar has caused more American coal industries to export their coal, as prices rise domestically. This is due mainly to a rise in global energy consumption and the tight global market which has raised the price of coal. In the United States, coal is produced primarily in two regions, the Appalachian Region which is the area east of the Appalachian Mountains and the Powder River Basin which is the area near southeast Montana and northeast Wyoming. The Appalachian Region has experienced recent decreases in coal production due to a major mine closure in Virginia. In addition, recent legislation has made mining underground more expensive. This favors the Powder River Basin, where mining is at the surface. With rising political and public concern about greenhouse gases, the mining industry is unclear as to how future legislation and a possible decline in coal demand will affect future output. This uncertainty could impact the amount and location of waterborne coal.

Domestic Vessels

According to the ENO Foundation's 2007 report "Transportation in America", domestic waterborne shipping moved 14 percent of the nation's cargo tonnage for less than three percent of the freight bill across all modes in 2003. A key component to domestic commerce flow is the fact that the nation's waterborne commerce industry is regulated by the Jones Act which reserves domestic waterways for vessels built in the United States. The USACE indicated that 80 million Americans per year typically utilize U.S. flag passenger vessels; i.e. passenger ferry transport. They also pointed out that over 90 percent of the U.S. population is served by domestic shipping with American private investment in domestic shipping estimated at $18 billion. The primary commodities moved on these American made vessels are crude petroleum, refined petroleum products, residual fuel, and coal.[8]

Many of the domestic (U.S. flagged) vessels in service now were built in the 1970s and 80s. However, due to their age some of these vessels have been removed from service. In 2006, as reported by the U.S. Department of Transportation Maritime Administration,

[8] U.S Department of Maritime Administration." Domestic Shipping: Vital to the Nation's Economy, Security, and Transportation", March 2007. www.marad.dot.gov

U.S.-flag vessels at U.S. ports have declined nearly 7 percent since 2001. These declines are caused by the removal of old tanker and container vessels from service. Tankers generally carry liquid bulk, primarily oil and petroleum products, one of the main domestic commodities. The cost of building new vessels to replace the out of service vessels is becoming prohibitive so there are fewer vessels to move these commodities domestically.

3.3 Florida Trends

Waterborne activity in Florida has been affected by some of the same trends as the United States such as the added security measures and the slowing economy. In addition to these, Florida has some trends of its own such as recent drought conditions and inadequate channel depths to accommodate commercial vessels. Another trend, to Florida's benefit, is the Strategic Intermodal System which has refocused transportation investments on a multimodal transportation system to encourage trends in mobility and economic competitiveness.

Florida Commerce

According to the 2006 USACE Waterborne Commerce report, Florida ranks fifth in the nation for total waterborne commerce based on tonnage. Florida's waterborne tonnage totaled over 128 million tons in 2006, which served 14 deepwater seaports, numerous harbors, and inland waterway systems. Over 1,540 miles of intracoastal and inland waterways provide the state with various forms of commercial activity and recreational opportunities including fishing, cruises, and tourist attractions.

Over the last five years, waterborne commerce in Florida has fluctuated and overall is below the national average change during the same period. Florida was compared to neighboring states as well as to others that utilized the AIWW and the GIWW. This comparison in total tons is shown in Table 3.3 covering the period from 2002-2006. The percentage change in traffic is shown in Table 3.4 over the same time period.

Table 3.3 Total Waterborne Commerce by Selected States, 2002-2006 (000 Short Tons)

	2002	2003	2004	2005	2006
United States	2,340,292	2,394,251	2,551,939	2,527,622	2,588,440
Louisiana (GIWW)	484,927	469,461	487,828	456,713	489,935
Texas (GIWW)	442,251	473,941	502,038	487,100	488,357
Florida (GIWW/AIWW)	122,516	131,570	132,913	133,281	128,737
Alabama (GIWW)	66,888	72,650	77,807	78,014	80,646
Virginia (AIWW)	47,494	50,033	58,227	59,165	55,437
Georgia (AIWW)	23,258	25,356	30,417	32,466	36,472

** Totals exclude duplication*
Source: Waterborne Commerce Statistics Center

Table 3.4 Percentage Change in Waterborne Commerce by Selected States, 2002-2006

	2002-2003	2003-2004	2004-2005	2005-2006	*2002-2006*
United States	2%	7%	-1%	2%	*3%*
Louisiana (GIWW)	-3%	4%	-6%	7%	*0%*
Texas (GIWW)	7%	6%	-3%	0%	*3%*
Florida (GIWW/AIWW)	7%	1%	0%	-3%	*1%*
Alabama (GIWW)	9%	7%	0%	3%	*5%*
Virginia (AIWW)	5%	16%	2%	-6%	*17%*
Georgia (AIWW)	9%	20%	7%	12%	*12%*

Source: Waterborne Commerce Statistics Center

There are a few reasons that may explain the fluctuation in waterborne commerce moving on Florida's waterways. One factor is the recent drought conditions that Florida has been experiencing which has affected the inland waterways. In 2007, water levels across the state reached near record lows. For example, Lake Okeechobee's water levels fell below historic lows. The twelve month period from May 2006 to April 2007 was the second driest season on record.[9]

A second reason may be the inability to maintain the waterways to their intended depths. The length of study and the high cost of labor and materials to dredge viable waterways prevent them from being used to their fullest potential. This results in less traffic moving on the waterways.

Another contributing factor may be Florida's susceptibility to hurricanes. Hurricanes can create weather conditions that may cause a port to close which impacts the flow of commerce. In addition, they can cause shoaling at inlets potentially impeding access to harbors and ports. Florida experienced a record number of major hurricanes in 2004 and 2005 impacting many areas of the state.

Finally, a factor impacting Florida as well as the nation is the declining value of the U.S. dollar. The U.S. dollar has decreased by four percent this year and approximately 12 percent since the end of 2006. This decline has the potential to slow trade for waterborne commerce. While recent studies have documented continued growth for waterborne trade, especially container movement, it remains to be seen what impacts the current economy will have on waterborne trade in Florida in the future.

Florida's Commodity Trends

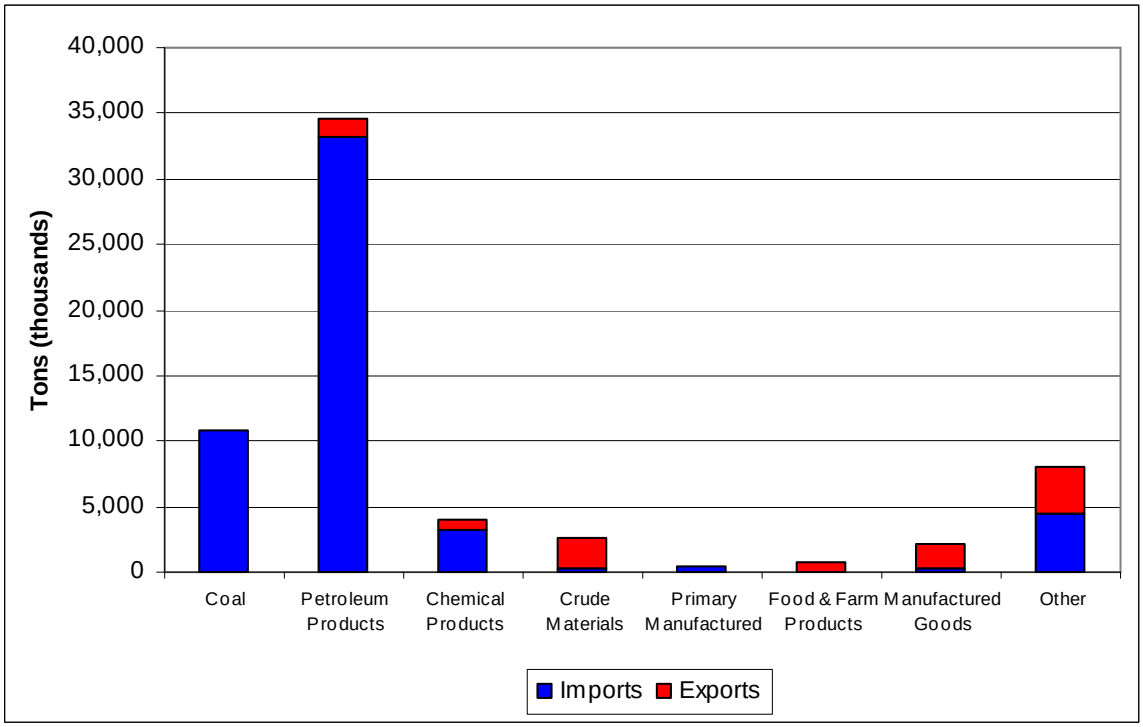
In 2006, over 63 million tons of cargo was moved on waterways between Florida and other states and territories. The top three commodities were petroleum and petroleum

[9] Florida Department of Environmental Protection. "Recommendations for a Drought Resistant Florida, Florida Department of Environmental Protection" July 2007 http://www.dep.state.fl.us/drought/files/drought_smart_report.pdf

products, coal, and chemical products. Petroleum and petroleum products was by far the lead commodity with a three to one margin over the next highest commodity, coal. Other products moving in and out of Florida include crude materials and manufactured goods.

Figure 3.4 details Florida's total reported commodities shipped and received domestically. Petroleum and petroleum products was the main imported commodity and crude materials and other products not specifically identified were the main exported commodities. However, the same figure shows imports exceed exports overall which is typical of Florida as a consuming state. Specifically, domestic imports to Florida make up 84 percent of the total waterborne tonnage with domestic exports from Florida moving the other 16 percent.

Figure 3.4 Domestic Imports and Exports in Florida by Major Commodity Type, 2006



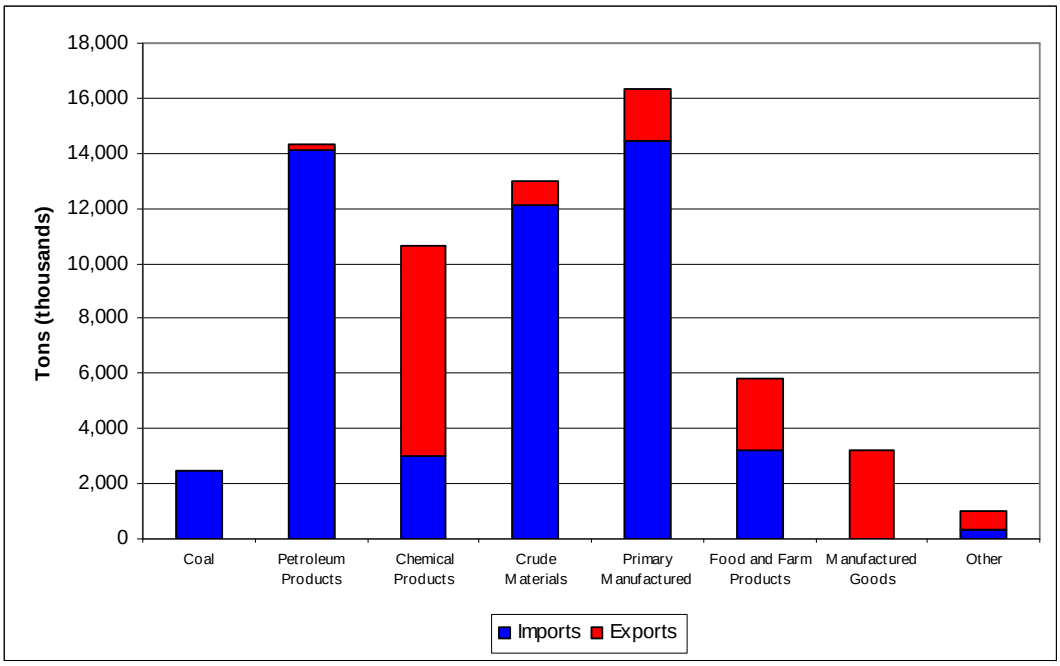
Source: Waterborne Commerce Statistics Center

In addition to waterborne commerce with other states and territories, Florida's waterways moved over 66 million tons of cargo to and from foreign countries. The top three foreign commodities were primary manufactured goods, petroleum and petroleum products, and crude materials. These top three represent about 65 percent of all foreign waterborne trade in Florida.

Figure 3.5 details Florida's total reported commodities shipped and received in foreign trade. When broken down by imports and exports, primary manufactured goods and petroleum and petroleum products emerged as the leading imported commodities while

chemical products were the leading exported commodity. Foreign imports to Florida represent almost 75 percent of the total waterborne tonnage with foreign exports from Florida making up the other 25 percent.

Figure 3.5 Foreign Imports and Exports in Florida by Major Commodity Type, 2006



Source: Waterborne Commerce Statistics Center

Waterborne Shipments from Florida

Table 3.5 shows Florida shipped approximately 28 million tons by water in 2006. Chemical fertilizers, manufactured goods, and sand and gravel were the primary commodities shipped out of Florida. Domestically, the top three states/territories that Florida shipped to were Louisiana, Alabama, and Puerto Rico which received over 79 percent of the total domestic products shipped out of Florida. Louisiana received the largest shipment from Florida receiving over three million tons most of which was chemical fertilizer. A large amount of trade occurred with foreign countries as well and represented nearly 62 percent of the total waterborne shipments leaving Florida in 2006.

Table 3.5 Total Waterborne Shipments From Florida, 2006

Shipments To:	Short Tons	Top Commodities
Louisiana	3,177,111	Chemical Fertilizers
Puerto Rico	2,758,399	Manufactured Goods
Alabama	2,354,532	Sand, Gravel
Total for All States	**10,460,661**	**Chemical Fertilizers**
Canada	118,356	Chemical Fertilizers
Other Countries	16,984,774	Chemical Fertilizers
Combined Total	**27,563,791**	**Chemical Fertilizers**

Source: Waterborne Commerce Statistics Center

Waterborne Shipments to Florida

Table 3.6 shows Florida received approximately 102 million tons by water in 2006. Louisiana and Texas dominate the domestic trade coming into Florida. Florida received nearly 21.4 million tons from Louisiana and over 13.1 million tons from Texas. The main commodities received from the top importers were petroleum, coal, and sand and gravel. Petroleum was the main commodity received representing 31.7 percent of the total shipments. Nearly 1.5 million tons were moved within Florida as well with the main commodity being petroleum. Foreign trade had a slightly higher market share totaling 43.1 percent of all the total imported shipments.

Table 3.6 Total Waterborne Shipments to Florida, 2006

Shipments From:	Short Tons	Top Commodities
Louisiana	21,395,781	Petroleum products
Texas	13,111,023	Petroleum products
Mississippi	6,046,383	Petroleum products
Alabama	5,729,381	Coal
Total for All States	**51,461,223**	**Petroleum**
Canada	5,449,393	Sand, Gravel
Other Countries	44,262,170	Petroleum products
Combined Total	**101,172,786**	**Petroleum**

Source: Waterborne Commerce Statistics Center

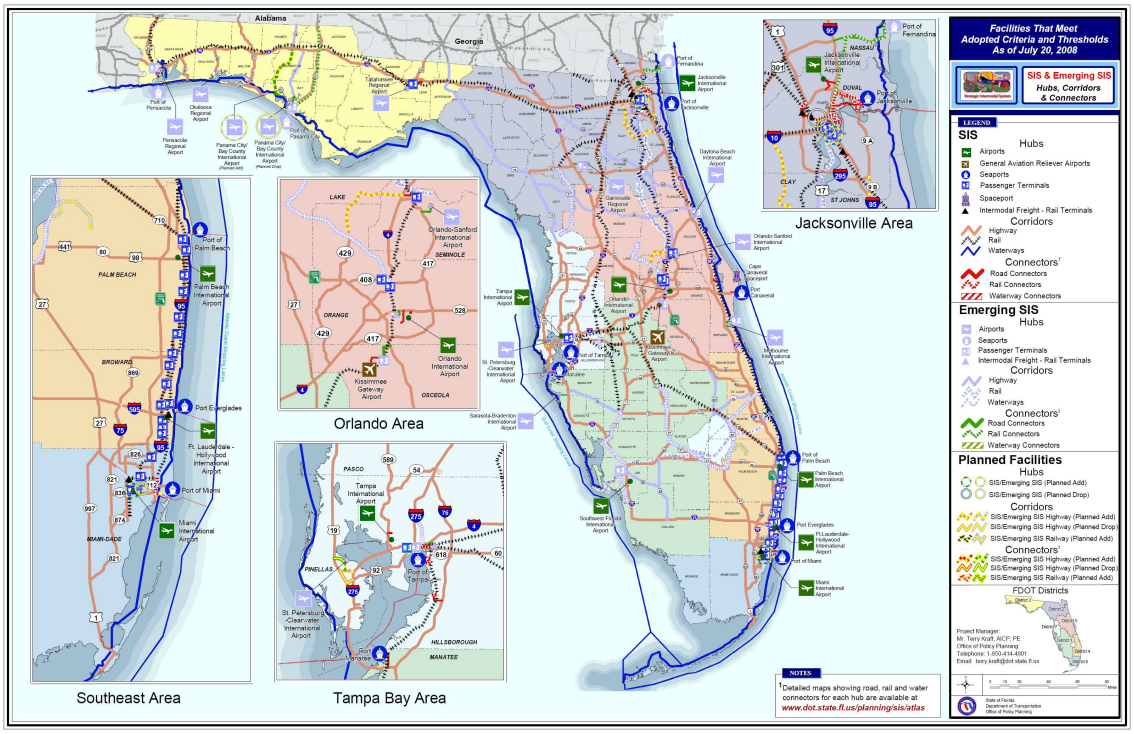
Strategic Intermodal System

Over the last several years, Florida has focused on the development of and investment in an integrated, multimodal transportation system. With the adoption of the Strategic Intermodal System in 2003, Florida began to focus on economic competitiveness by directing limited state resources to transportation facilities that are vital to Florida's economy and quality of life. This system includes two types of facilities: SIS facilities and Emerging SIS facilities. SIS facilities support the major interregional, interstate, and international movements of passengers and freight. Emerging SIS facilities meet lower levels of people and goods movement, generally serving fast-growing economic regions and Rural Areas of Critical Economic Concern. Both types of facilities play an important role in moving people and goods to and from other states and nations.

As part of this intermodal system, waterways were included and reviewed for their contribution to the network of high priority transportation facilities and their connection to the other parts of the system. Waterway corridors and connectors were identified as significant to the statewide economy using criteria established through the SIS Steering Committee process.

In the 2005 SIS Strategic Plan, all coastal shipping lanes and intracoastal waterways were designated as SIS facilities and two inland waterways, St. Johns River and the Okeechobee Waterway, were designated as Emerging SIS facilities. Figure 3.6 displays the major transportation facilities designated on the SIS including waterways in the 2005 SIS Strategic Plan.

Figure 3.6 Major Transportation Facilities on the SIS



Source: FDOT, Office of Policy Planning

Systemwide SIS Data and Designation Review

In 2007, FDOT performed the first Systemwide SIS Data and Designation Review. This annual update, required by Florida Statutes, reviewed the entire system including all activity data. The data review clarified that waterway corridor criteria are now distinguished as deep and shallow draft corridors. The data review also clarified the depiction of waterway connectors as polygons and identified waterway corridor designations. The following provides a summary of the clarification of the waterway corridor criteria, waterway connector representations, and the approved facility designations.

Waterway Corridor Criteria

The universe of waterways that are considered for potential SIS eligibility is expanded from those that physically connect two regions to all waterways in the state. This change recognizes that all of the waterway corridors ultimately connect to the national and international waterway system, and that the majority of the traffic handled on most waterways is interregional, interstate, or international in nature.

In light of this distinction, the method to determine whether a waterway corridor meets the SIS or Emerging SIS threshold has changed. In prior analyses, the waterway corridor's freight tonnage was measured as a percentage of total U.S. inland waterway traffic. This measure is appropriate for rivers that mainly carry domestic traffic, and was appropriate for analysis of those few rivers in Florida that physically connect two regions. However, given that most of Florida's waterways are extensions of harbors and water bodies that handle a mix of international and domestic traffic, the more appropriate measure for many waterways is to divide the waterway's freight tonnage by total U.S. domestic and international waterborne traffic.

A waterway corridor can be designated as a SIS or Emerging SIS facility if it meets the adopted criteria and thresholds. There is no minimum size threshold for coastal shipping lanes and intracoastal waterways; these waterways are automatically designated as part of the SIS. The minimum size criteria and thresholds for SIS inland waterway corridors are based on annual freight traffic, as measured in tons. The threshold is established as a percentage of total nationwide activity. An inland waterway corridor can be designated on the SIS if it handles 0.25 percent of the nation's domestic waterborne freight tonnage for shallow draft corridors, or 0.25 percent of the nation's total (domestic and international) waterborne freight tonnage for deep draft corridors.

Similarly, Emerging SIS waterway corridors must handle 0.05 percent of the nation's domestic waterborne freight tonnage for shallow draft corridors and 0.05 percent of the nation's total (domestic and international) waterborne freight tonnage for deep draft corridors to be eligible for designation as an Emerging SIS facility.

To determine which waterway corridor should be compared to only domestic traffic or to total traffic (domestic plus international) the depth of the corridor is analyzed. If the draft depth of the waterway corridor is a shallow draft corridor (i.e., less than or equal to 12 feet) then the freight tonnage is divided by only the total U.S. domestic tonnage because

by definition shallow draft corridors only carry domestic traffic. If the draft depth is a deep draft corridor (i.e., greater than 12 feet) then the freight tonnage is divided by the total U.S. tonnage including both domestic and international tonnage.

As a result of this clarification to the waterway corridor criteria, the thresholds identified in Table 3.7 were established for shallow and deep draft waterway corridors. The data set used for the analysis of SIS waterway corridors was the 2006 USACE Waterborne Commerce Statistics report as referenced earlier in this report. It should be noted that for the purposes of the SIS, inland waterway corridors include inland waterways made up of navigable rivers, canals, and channels. Inland waterways do not include harbors, as these water bodies do not represent corridors as intended by the SIS. Channels and turning basins in the harbors are represented on the SIS as waterways connectors from the waterway corridor to the seaport, as discussed below. In addition, all SIS waterway corridors must be evaluated on community and environment screening criteria which examines their impacts on community livability, land use, air quality, natural resource lands, cultural and historic sites, and agricultural areas.

Table 3.7 Recommended SIS and Emerging SIS Minimum Size Thresholds for Waterway Corridors based on 2006 data

	Shallow Draft Corridors (All Domestic)	**Deep Draft Corridors** (All Domestic and International)
Freight Tonnage Handled (national total)	1.022 billion	2.587 billion
SIS Threshold (tons) (0.25% of national total)	2.6 million	6.5 million
Emerging SIS Threshold (tons) (0.05% of national total)	511,000	1.3 million

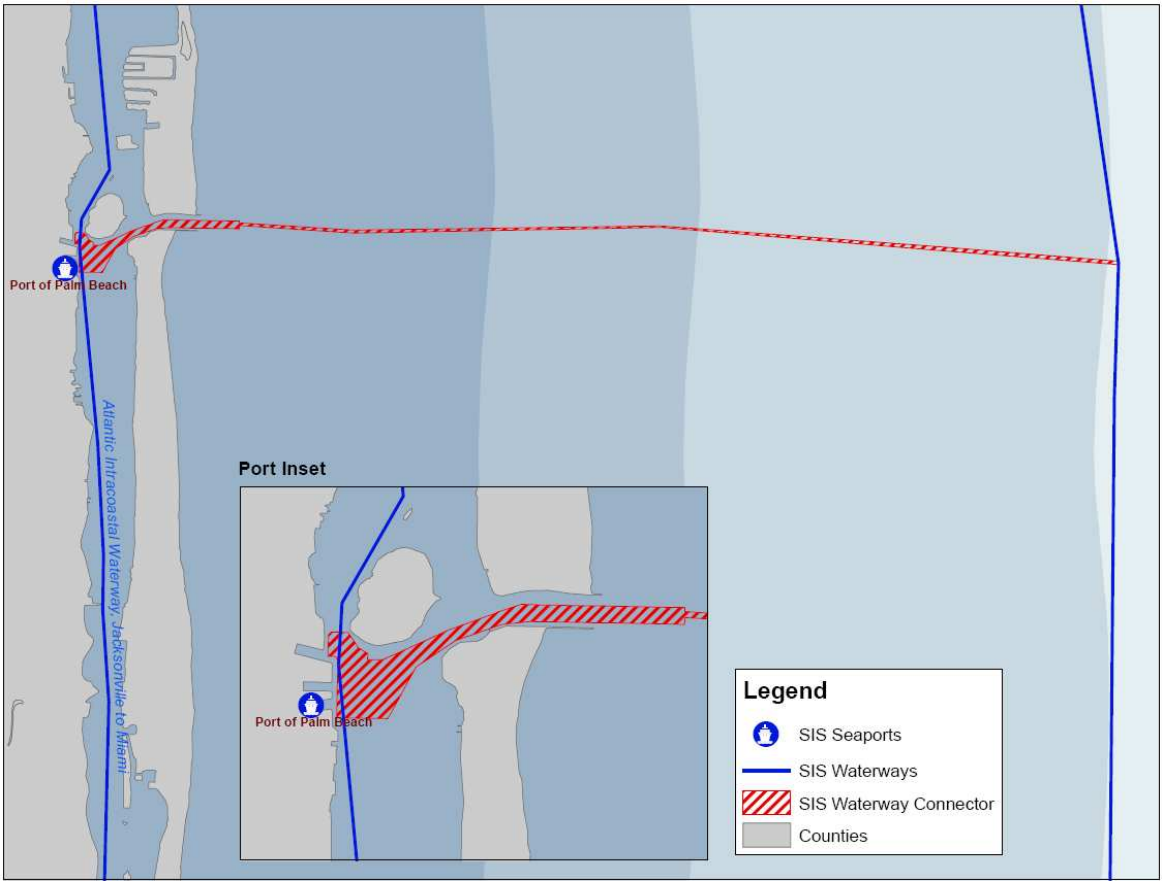
Waterway Connector Representation

SIS and Emerging SIS seaport connectors are designated using adopted intermodal connector criteria and implementation guidance. The purpose of SIS connectors is to connect SIS hubs to the nearest or most appropriate SIS corridor. The purpose of Emerging SIS connectors is to connect Emerging SIS hubs to the nearest or most appropriate SIS or Emerging SIS corridor. In addition, the function of the SIS and Emerging SIS connectors is to provide safe, secure, efficient, reliable, and direct access between hubs and corridors.

In the 2007 Systemwide Data and Designation Review, the representations of waterway connectors on SIS maps were changed. The width of a waterway may vary greatly over a given length. Waterways also include various non-linear elements such as turning basins and anchorages, which are used for vessel turning and maneuvering and therefore help

facilitate the connection between the seaport and the waterway. For these reasons, the channels, turning basins, and other dredged areas that make up waterway connectors are now depicted in the SIS geodatabase as areas, or polygons, rather than linear segments. Figure 3.7 provides an example of a waterway connector polygon. A map with insets for all SIS and Emerging SIS waterway connectors can be found in Appendix C.

Figure 3.7 Example of a Waterway Connector, Port of Palm Beach



Approved SIS Designations

As a result of the 2007 Systemwide SIS Data and Designation Review, five waterway corridors totaling 1,135 miles meet either the coastal shipping lane and Intracoastal Waterway criteria or the SIS minimum size criteria and are designated as SIS facilities. In addition, they also meet the community and environment screening criteria. These include the AIWW-Fernandina to Key West, GIWW-Caloosahatchee River to Anclote River, the Coastal Shipping Lane-Anclote River to Apalachee Bay, the GIWW-Apalachee Bay to Mobile (Alabama), and the Escambia River.

In addition, three waterway corridors totaling 312 miles meet either Emerging SIS minimum size or economic connectivity criteria and are designated as Emerging SIS facilities. These include LaGrange Bayou (minimum size), the St. Johns River (economic

connectivity), and the Okeechobee Waterway (economic connectivity). Figure 3.8 provides a summary of the evaluation of waterway corridors for consideration of SIS designation.

Table 3.8 Summary of Waterway Criteria for SIS Designation

Waterway	Intracoastal Waterway of Coastal Shipping Lane?	2006 Tons (000s)	Channel Depth (Deep/ Shallow)	% Domestic Traffic for Shallow Draft Corridors (000s)	% Total Traffic for Deep Draft Corridors (000s)
Total National Tonnage				1,022,500	2,587,300
AIWW, Fernandina to Jacksonville	**Yes**	**233**	**Shallow**	**0.07%**	**-**
AIWW, Jacksonville to Miami	**Yes**	**234**	**Shallow**	**0.07%**	**-**
AIWW, Miami to Key West	**Yes**	**276**	**Shallow**	**0.07%**	**-**
Chico Bayou	No	483	Deep	-	0.02%
Coastal Shipping Lane, Anclote River to Apalachee Bay	Yes	*	*	-	-
Escambia River	**No**	**3,426**	**Shallow**	**0.34%**	**-**
GIWW, Apalachee Bay to Panama City	**Yes**	**995**	**Shallow**	**1.22%**	**-**
GIWW, Panama City to Pensacola Bay	**Yes**	**3,635**	**Shallow**	**1.22%**	**-**
GIWW, Pensacola Bay to Mobile, AL	**Yes**	**7,873**	**Shallow**	**1.22%**	**-**
GIWW, Caloosahatchee River to Anclote River	**Yes**	**2**	**Shallow**	**0.00%**	**-**
LaGrange Bayou	*No*	*553*	*Shallow*	*0.05%*	-
Miami River	No	557	Deep	-	0.02%
Okeechobee Waterway	*No*	*2*	*Shallow*	*0.00%*	-
Rice Creek	No	111	Shallow	0.01%	-
St. Johns River	*No*	*121*	*Deep*	-	*0.00%*
St. Marks River	No	145	Shallow	0.01%	-
Watson Bayou	No	14	Shallow	0.00%	-
Weedon Island	No	807	Deep	-	0.03%
Florida Total		19,467			

Source: USACE, 2006

Bold indicates that criteria were met to be designated as a SIS facility
Italics indicate that criteria were met to be designated as an Emerging SIS facility.

SIS designation is important to the waterways because it provides a dedicated funding source for designated facilities to receive funding for capacity improvements. In May 2006, FDOT prepared the 2030 SIS Multi-Modal Needs Plan. The section for seaports includes inland waterways and estimates $2.83 million is needed to maintain and improve SIS waterway and seaport facilities through channel dredging, intermodal container transfer facilities, and moving people.

3.4 Regional and Local Trends

Florida's waterways also contribute regionally. The regional benefits that are realized for passenger or recreational service provide an economic impact locally as well as for Florida. Many times this comes in the form of benefits derived from passenger and recreational activities, such as passenger ferry service and recreational boating, which may consist of a variety of water based businesses including dive operations, fishing charters, and marine service providers.

Most metropolitan areas are dependent upon trucks for the movement of the majority of the freight and highways for the movement of people. Florida's counties are no exception, despite the intracoastal waterways and numerous canals, channels, rivers, and creeks found throughout the state. However, some counties are currently utilizing their waterways as a viable transportation mode and others are studying the feasibility of doing so. The following are examples of water transportation options especially for passenger movement. These examples are by no means a comprehensive list of approaches to waterborne transportation options but do provide an idea of the trends in regional transportation planning.

- **Miami River Corridor Multimodal Transportation Plan.** Miami is currently undertaking a pilot program to help with problems concerning congestion and accessibility in the downtown area. Miami- Dade County has established a Miami River Corridor Multimodal Transportation Plan that proposes many recommended enhancements and improvements to the Miami River Corridor. This plan includes a proposal for an inland water terminal, a short sea shipping service/ barge transfer, and future studies into a water transit service.

- **Palm Beach Intracoastal Waterway Master Plan.** Palm Beach County is exploring the AIWW as a mixed use transportation corridor. Limited passenger vessel operations, like gambling operations, water taxi services, barge traffic, and personal vehicles all utilize the AIWW. The County is presently conducting a study for potential expansion of water taxi services along the AIWW. They have identified an operating matrix, potential high speed passenger service, possible service locations, funding opportunities, SIS seaport connections, and service enhancements.

- **Jacksonville Transportation Authority Waterborne Feasibility Study**. The Waterborne Transportation Feasibility Study, jointly funded by the JTA and the First Coast MPO, is designed to investigate the feasibility of using the region's waterways for passenger transportation. The goals were to look for passenger service alternatives, along the St. Johns River and AIWW, to serve commuter needs, reduce reliance on automobiles, better utilize natural resources, and promote regional mobility. The development of waterborne passenger services has long been discussed in the region and has had continued support by a variety of communities searching for improved mobility, connectivity, and economic sustainability.

- **Domestic and Dinner Cruises**. Florida has many successful waterborne passenger-oriented services in operation today, like domestic and dinner cruises and gambling excursions. The Yacht StarShip labels itself as Tampa's premier dining yachts, offering daily lunch and dinner cruises with a brunch offered on Sunday. SunCruz Casinos operates out of Jacksonville, Daytona Beach, Port Canaveral, Port Richey, Key Largo, and Johns Pass. These trips generally last from 90 minutes to just over five hours. Some overnight trips are available on the intracoastal and inland waterways.

- **Water Taxi Services.** One example is Broward County's Water Bus. The County's marine transportation system serves as an alternative to traditional methods of transportation. The County seeks to pursue and expand their water transportation services as a potential option to manage congestion concerns in various parts of the county, and to help improve mobility and accessibility of residents and visitors. According to their MPO's LRTP 2030, they plan to extend the water bus service and expand the current coverage area.

4.0 Opportunities and Challenges for the Waterway System

The adoption of the SIS provides an opportunity to increase mobility for people and freight by advancing a multimodal approach to transportation planning. Waterway corridors are an integral part of this approach.

This chapter will focus on the opportunities and challenges for the waterway system. This chapter is organized as follows:

- Section 4.1 will focus on opportunities to enhance waterborne transportation including the efficiency of waterborne transportation impacting capacity, environment, and safety; economic impacts of marine transportation related businesses; and other economic impacts of waterway transportation.
- Section 4.2 will discuss the challenges of waterborne transportation including maintaining navigable channels, dealing with environmental concerns, and addressing waterway congestion.
- Section 4.3 identifies two policy issues, short sea shipping and the Jones Act, to be addressed that could potentially impact the advancement of waterway corridors as part of a multimodal approach to transportation planning.

4.1 Opportunities to Enhance Waterborne Transportation

With Florida a leader in waterborne cargo imports and exports, it's important to take advantage of the intracoastal and inland waterway system. In order to take advantage of the system, available opportunities must be realized. Some key opportunities for Florida to realize are the efficiency of waterborne transportation, the economic impacts of marine transportation related businesses in regional and local communities and in turn Florida, and the possible growth of intracoastal and inland domestic cruising.

Efficiency of Waterborne Transportation

The most dominant form of freight transportation is truck. However, this popular mode has contributed to increased congestion. A definite advantage to intracoastal and inland waterway transportation is the efficiency in handling large amounts of cargo by barge especially over long distances. In addition, multimodal connectivity is important for the success of waterborne commerce. Water transportation does not cover the entire trip for

passengers or cargo so connections with road and rail access points are crucial for passenger mobility and trade.

The utilization of waterways decreases street surface congestion with long haul trucks and rail. The high capacity of barges helps lower the cost to move goods. Waterborne transportation has environmental advantages over highway and rail and contributes to lower accidents per ton of cargo moved. In addition, many urbanized areas have developed or are looking to develop passenger service to help relieve peak period congestion.

Waterborne Capacity

Florida has the ability to connect to all parts of the world through a variety of different modes. With the existing system, Florida is at a competitive advantage to provide efficient service to destinations across North America, utilizing these different modes of transport. However it is becoming increasingly difficult to reach these destinations with the increase in congestion on highway and rail corridors. This delay in travel is in part due to crashes and breakdowns, but most of the congestion stems from travel demand far exceeding road and rail capacity. Most of the vehicle miles traveled come from the frequent deliveries of trucks that specialize in services with smaller, higher-value shipments and rapid increases expected in rural and urban interstate travel.[10] The capacity of Florida's highway and rail corridors are struggling to keep up with the increasing demand for freight movement.

Waterborne transportation offers some relief to this issue. Barges have the capacity to carry more short tons of liquid, dry, and bulk goods than truck or rail. Therefore they have the potential to relieve capacity constraints and congestion on land. Utilizing barge transportation keeps extra railcars and trucks off the road and in turn reduces landside congestion. There have also been efforts to reduce personal vehicle use, within cities with heavy traffic, by utilizing waterborne passenger transportation.

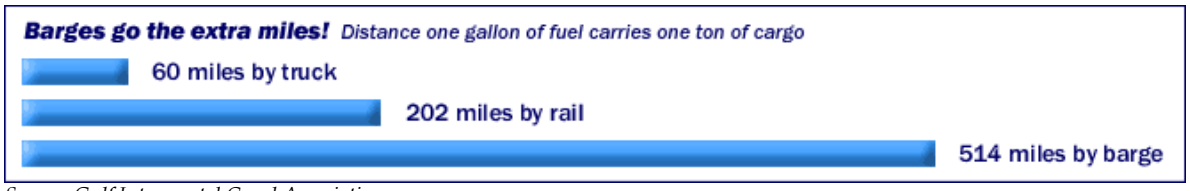
In addition, utilization of the waterways helps keep the price down on many commodities and goods. The efficiency of waterborne transportation is due to the large capacity of the barge over the truck and the railcar. Even more important, is the fuel efficiency of waterborne transportation over land-based transportation. According to the Gulf Intracoastal Canal Association, a single barge can move one ton of cargo 514 miles with one gallon of fuel while a railcar can move one ton 202 miles and a truck can only carry one ton of cargo for 60 miles.[11] Inland barges mainly carry petroleum and petroleum products, coal, crude materials, and food and farm products but can provide capacity for many other commodities. With the escalating cost of fuel, water transportation may

[10] U.S. Department of Transportation. Federal Highway Administration. Freight Management and Operations. *Key Freight Transportation Challenges*. http://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/congest.htm

[11] Gulf Intracoastal Canal Association. *Advantages Over Competing Modes*. http://www.gicaonline.com/pages/initiatives/promotion.htm

become a more viable form of transportation for more types of goods. Figure 4.1 shows the fuel efficiency comparison by mode.

Figure 4.1 Fuel Efficiency Comparisons by Mode

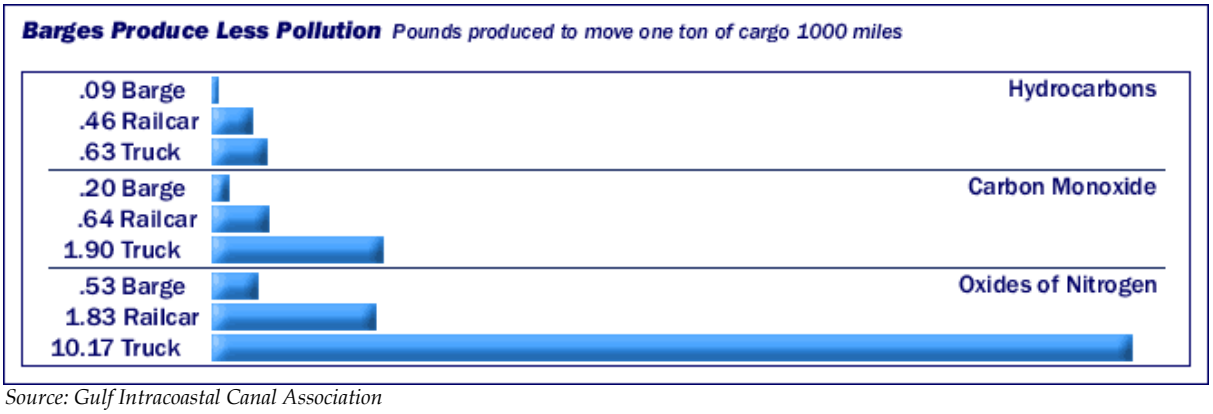


Source: Gulf Intracoastal Canal Association

Environmental Benefits

Another positive impact of waterborne transportation over traditional modes is the environmental advantages. It is reported that barges, tugboats, towboats, and other cargo vessels produce less air pollution than other forms of commercial transportation because it takes less fuel to do the same job. The greater fuel efficiency results in fewer emissions, which contributes to cleaner air. In addition, the use of waterborne transportation results in less noise pollution especially for dense urban areas. Based on information provided by the Gulf Intracoastal Canal Association, barges (or other waterborne vessels) produce 86 percent less pounds of hydrocarbons, 89 percent less pounds of carbon monoxide, and 95 percent less pounds of nitrous oxide than trucks.[12] Figure 4.2 details, by mode, the air emissions produced to move one short ton of cargo 1,000 miles.

Figure 4.2 Comparison of Pollution Produced by Mode



Source: Gulf Intracoastal Canal Association

Emissions from passenger vessels were not detailed in this report because a comparison cannot be made between buses and personal vehicles based on existing literature. There

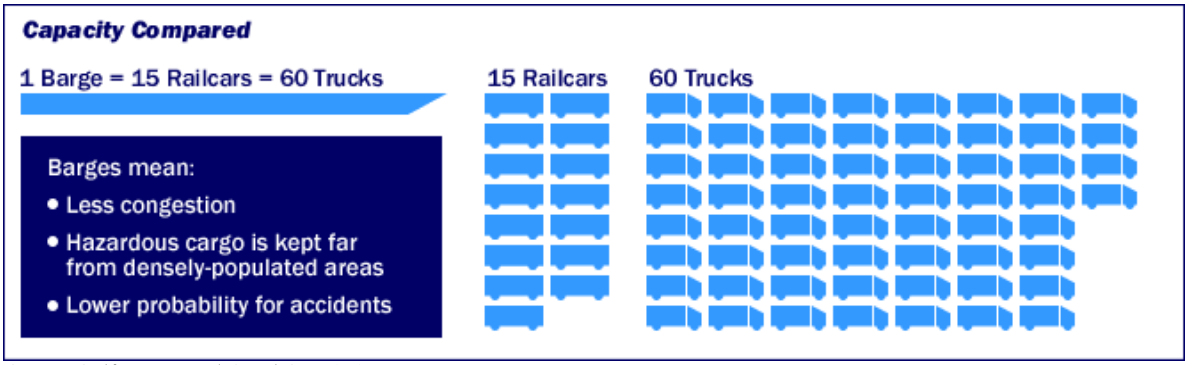
[12] Ibid.

has been no verifiable research and testing from an accredited organization to provide such information. However, the U.S. Department of Transportation is developing a new program to report such data. Though it cannot be scientifically verified, it is assumed that the air emissions of waterborne transit emissions would be lower than automobiles, due to the higher occupancy of the waterborne transit vessels. No assumption is made about air emission comparisons of waterborne transit and buses, as they carry similar occupancy levels.

Safety Advantages

Waterborne transportation is the statistically safest mode for carrying goods. This is true because the use of barge vessels means fewer railcars and trucks on land. In fact, it's been reported that one barge on the water represents 15 fewer railcars and 60 fewer truck on the road. Figure 4.3 details the modal cargo capacity of one barge to railcars and trucks.

Figure 4.3 Cargo Capacity Comparisons by Mode



Source: Gulf Intracoastal Canal Association

It also means that in the unlikely event of an oil spill or accident involving hazardous or dangerous cargo, there is a smaller risk of impacting the general public especially in highly populated areas when compared to a similar accident with a railcar or truck.

The concern of oil spills or other accidents involving hazardous cargo has been addressed through legislation requiring all tanker vessels to be double-hulled by 2015. In addition, since 1997, the oil spill rate has dropped significantly. The American Waterways Operators reported in 2003, the latest year for which data is available, that the industry safely transported 99.9997 percent of the petroleum and petroleum products it delivered.[13]

Also, there are fewer accidents per unit of cargo moved on a barge than for railcars and trucks. Barges generally carry a high capacity of cargo, which require fewer barges on the

[13] American Waterways Operators. *What You Should Know About Tugboat, Towboat, and Barge Industry Safety.* http://www.americanwaterways.com/commitment_safety/stats2.pdf

waterways than vehicles on the road or rail. This results in less congestion on the waterways, which result in fewer accidents.

Waterborne passenger services have become more common throughout the county as more public agencies have implemented these programs. The American Public Transportation Association recently created a standing committee for waterborne transit services to address the needs of safety, regulations, operations, and standards. The Society of Naval Architects and Marine Engineers have documented waterborne transit systems as safe and reliable across the United States, even during natural disasters when land side transportation services have been hindered or closed due to impassibility.

Economic Impact of Marine Transportation Related Businesses

A goal of the SIS is to advance Florida's economic competitiveness by focusing limited state resources on those transportation facilities that are critical to Florida's economy and quality of life. This approach is important for Florida to be able to compete in domestic and global economies.

All too often, highways are a first thought to moving people and goods. In order for Florida to reach its goal of a multimodal transportation system that is economically competitive, it must consider investment in waterway corridors equally as important as other modes. Waterways provide goods movement capabilities not found on highway and rail corridors. However, most of the waterways in Florida are not maintained to their design depth and are not economically competitive for freight movement. In most cases, the inadequate design depth is a result of lack of dredging or fluctuations in the seasonal and weather changes.

Currently, the intracoastal and inland waterways in Florida contribute to the local and regional economy by providing employment opportunities and increased business activity and personal income. The waterways are a naturally attractive location for businesses and economic nodes of all business types, especially water-related and water-dependent businesses.

In order to determine the current economic impact of these water-dependent businesses, 2007 InfoUSA data for Florida was analyzed. InfoUSA provides spatially enabled employment data with information related to classification and size of the business establishments. This information is collected and analyzed daily by InfoUSA researchers. These classifications can be used to identify the type of employment centers like commercial, industrial, etc. that are needed for splitting industry specific employment data that feed into the travel models. The use of InfoUSA data is meant to illustrate the patterns established for each classification considered and not as an exact "windshield survey" of all water-dependent businesses in Florida.

Six North America Industry Classification System (NAICS) codes representing businesses that are water-related or water-dependent were reviewed to identify the number of businesses and employees, and the mean annual sales as reported by InfoUSA in early 2007. The NAICS codes reviewed and their statistics are included in Table 4.1. The following explanations provide a closer look at each of these groups of businesses.

Table 4.1 Florida Summary of InfoUSA Statistics by NAICS Code

NAICS Code	Description	Number of businesses	Number of Employees	Annual Mean Sales
3366	Ship and boat building	429	16,018	$3,989,750,000
4831	Deep sea, coastal, & Great Lakes water transportation	13	7,396	$724,750,000
4832	Inland water transportation	315	2,234	$894,000,000
4872	Scenic and sightseeing water transportation	1,049	6,360	$776,750,000
4883	Other support activities for water transportation	747	3,980	$881,750,000
71393	Marinas	1,953	14,661	$3,027,000,000

Source: 2007 InfoUSA data

Deep Sea, Coastal and Inland Transportation (NAICS 4831/4832)

Figure 4.4 shows businesses for deep sea, coastal and inland water transportation. Water transportation as defined in NAICS code 4831 provides transportation of passenger and cargo using ships, barges, and boats for ocean-going or coastal trips. NAICS 4832 details establishments primarily engaged in providing inland water transportation of passengers and/or cargo on lakes, rivers, or intracoastal waterways.

The deep sea and coastal transportation facilities are mainly clustered in the southeastern part of Florida, from Riviera Beach in Palm Beach County down to Miami in Miami-Dade County, along the AIWW. Only one is located away from the coast in Orlando. The 13 deep sea and coastal businesses shown below collectively reported 7,396 employees and $724,750,000 in mean annual sales.

The inland water transportation facilities are largely grouped around the major ports and harbors within Florida. These facilities are found mainly near the Tampa-St. Petersburg and Miami metropolitan areas, some in Orlando, and on the St. Johns River. The 315 inland transportation businesses shown on the next page collectively reported 2,234 employees and $894,000,000 in mean annual sales to the economy.

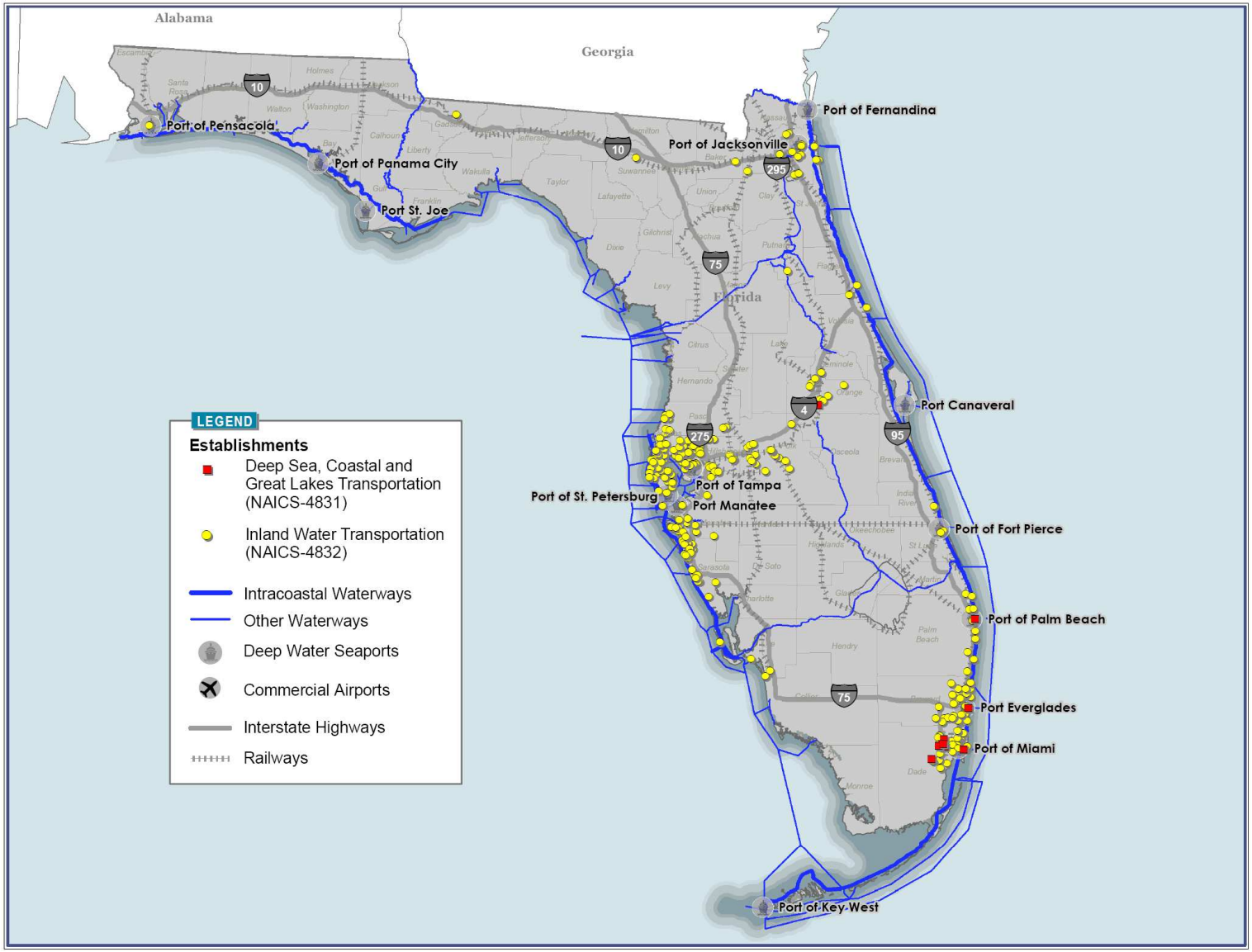
Ship and Boat Building and Support Activities for Water Transportation (NAICS 3366/4883)

Figure 4.5 shows the establishments described as ship and boat building and other support activities for water transportation. Activities include operating shipyards (construction, repair, conversion, and alternation of ships/boats), operating ports and harbors, handling marine cargo, navigational services, and other water transportation services.

The ship and boat building facilities are spread across Florida, but cluster around the intracoastal waterways and some of the major inland waterways including the St. Johns River, Escambia River, and the Okeechobee Waterway. The 429 establishments shown below collectively reported 16,018 employees and contributed $3,989,750,000 in mean annual sales to Florida's economy.

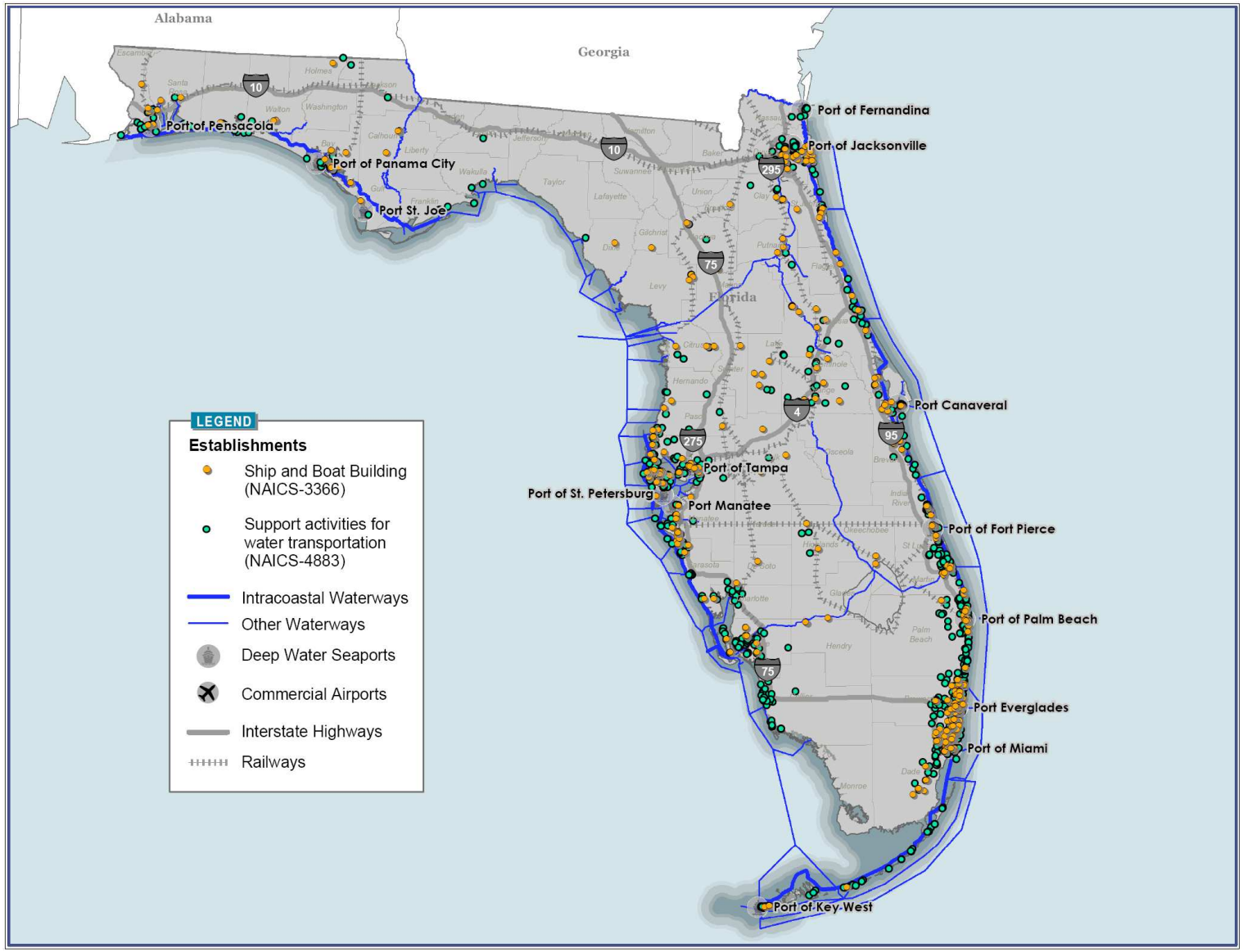
The other support activities follow a similar pattern with clusters around the state mainly near intracoastal and inland waterways. The 747 support activities for water transportation shown on page 4-9 collectively reported 3,980 employees and contributed $881,750,000 in mean sales to the economy.

Figure 4.4 Deep Sea, Coastal, and Inland Transportation Establishments



Source: 2007 InfoUSA

Figure 4.5 Ship and Boat Building and Support Activities for Water Transportation Establishments



Source: 2007 InfoUSA

Marinas (NAICS 71393)

Figure 4.6 shows the businesses described as marinas generally engaged in operating docking and/or storage facilities for pleasure craft owners, with or without one or more related activities, such as retail fueling and marine supplies; and repairing, maintaining, or renting pleasure boats.

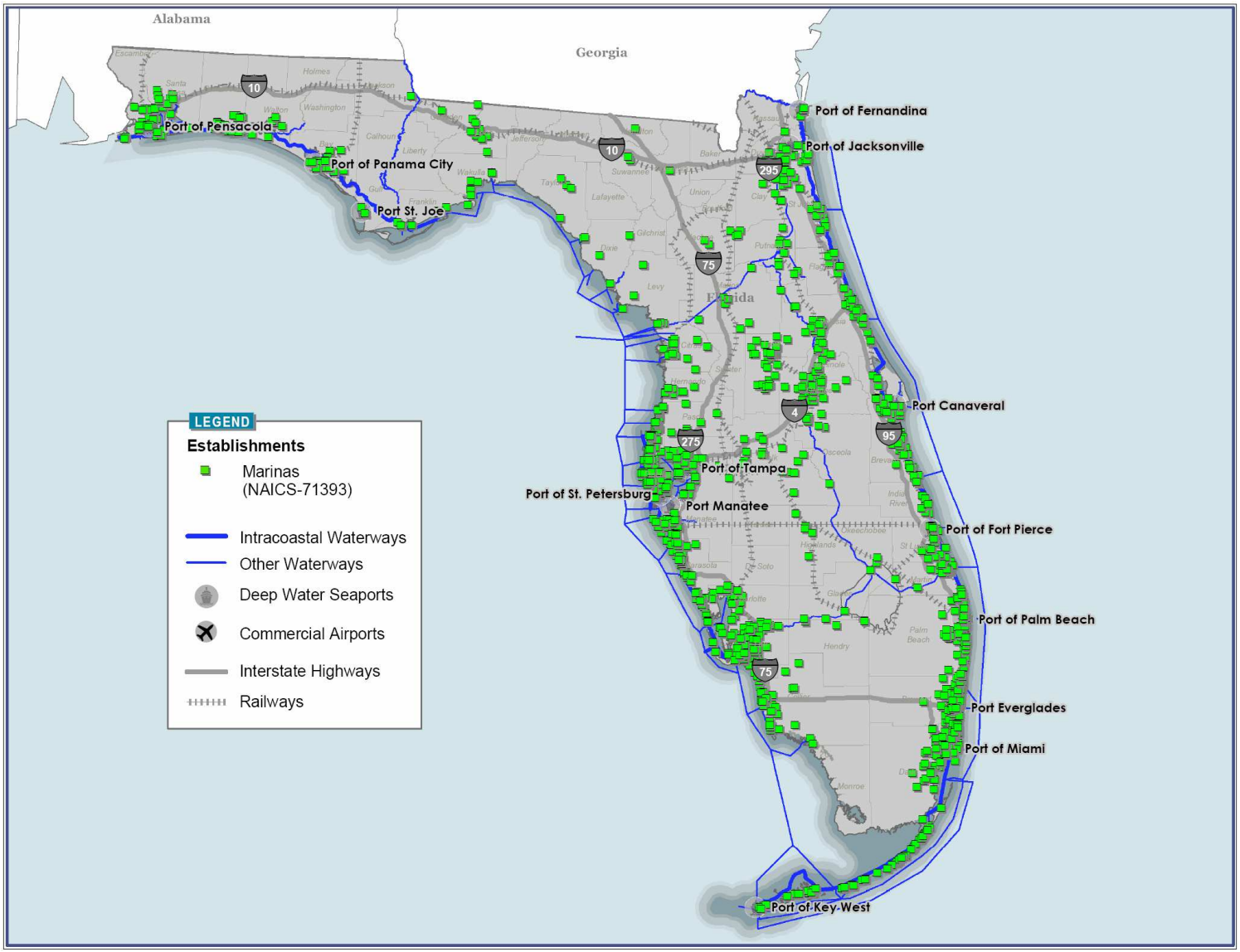
The marinas are widely dispersed throughout Florida. Many of the marinas are found along the AIWW and the GIWW. The marinas located inland are mainly found along the Escambia River, the St. Johns River, and Okeechobee Waterway. Some of the inland marinas are located on smaller lakes, rivers, and tributaries that were not listed in this report. The 1,953 marinas shown on the next page are generally small, but collectively reported 14,661 employees and contributed $3,027,000,000 in mean annual sales to the economy.

Scenic and Sightseeing Water Transportation (NAICS 4872)

Figure 4.7 shows the establishments primarily engaged in providing scenic and sightseeing water transportation usually involving same-day return to place of origin.

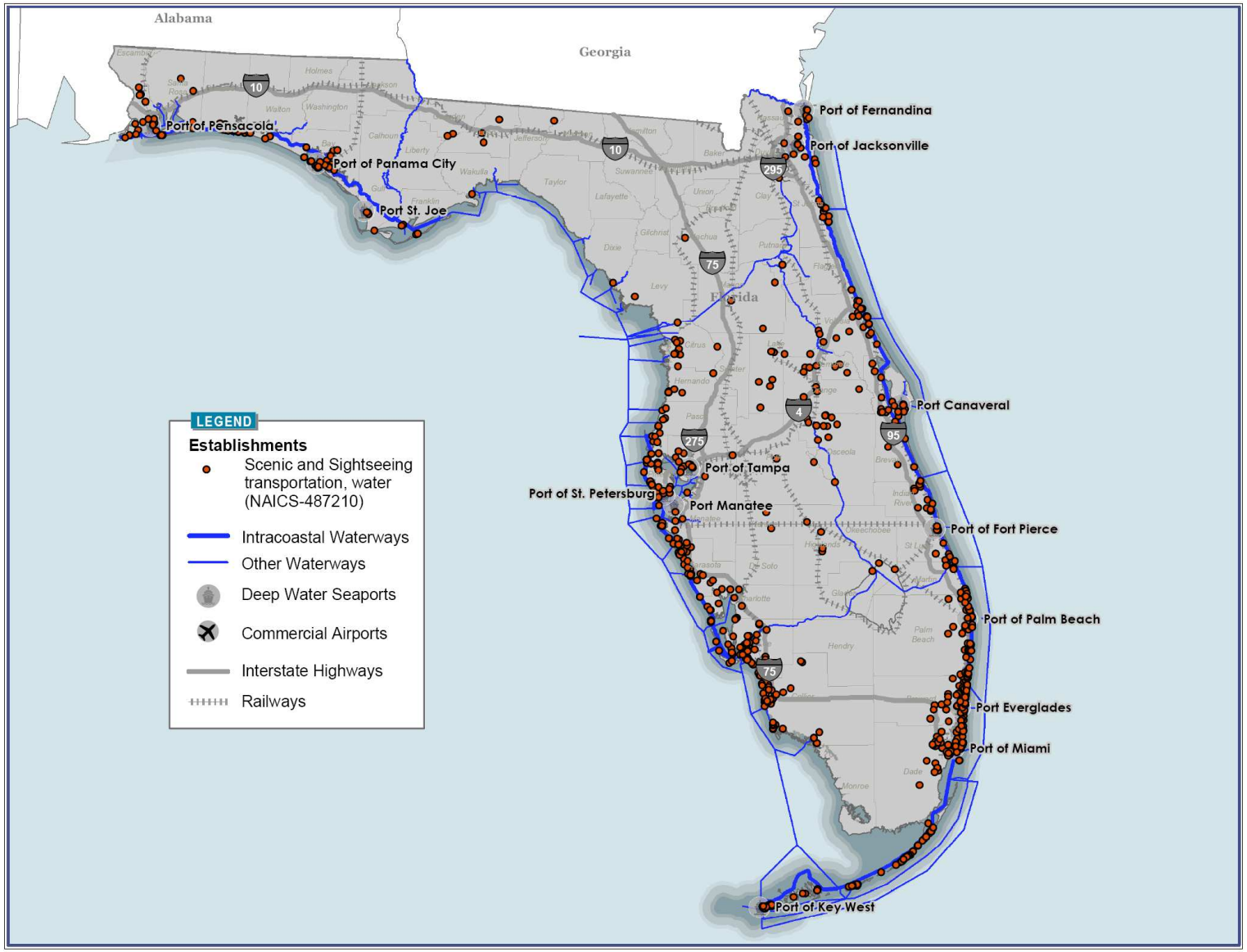
The scenic and sightseeing water transportation facilities are generally located along the AIWW and the GIWW. Many of the inland scenic and sightseeing facilities are located on smaller lakes, rivers, and tributaries that were not listed in this report. The 1,049 scenic and sightseeing businesses shown on page 4-12 are generally small but collectively reported 6,360 employees and contributed $776,750,000 in mean annual sales to the economy.

Figure 4.6 Marina Establishments



Source: 2007 InfoUSA

Figure 4.7 Scenic and Sightseeing Water Transportation Establishments



Source: 2007 InfoUSA

Economic Impact on Regional and Local Economies

This analysis of 2007 InfoUSA data highlights the important economic impacts waterborne transportation and associated activities have on local and regional economies and Florida. This industry cannot grow if the corridors on which they travel are not maintained. The degradation of Florida's intracoastal and inland waterways could negatively impact Florida's ability to remain economically competitive.

If intracoastal and inland waterways were maintained to the control depth authorized, they could potentially contribute even more to Florida's economy. Likewise, if they are allowed to deteriorate to unusable or unsafe conditions it would most certainly decrease their financial impact.

One study conducted by the Florida Inland Navigation District (FIND) and another for the Miami River Commission demonstrate the current and potential economic impacts of waterways on local and regional areas which in turn enhances Florida's economic competitiveness. These studies are described below. Other studies are underway to determine similar impacts. Many regions are recognizing the asset they have in the availability of water transportation and the benefits of taking advantage of it.

Economic Analysis of the AIWW

FIND conducted analyses for the counties that house the AIWW in Florida to determine their economic impact.[14] Each county was analyzed for the current economic contribution the AIWW and other inland waterways make in their region. These studies (one for each county) were conducted over the period from 2000-2008.

[14] Florida Inland Navigation District. *Economic Analysis of the District's Waterways.* http://www.aicw.org/studies.htm

One way to identify economic benefits associated with the waterway system is by calculating the Regional Economic Development (RED) benefits. RED benefits are used to assess the regional economic impacts that the inland waterways have on the state of Florida.

In the reports conducted by FIND, RED benefits were further studied. FIND classified RED benefits as the following:

> Regional economic development benefits are above and beyond the net benefits accruing to the nation and can include transfer of income from other regions and secondary benefits that accrue to a region. Local or regional impacts include: employment and income from project operation and maintenance, the operation and expansion of existing firms in the region, the entry of new firms into the region, and induced and indirect impacts from existing and new firms.[15]

RED benefits help to better define the impacts of Florida's waterways. A harder to measure factor related to Florida's waterways is socioeconomic benefits. These benefits represent the social impact over an economic change. These benefits range from the effects to an individual, a community, or a region. These benefits include overall quality of life, physical health, and the aesthetic appreciation of the environment. All these benefits were used in the analysis of the FIND studies to assess the regional economic impact of Florida's waterways.

As a part of this study, FIND conducted surveys of all registered boat owners to determine all water-related businesses within the county. All businesses that were directly related, indirectly related, and those who had no affiliation with the waterways were examined to determine the total economic impacts of the waterways. Some businesses were easy to identify, such as marinas, boat dealers, tackle shops, and marine supply stores. Others were harder to identify because they gained revenue from people that were either employed by a water-related business or from persons that utilized the waterways.

The analyses found that maintaining navigation and keeping the waterways at their design depth allows for the waterway related businesses to contribute more to the local economy. There is additional spending by businesses and persons that utilize the waterway which generates more money for the local economy. This money increases the annual sales of the area, creates more jobs, and adds more personal income to the local economy.

These studies point out the important impact water-related and water-dependent industries have on the local economy. It appears from this select sample that it would be valuable, at a minimum, to maintain the waterways at the current level and where feasible increase the waterways to the design water depth for the potential added economic profit to the local and regional economy.

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[15] Florida Inland Navigation District. Final Report "An Economic Analysis of the District's Waterways in Nassau County" March 2008. www.aicw.org

Table 4.2 lists the county and year of analysis along with existing economic impact in each county in terms of annual sales, jobs created, and personal income generated by the AIWW. This table also shows the increase in economic impact if the AIWW and other waterways were adequately maintained to their designed depth. Conversely, it shows that ceasing to maintain the waterways would result in a decrease in economic impact.

Table 4.2 Economic Impacts of the Waterways in the FIND Studies

		Economic Impact under Existing Conditions			Increase in Economic Impact if Maintained to Design Depths			Decrease in Economic Impact if Not Adequately Maintained		
County	Year of Study	Annual Sales (millions)	Jobs	Personal Income (millions)	Annual Sales (millions)	Jobs	Personal Income (millions)	Annual Sales (millions)	Jobs	Personal Income (millions)
Nassau	2008	$55	515	$15	$3	31	$1	$12	111	$3
Duval	2005	$2,290	19,394	$725	$125	1,258	$42	$303	3,278	$114
St. Johns	2005	$213	2,157	$73	$15	185	$6	$139	1,385	$49
Flagler	2002	$133	1,116	$46	$6	55	$2	$118	991	$42
Volusia	2002	$267	2,979	$86	$6	84	$2	$43	637	$15
Brevard	2002	$754	7,382	$260	$27	277	$9	$541	5,193	$193
Indian River	2000	$80	1,185	$29	$30	46	$1	$27	396	$10
St. Lucie	2000	$193	2,359	$66	$28	303	$8	$120	1,426	$40
Martin	2000	$326	4,237	$123	$60	768	$22	$177	2,209	$64
Palm Beach	2007	$1,900	16,505	$688	$227	1938	$80	$824	7,256	$297
Broward	2008	$6,100	31,843	$1,430	$828	4,603	$190	$2,900	15,924	$650
Miami-Dade	2007	$2,180	20,285	$769	$293	2,727	$104	$1,240	11,274	$437

Source: Florida Inland Navigation District, Economic Impact Studies

Economic Analysis of the Miami River

Another study prepared for the Miami River Commission also points out the positive economic impacts that waterways have in Florida. The Miami River is one of Florida's "working rivers"; it is used for commercial and recreational purposes, with many marinas, commercial boatyards, shipping terminals, and warehousing facilities located on its banks. According to the USACE, the river totals 5.5 miles, and has an authorizedling depth of 15 feet although current depth is only 13 feet. There are current operations and permitting with the USACE that may allow for the continued dredging of the River to reach the original project depth of 15 feet by the end of 2008, depending on funding. The maintenance dredging project on the river is 40 percent complete, with the work completed on the Upper River. With the mouth of the river unfinished, many current business projects are contingent on the maintenance dredge completion.

The river is commonly divided into three zones based on land uses, residential density, and neighborhood characteristics. The ***Upper River*** is typically known for its industrial business centers, primarily marine and shipping. Many of the shipping terminals are

located here. The ***Middle River*** is known for its huge residential district, parks and historic neighborhoods. The ***Lower River*** is where downtown Miami is located. This area is known for its extensive commercial businesses, offices, and developments.

The shipping industry is located mainly on the Upper River. Foreign trade is an important aspect of the Miami River, with foreign exports accounting for over 75 percent of the total from 1994-2003, as indicated in the recent economic analysis report.[16] Countries in the Caribbean mainly the Dominican Republic, Haiti, and the Bahamas contribute much of the foreign trade on the Miami River. These ports are compatible with the Miami River port, due to their comparable shallow draft ports, short distances, and relative accessibility. Overall, the report stated that the shipping industry is estimated as producing 6,106 jobs, $682.5 million in total county output, and $338.9 million in increased earnings. The total Miami River shipping industry is estimated to bring in over $4 billion from cargo shipments annually.

The non-shipping marine industry includes boat manufacturing and repair, commercial fishing, tour boat service, and boats that service the cruise and mega yacht industry. For example, the mega yacht industry sees potential for expansion with one Dry Dock Company planning to construct and expand their business with a $55 million recreational boatyard that would cater its services to mega-yachts. The expansion is contingent upon the dredging maintenance project that is needed to secure a higher draft for the large yachts. The local company had an economic impact study prepared on the proposed mega-yacht project. The study forecasted the creation of 642 jobs initially during the construction phase, with $26 million produced in earnings. It is estimated that the indirect expenditures from the construction phase will total nearly $45 million, an increase of 1,090 county jobs, $100 million in total county output, and $53 million in increased earnings. Upon completion of the project, the company expects to see annual revenues in excess of $90 million.[17]

The Miami River study also highlights the economic impact that both the shipping and the non-shipping industries have on one river. These economic impacts are beneficial to the region and to Florida as a whole.

[16] Center for Urban & Environmental Solutions at Florida Atlantic University. *An Economic Analysis of the Miami River Marine Industry.* April 2008

[17] Washington Economics Group. *The Economic Development Impacts of Merrill Stevens Comprehensive Revitalization of the Miami River through the Modernization and Expansion of its Dry Dock Ship Repair Facility.* May 2006

Domestic Cruising

Another possible economic engine that the waterways could support is domestic cruising. The cruise industry is a major financial sector for Florida. Besides the traditional international cruises that embark from Florida's major seaports, there are intracoastal and inland cruises sometimes referred to as domestic cruises. This cruise segment is growing in popularity within the United States. River and intracoastal cruises are smaller than ocean-going cruises with capacity for groups of 5 to 450 passengers. These cruises can last from one to 14 days. River and intracoastal cruises utilize smaller ships that navigate shallow draft waterways, and reach a variety of areas, attractions, and places that larger cruises can not. These cruises are advertised for experiences of a local area's culture, history, and natural beauty.

One of the most popular river cruise lines is Majestic America Line, home to the Delta Queen and the American Queen, the latter being the world's largest river cruise. Both of these river cruises travel along the Mississippi River. In Florida, the American Cruise Line (ACL) offers a Great Rivers of Florida cruise that travels on the St. Johns River. The cruise starts in Orlando, and travels through Jacksonville to Amelia Island, and ends at St. Augustine. Within Florida, several marinas have advertised intracoastal cruises and sport-fishing expeditions. Most of these cruises are overnight excursions. One notable marina offering intracoastal cruises is the Santa Barbara Resort in Ft. Lauderdale.

Dinner cruises are another form of domestic cruising that are catered for special events. These cruises offer dining, dancing, sightseeing, and other recreational activities. The trips typically last for a few hours or overnight. There are several dinner cruises in Florida. A noted scenic river boat cruise in Florida is the Rivership Romance, which operates on the St. Johns River. This line offers brunch, luncheon, themed night and theatrical/comedy cruises and caters to many special events. Another noted dinner cruise is the StarLite Cruise, which operates in the Tampa Bay area. This cruise line offers a variety of day and evening cruises, with many offerings for lunch, dinner, dancing, sight-seeing, tours, and specialty themed cruises. This line also caters to special events.

Domestic cruising could be a lucrative business venture that could tap into the underutilized intracoastal and inland waterways within Florida. Further research into feasibility study would dictate potential revenues from these smaller cruise operations.

4.2 Challenges for Waterborne Transportation

Marine transportation is an essential, but often overlooked component of the U.S. transportation system. International trade is expected to triple by 2020, with over 90 percent moving by sea.[18] Florida must be able to handle this projected increase with appropriate planning and management to improve the infrastructure of the waterways and coastal areas. There are several challenges that Florida must address to adequately handle the projected demand on waterborne commerce and passenger movement. These include maintaining navigable channels, mitigating environmental concerns, and alleviating potential waterway congestion.

Navigable Channels

The navigability of waterway channels is vital to their use as a waterway corridor in a multimodal transportation system. Often, however, channel depth and passibility are hindrances to navigability. In addition, the funding needed to maintain navigable channels is often lacking.

The USACE defines navigable waters as "those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce."[19] Channel depth is important in maintaining navigability for water bodies. There are several natural occurrences that can impede channel depth including sediment build-up, shoaling, sand bars, tidal currents, water surges or similar obstructions. Shoaling occurs due to the sediment build-up of wave breaks, where the sand is moved from the tidal currents and deposited. These sand bars and shoaled areas lower the channel depth and can become dangerous barrier for waterborne transportation. Surges are an issue, generally due to locks or extreme weather conditions, because they can depress the water level, which lowers the water depth of a channel.

[18] National Oceanic and Atmospheric Administration. International Year of the Ocean. "US Marine Transportation System" 1998. http://www.yoto98.noaa.gov/yoto/meeting/mar_trans_316.html

[19] 33 CFR Part 329 "Definition of Navigable Waters of the US" http://www.usace.army.mil/cw/cecwo/reg/33cfr329.htm

Another challenge to navigable channels is invasive aquatic species. Florida is home to many invasive aquatic species that can have huge consequences for navigation if left unchecked. Florida's Bureau of Invasive Plant Management states that plants such as hydrilla, water hyacinth, and water lettuce can block access to ports, docks, and locks, which slows commercial traffic and activity. An acre of floating water hyacinth can weigh up to 200 tons; this large volume of plants can cause severe damage to boats, dams, locks, and bridges when in contact. The USACE spends $2.5 million annually to control the plant infestations, while Florida contributes an additional $10-15 million annually.[20] If ignored, plant infestations could be the most important threat to inland navigation.

Finally, navigable channels are hindered by inadequate funding. As in many other government programs, federal funding for waterway construction projects as well as operations and maintenance on federally navigable channels has been decreasing. In addition, inadequate funding is often a result of low usage on the waterway because federal funding is distributed based on volume of traffic moved. In recent years, the minimum amount of tonnage needed to qualify for dredge funding has been raised to the point that it precludes many waterways (including ones in Florida) that need the maintenance funding to remain competitive. Due to reduced federal funding, local sponsors of some inland navigation systems have been forced to bear the additional maintenance costs. For example, the AIWW through assistance from FIND receives federal funding of approximately $3.2 million per year, while maintenance requires $12 to $16 million. In response, FIND has decided to maintain the AIWW, at an estimated cost of approximately $800 million over the 50-year planning period of the waterway.[21]

[20] Bureau of Invasive Plant Management, Plant Management in Florida Waters "Florida's Inland Commercial Navigation" 2004. http://plants.ifas.ufl.edu/guide/navigati.html

[21] Florida Inland Navigation District. Executive Summary "An Economic Analysis of the District's Waterways in Nassau County" www.aicw.org

Environmental Concerns

The very activity that aids in the navigability of the waterway corridor is at the heart of the environment concern for waterways: dredging. Dredging has been regulated since the early 1970's in Florida to protect surface water from degradation, pollution, and to help prevent the alteration of wetlands. The wetlands in Florida serve a variety of common good purposes. Wetlands serve as flood storage areas, prevent shoreline erosion, and are home to many species of plants, fish, birds, and wildlife that are often rare or endangered. There are currently 41 aquatic preserves that cover nearly two million acres, 37 of which can be found along Florida's 8,400 miles of coastline.[22] Dredging has the potential to degrade the quality of water, and can pose harmful effects to plants and wildlife. However, due to the environmentally sensitive waters in Florida, organizations such as the USACE in cooperation with FIND take extensive safety precautions when dredging to ensure minimal disruptions to the environment and wildlife.

Obviously, dredging is needed to maintain navigable waterways and keep them economically competitive. However, there is negative public perception about dredging. Even when dredging is required to maintain design depths for commercial flow, most of the projects are viewed as being harmful for biodiversity and the environment within Florida.

There are some risks that deeper dredging will expose concentrated contaminants but a major concern is the disposal of dredge spoils. In response to environmental concerns over the disposal of dredged material, the Marine Protection, Research, and Sanctuaries Act (MPRSA) was enacted to control the dumping of harmful dredged materials into ocean waters. To ensure that the environment is protected and preserved, Florida uses seasonal dredging

[22] Florida Department of Environmental Protection. "Florida's Aquatic Preserve" http://www.dep.state.fl.us/coastal/programs/aquatic.htm

schedules and specially designed dredging equipment. However, as a result, the associated dredging costs have risen due to the additional requirements that are in place to safeguard the surrounding marine environment.

Waterway Congestion

Waterway congestion problems are most apparent at bottlenecks within the channels that lead to the ports and harbors. There are specific physical locations on the waterways that experience congestion and traffic backups due to inadequate room for vessel turning, depth problems, shoaling, narrow channels, and bridge clearance.

These waterway bottlenecks are a problem because they often delay large numbers of waterborne shipments. This can become problematic because of the transfers that most of these waterborne commodities make once they reach land either by truck or rail. The inefficient use of the waterways allows for an inability to receive "just-in-time" delivery that can result in higher prices for goods.[23] This problem might not ever be resolved, as most of the ports and waterways are located near heavily populated metropolitan areas. These high population centers face more street surface congestion that causes more delay for the freight trucks that utilize those interstates and roads. The seamless transition between modes is important to keep a multimodal transportation system moving.

Bridge clearances often pose obstacles to intracoastal and inland waterway transportation. The bridges can impede passibility both horizontally and vertically for larger freight or passenger vessels. Though bridges aid in navigation, most were built to connect heavily populated areas, and are heavily traveled. When in operation, moveable bridges cause road surface congestion at the access points as vehicles must wait for the bridge to open and close. For waterborne transportation, the process to open and close the bridges presents longer waiting times that can extend delivery time. Careful planning and coordination is vital to a seamless transportation system.

[23] National Oceanic and Atmospheric Administration. International Year of the Ocean. "US Marine Transportation System" 1998. http://www.yoto98.noaa.gov/yoto/meeting/mar_trans_316.html

4.3 Other Issues to Consider for Waterborne Transportation

Florida, like other states, is addressing a multitude of issues facing people and goods movement. They are researching solutions to combat growing congestion and capacity issues and looking for ways to advance their multimodal transportation system. Similarly, waterway transportation experts are studying options for advancing waterborne commerce.

Short Sea Shipping

As mentioned earlier, international trade is expected to triple to over 2 billion tons by 2020, and road capacity will not be able to handle the freight tonnage demand. According to the U.S. DOT, between 1998 and 2020, total vehicle miles traveled is expected to increase an average of 2.5 percent annually and truck vehicle miles traveled is expected to increase 3 percent annually. As a result, congestion is expected to have a devastating effect on speed and reliability.[24] To compensate for this anticipated growth, expanded uses of alternate modes of transportation are being explored to help alleviate this expected growth in highway use. Short sea shipping, operated on a statewide-level, is one approach to reduce land side congestion.

Short sea shipping is looked at as a viable mode of domestic trade travel that can help reduce road congestion and save fuel. Short sea shipping is not uncommon to Florida. There are currently some short sea shipping operations in place that distribute fuel, and some feeder ships that move between the larger ports to the smaller ports and intracoastal and inland terminals. Currently, there is no statewide effort to advance the use of this transportation option.

There is no mutually accepted definition for short sea shipping. The U.S. Maritime Administration (U.S. MARAD) defines it as commercial waterborne transportation that does not transit an ocean. It is an alternative form of commercial transportation that utilizes inland and coastal waterways to move commercial freight from major domestic ports to its destination. Other definitions describe it as maritime transport between the ports of a nation as well as between a nation's ports and the ports of adjacent countries or that are situated within a region. In general, short sea shipping, within the context of national and international transportation systems, is primarily a non-deep sea complementary segment to truck and rail transport.[25]

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[24] U.S. Department of Transportation. Federal Highway Administration. Freight Management and Operations. *Key Freight Transportation Challenges*. http://ops.fhwa.dot.gov/freight/freight_analysis/freight_story/congest.htm.

[25] Lombardo, Ph.D., Gary A. 2004. *Short Sea Shipping: Practices, Opportunities and Challenges*. http://www.insourceaudit.com/Whitepapers/Short_Sea_Shipping.asp

Opportunities in Short Sea Shipping

Growth in freight traffic has placed a burden on the current highway and rail system. Both of these systems are reaching capacity constraints, and will have problems keeping pace with future demand in the coming years with existing infrastructure conditions. To maintain demand and current levels of operation, enhancements and expansions are needed. Securing funding for these projects would be limited as the cost to add capacity is skyrocketing. In addition, the land use and environmental concerns surrounding increasing road and rail capacity adds to the issue. An alternative to these modes has been identified in utilizing waterborne transportation. A seemingly underutilized option for waterborne transit is short sea shipping. Short sea shipping has the potential to accommodate the expected growth in cargo tonnage that would otherwise further burden the currently congested road and rail arterials. The importance of short sea shipping has attracted the U. S. MARAD to look into the development of it for America's future.

In 2003, the Short Sea Shipping Cooperative was created to develop and promote the concept of short sea shipping. This cooperative works closely with U.S. based members to study and find maritime transportation solutions to the growing freight congestion problem. In 2004, as part of their work, they provided a study that identified public benefits of short sea shipping. This report stated that evaluating short sea shipping only on a financial and operational basis would make it difficult to establish viable service on short or long routes. The study considered both private and external costs in evaluating transportation alternatives. This "full pricing network" is necessary to account for other negative externalities like air and noise pollution, congestion and accidents, and public infrastructure subsidies. The report pointed out that the market cannot account for all of these negative externalities. This calls for public policies to promote positive societal outcomes by regulation. The study concluded that "such a system would relieve congestion and decrease the number of heavy trucks on coastal highways. It also improves safety, air, noise, and other environmental consequences of land based transportation modes, creates a modern U.S. fleet reserve and cadres of seafarers for military and other emergencies."[26]

Another study conducted by the Texas Transportation Institute found that there were several factors for successful short-sea shipping ventures. These include identifying a niche market and a limited variety of cargo, meeting specific needs using adequately sized/outfitted vessels, developing secure market bases in their operation, providing vessel sailings scheduled on a "frequent", regular or competitive basis, and identifying services provided to shippers.[27] The study focused on cross-Gulf activities and provided perspective from shippers and ports.

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[26] Short Sea Shipping Cooperative. *The Public Benefits of the Short Sea Intermodal System.* November 2004 http://www.shortsea.us/benefits_study.pdf

[27] Kruse, C. James, David H. Bierling, Nathan J. Vajdos. "Analysis of Start-Up Cross-Gulf Short Sea Shipping Activities with Mexico since 1990: Problems and Opportunities" Texas Transportation Institute August 2004 http://swutc.tamu.edu/publications/technicalreports/473700-00021-1.pdf

The U.S. Government Accountability Office (GAO) performed a review for the Senate Committee on Commerce, Science, and Transportation and the House Committee on Transportation and Infrastructure that studied the topic of public investment in short sea shipping. In their July 2005 report entitled Short Sea Shipping Options Show Importance of Systematic Approach to Public Investment Decisions, they point out four overall benefits to short sea shipping as identified by a group of stakeholders. Table 4.3 identifies these benefits and their rationale. They also point out that while there are noted benefits to this alternative to highway freight travel; there are decisions to be made on what role the government should play.

Table 4.3 Benefits of Short Sea Shipping

Benefit	Explanation
Improved freight mobility (increased freight capacity)	At a basic level, incorporating short sea shipping into the surface transportation system may add capacity to certain cargo routes because it increases modal alternatives. Short sea shipping operations may also help increase capacity in other ways, such as helping remove containers from busy ports freeing up needed dock space for incoming cargo.
Improved freight mobility (less congestion)	By taking trucks off the road, short sea shipping may help alleviate congestion along key corridors.
Improved air quality	Barging services may be more fuel efficient than trucking. One barge may be able to carry as much freight as 58 trucks. Removing these trucks from the road and using a more fuel-efficient option may reduce emissions and improve air quality.
Reduced need to build roadways and rail lines	By reducing the pressure on existing transportation infrastructure, short sea shipping can reduce the need to build new infrastructure. Large infrastructure projects such as new roadways and rail lines are expensive, time consuming, and in some cases may be limited.

Source: U.S. GAO U.S. Government Accountability Office. *Freight Transportation: Short Sea Shipping Option Shows Importance of Systematic Approach to Public Investment Decisions*. July 2005. http://www.gao.gov/new.items/d05768.pdf

Challenges in Short Sea Shipping

Despite the many benefits of short sea shipping, the obstacles must be considered for a balanced analysis. There are several issues that will prove challenging in short sea shipping ventures including taxes, marketing to private companies, competition with other modes, and adequate labor.

Taxes. The Harbor Maintenance Tax (HMT), enacted in the Water Resources Development Act of 1986, is a tax of 0.125 percent on the value of commercial cargo and passengers that move through any port on federally maintained navigable waters. The tax revenues are placed in the Harbor Maintenance Trust Fund that is used to pay for harbor maintenance and improvements. Based on current needs, the annual Trust Fund revenues are not sufficient to maintain expenditure levels on necessary projects. The Inland Waterways Tax, enacted in the Waterways Revenue Act of 1978, is a tax on fuel for vessels that participate in commercial waterway transportation and investment interest.

The tax is 24.3 cents per gallon, of which 4.3 cents is dedicated for deficit reduction, and a maximum of 20 cents is allocated to the Inland Waterways Trust Fund. The funds are used for financing one half of the USACE's construction and rehabilitation costs of specific inland waterway projects. These taxes add to the cost of short sea shipping and pose an obstacle to further pursuing the concept.

The HMT would actually result in double taxation because short sea shipping would require more stops, and with the HMT paid every time, the tax reduces the financial savings and revenues generated from short sea shipping operations and limits opportunities for business expansion. The National Ports and Waterways Institute conducted a study about short sea shipping and the HMT. In their October 2005 report titled Short Sea Vessel Services and the Harbor Maintenance Tax, they point out reasons why the short sea shipping should be exempted from the HMT. Some reasons include the external advantages associated with a short sea intermodal system, comparisons to land side transportation that is not subject to additional costs, and providing the estimated financial savings from a short sea intermodal system.

Marketing to Private Companies. There are many companies that currently have short sea shipping operations in place, though this process is not being implemented on a large scale nationwide. To increase the use of short sea shipping operations, the advantages will need to be marketed to become a viable complement to the existing infrastructure and other modes of transport. Frequency of service, competitive prices, and flexibility within ports and navigable waters are important to the success of short sea shipping, to display the advantages over surface transportation.[28] Business participation and awareness about short sea shipping must be attained for effective utilization within Florida's ports. Incentives, promotions, and marketing ads must be directed towards businesses within Florida and their respective trading destinations to utilize this method of transport.

Competition with Other Modes. The successfulness of short sea shipping against traditional modes of transport (i.e., truck and rail) remains uncertain. Shipping takes longer, so it would be harder to attain "just-in-time deliveries". Common concerns about short sea shipping include frequency of service, slow travel times of barges, Coast Guard crewing requirements, and reluctance to switch from trusted modes of transportation to short sea shipping[29]. Overall, short sea shipping might not cost less for businesses, but it could possible relieve congestion on the interstates within Florida, if employed.[30] Despite the rising gas costs only time will tell if short sea shipping could be more cost-efficient than trucks.

Adequate Labor. The International Longshoremen Association (ILA) is the largest labor union representing maritime workers in North America. The ILA is represented in

[28] ibid.

[29] U.S. Government Accountability Office. Freight Transportation: Short Sea Shipping Option Shows Importance of Systematic Approach to Public Investment Decisions. July 2005. http://www.gao.gov/new.items/d05768.pdf

[30] "Can Short sea measure up?" *Journal of Commerce*, April 19-25, 2004, pg. 30-31

Florida with districts in Jacksonville, Ft. Lauderdale, Miami, Tampa, and Ft. Pierce. Most dockworkers are ILA members. The ILA is required to work with freight that is imported or exported from a foreign country. The cost of ILA labor would increase the price of short sea shipping. The U.S. GAO reported in 2005 the effects of handling costs in short sea shipping operations across the country. It was noted that some Gulf Coast operators have been able to secure special rates to reduce the handling costs for short sea shipping. However, some Northeast operators stated that these contracts for special rates with dockworkers are still high and may have deterred some business. One concern would be whether or not to utilize ILA members in domestic short sea shipping operations. Most ports work in conjunction with the ILA, and the ILA has shown their interest and support for short sea shipping, but the cost factor might represent a challenge.

Overall

Short sea shipping can be a viable alternative mode compared to road transport within Florida. There are some challenges that will have to be overcome to have successful domestic short sea shipping. The waterborne industry would need to demonstrate it can ensure comparable delivery of goods to that of road and rail vehicles. FDOT should consider the potential benefits that short sea shipping could provide to Florida's growing congestion problems. Further study including a statewide coordinated plan for partnerships across all operators of transport could address the impacts of rail and freight to maximize efficient use of cargo movement and the issues of intermodal connectivity, growing road surface congestion, and the aging infrastructure. In addition, FDOT should consider a reliable funding source to invest in the capital to maintain, replace, and repair the needed improvements to the physical infrastructure for locks, dams, bridges, railroads, and highways.

Finally, there would have to be a perception change to the potential of short sea shipping in ports across the state. It should be studied for its utilization as an effective form of transport for cargo that can meet "just-in-time" shipments to complement other modes of transport. This could be accomplished through educational services and promotion to encourage the use and effectiveness of short sea shipping to businesses, organizations, ports, and navigational districts.

Jones Act

The Jones Act, Title 46 U.S.C. 883, requires that all cargo moved between two U.S. seaports is shipped on a vessel owned by a U.S. citizen or corporation, built in a U.S. shipyard and manned by a U.S. crew. This law was enacted in 1920 to protect American shipping, provide for an equally competitive domestic marine trade, and maintain the operation and viability of U.S. shipyards. The Jones Act is intended to protect the interests of American workers involved in any maritime business or organization.

Opportunities with the Jones Act

According to the Maritime Cabotage Task Force, the United States has had laws to encourage a national flag fleet since its founding, and the principle of U.S. ownership, construction, and crews has governed domestic waterborne commerce since 1817. The Jones Act fleet has achieved support over the years because the Jones Act guarantees a level playing field with both vessel operators and other modes of transportation. The level playing field ensured by the Jones Act encourages U.S. companies to invest in new vessels and new opportunities.[31]

The Jones Act is part of the U.S. Merchant Marine Act which provides numerous opportunities for the nation's seafarers. It provides a fleet of U.S. flag vessels that provide service in 41 states and to 90 percent of the population. Annually, they contribute 123,000 jobs directly related to maritime activity, have an economic impact of $63 billion, move 17 percent of the nation's intercity freight in terms of ton-miles, and have over 39,000 domestic vessels that service waterborne activity. This fleet represents nearly $30 billion in investment.[32] The Jones Act fleet represented 78 percent of total U.S. operating vessels that called on U.S. ports in 2006 but only nine percent of overall calls.[33]

Challenges with the Jones Act

The Jones Act provides strict governance intended to protect shipping and waterborne commerce movement in the U.S. by restricting foreign vessels calls. Vessel calls occur each time a vessel stops at a port or a terminal to unload or pick up cargo. Restricted coastwise trading privileges means a foreign flagged ship cannot engage in domestic trading including merchandise trade or transportation of goods between two domestic points. With this restriction in place, American crew and ships incur higher costs to ship goods between U.S. ports.

Adding to this challenge is the noncompetitive nature of the U.S. shipbuilding industry. Ship operators are more likely to maintain older ships than replace them with new vessels because of rising costs. Many shipbuilding facilities are not consistently utilized, which results in declining skilled boat building workers. There is potential that these workers may be replaced by foreign born skilled workers in the future to account for the shortage because U.S. shipyards only hold about one percent of the world wide market for large commercial ships. Consequently, U.S. flag vessels at U.S. ports were down seven percent from 2001-2006 as older vessels were removed from service.[34]

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[31] Maritime Cabotage Task Force. *About the U.S. Maritime Cabotage Laws*. 2006. http://www.mctf.com/about_cabotage.shtml

[32] ibid.

[33] U.S. Department of Transportation. Maritime Administration. *Vessel Calls at U.S. Ports Snapshot, 2006*. January 2008. http://www.marad.dot.gov/MARAD_statistics

[34] U.S. Department of Transportation. Maritime Administration. *Vessel Ports at U.S. Ports Snapshot, 2006*. January 2008. http://www.marad.dot.gov/MARAD_statistics

The market entry for domestic competition is high because foreign shippers have many regulations imposed that make it harder for them to profitably compete. The higher costs associated with U.S. vessels and employees are often passed onto the consumer. According to the 2005 GAO report, the high capital costs of U.S. flag vessels require some operators to seek used U.S. flags as an alternative. However, in recent years, there has been a scarcity in used U.S. flag vessels available for purchase or use. Other forms of water transport are usually used that are slower, and make water transport inefficient for "just-in-time" shipping. This slows product movement, makes it harder for competitive prices with other modes, and reduces the ability to expand water operations.[35]

Overall

The Jones Act has implications on how Florida approaches the concept of short sea shipping and other waterborne activity. FDOT should understand these implications and how they fit into planning for waterway transportation in the future.

[35] U.S. Government Accountability Office. Freight Transportation: Short Sea Shipping Option Shows Importance of Systematic Approach to Public Investment Decisions. July 2005. http://www.gao.gov/new.items/d05768.pdf

5.0 Key Findings and Recommendations

This chapter details the findings and recommendations developed as a result of the work in Chapters 2 through 4.

5.1 Key Findings

The following presents a list of findings resulting from the analysis of Florida's intracoastal and inland waterway system:

- **Florida's intracoastal and inland waterway system is well established where it ranks fifth in the nation for total waterborne tonnage moved.** Florida's waterways carried over 128 million tons of cargo in 2006 which traveled the AIWW, the GIWW, 18 harbors, bay, and bayous; two canals; and eight rivers and creeks. The overwhelming majority of tonnage, about 90 percent, is moved through the harbors. The intracoastal and inland waterways move only a small percentage of the total tonnage moved in Florida due to the depth requirements that limit large ships, boats, and vessels from accessing the waterways.
- **Florida's intracoastal and inland waterways are not a reliable means of transporting goods.** The depth level of these waterways is not sufficient to carry the tonnage needed to make full use of these waterways. Most of the waterborne commerce is moved on large vessels and ships that require deep draft navigation, and an increase in water depth is unlikely to occur in the near future due to environmental constraints, funding, and dredging limitations. Despite this, the waterways should at a minimum be maintained at current levels as they do provide numerous economic and recreational opportunities to the local and regional economy.
- **Over the last five years, total waterborne commerce on intracoastal and inland waterways in Florida has fluctuated and overall is below the national average change for the same period.** Florida's total waterborne tonnage slowly increased through 2005 but decreased slightly in 2006. When compared to neighboring states as well as other states that utilize the AIWW, the GIWW, and inland waterways, Florida's percentage growth in tonnage over the last five years is among the lowest. To secure Florida's position in waterborne commerce, more attention should be focused on controlling factors such as necessary infrastructure and facility improvements as global trade is expected to grow substantially presenting further opportunities for Florida's waterways.

- **Most of Florida's metropolitan areas are dependent upon trucks for the movement of the majority of freight, despite the numerous rivers, lakes, and water bodies found throughout the state.** Marine transportation is an essential, but often overlooked component in the transportation system. Florida has to overcome this perception with appropriate planning and management to improve and develop the waterways.
- **Opportunities exist for Florida to take advantage of enhancing waterborne transportation**. Some key opportunities for Florida to realize are the efficiency of waterborne transportation, the economic impacts of marine transportation related businesses in regional and local communities and in turn Florida, and the possible growth of domestic cruising.
- **Studies by the Florida Inland Navigation District (FIND) conclude that the AIWW provides regional economic benefits to its surrounding counties**. Analyses conducted by FIND found that maintaining navigation and keeping the waterways at their design depth allows for the waterway related businesses to contribute more to the local economy. There is additional spending by businesses and persons that utilize the waterway which generates more money for the local economy. This money increases the annual sales of the area, creates more jobs, and adds more personal income to the local economy.
- **The intracoastal and inland waterways are a source of economic development, vitality and growth for the counties and areas that they serve.** These waterways contribute socioeconomic benefits that are measured in value by business activity, personal income, employment, recreational opportunities, environmental appreciation, and many other aspects important to the counties and areas that these inland waterways serve. A major challenge will be how to appropriately monetize these socioeconomic benefits of intracoastal and inland waterways to secure funding for improvements and maintenance.
- **There are several challenges that Florida must address to adequately handle the projected demand on waterborne commerce and passenger movement.** Florida must work toward maintaining navigable channels, mitigating environmental concerns, and alleviating potential waterway congestion.
- **Geographical constraints, funding and environmental issues are major problems for intracoastal and inland waterways.** Capacity and the physical structure of Florida's waterways greatly impact access and multi-modal transport options to expand waterborne commerce. Most of these waterways carry low tonnage that does not qualify them for the SIS designation, and they receive little funding to improve and maintain their physical infrastructure.
- **Short Sea Shipping, operated on a statewide-level, is one approach to reduce land side congestion**. Short sea shipping is looked at as a viable mode of domestic trade travel that can help reduce road congestion and save fuel. Short sea shipping is not uncommon to Florida. There are currently some short ship shipping operations in place that distribute fuel, and some feeder ships that move between the larger ports to the smaller ports and intracoastal and inland terminals. Currently, there is no statewide effort to advance the use of this transportation option.

5.2 Recommendations

The following recommendations should be considered in the effective management of Florida's waterway corridors. The FDOT Seaport Office should:

- **Provide leadership and regularly update the plan.** The FDOT Seaport Office should continue to be the lead office for monitoring waterway corridors in Florida and should prepare an update of the waterway system plan on a two year cycle. This will help FDOT better integrate the waterway system in the state's overall transportation system.
- **Maintain a database of Florida's intracoastal and inland waterway system.** To maintain and manage Florida's waterways, an extensive record of all Florida's commercial and recreational waterways should be compiled in a database. Tonnage should not be the only factor that determines a waterway's significance, more focus should be on the regional impact that a waterway brings.
- **Reevaluate waterway corridors in the SIS Comprehensive Update.** The criteria for waterway corridors as part of the SIS should be revisited in the upcoming SIS Comprehensive Update. The AIWW and the GIWW currently do not carry a significant portion of Florida's waterborne tonnage. However, the intracoastal as well as inland waterways provide numerous economic and recreational opportunities to the local and regional economy.
- **Coordinate with seaport planning activities.** Most of Florida's waterborne tonnage is carried through its harbors. More attention should be focused on enhancing and improving the problems that the ports are currently facing with waterway congestion. There should be coordination with Seaport Master Plans, Intracoastal Plans, and the local Comprehensive Plans in planning waterway corridor improvements. This will be further defined in the Seaport System Plan which is currently under development.
- **Partner with local waterway sponsors.** FDOT should partner with local sponsors of the waterway systems in Florida to keep an open dialogue of the issues concerning waterways. Taking an active role in waterway corridors will keep the FDOT abreast of current conditions and better able to address issues as they relate to the overall transportation system. Statutorily created partners include the Florida Inland Navigation District and the West Coast Inland Navigation District.
- **Quantify the economic impact of the waterway system.** FDOT should further quantify the economic impacts of the intracoastal and inland waterway system. Based on current research, it would be valuable, at a minimum, to maintain the waterways at the current level and where feasible increase the waterways to the design water depth for the potential added economic profit to the local and regional economy. Additional research is recommended to investigate a more in-depth understanding of the recreational benefits of Florida's waterways for economic purposes and to gain a more accurate assessment of Florida's natural resources.

- **Study impacts of using waterway corridors to relieve land side congestion**. FDOT should pursue further study into the relief waterway corridors could potentially provide to the increasing land side congestion and gridlock. Other states and Europe have found success in using waterway corridors to relieve highway and rail congestion.
- **Evaluate the feasibility of domestic cruising.** Further study is recommended to understand the economic impact domestic cruising might have and how the maintenance of the waterway system could assist in pursuing this economic engine in Florida.
- **Understand the environmental impacts of waterway enhancements.** FDOT should further explore and fully understand the environmental impacts of waterway enhancements. Understanding the issues and engaging environmental partners with open communication could potentially further the goals of both parties.
- **Evaluate the potential impacts of Short Sea Shipping.** Implementation of short sea shipping should be further studied to evaluate the possible benefits to Florida and its transportation system. Jones Act laws should be studied for their implications on short sea shipping and other domestic movements. Despite the many challenges, Florida could potentially benefit from implementing a short sea shipping program throughout the state and to nearby states, Mexico, and its Latin America trading countries.

Appendix A

Appendix A – Websites Visited

American Waterways Operators	www.americanwaterways.com
American Cruise Lines	www.americancruiselines.com
Broward County, Florida	www.co.broward.fl.us/port
Charlotte Harbor and the Gulf Islands	www.charlotteharbortravel.com
Charlotte Harbor National Estuary Program	www.chnep.org
City of Freeport, Fl	www.freeportflorida.gov
City of St. Petersburg, FL	www.stpete.org/port/index.htm
Florida Inland Navigation District	www.aicw.org
Florida Department of Environmental Protection	www.dep.state.fl.us
Gulf County, FL	www.gulfcountyedc.org
Gulf Intracoastal Canal Association	www.gicaonline.com
Jacksonville Port Authority	www.jaxport.com
Maritime Cabotage Task Force	www.mctf.com
National Oceanic and Atmospheric Administration	www.noaa.gov
North Florida Water Management District	www.nwfwmd.state.fl.us
Pensacola Marinas	www.pensacolamarinas.com
Port Canaveral	www.portcanaveral.org
Port Everglades	www.porteverglades.org
Port Manatee	www.portmanatee.com
Port of Miami	www.miamidade.gov/portofmiami
Port of Palm Beach	www.portofpalmbeach.com
Port Panama City	www.portpanamacityusa.com

Port of Pensacola	www.portofpensacola.com
Rivership Romance	www.rivershipromance.com
Short Sea Shipping Cooperative	www.shortsea.us
St. Lucie County, Fl	www.stlucieco.gov
St. John River Water Management District	www.sjr.state.fl.us
StarLite Cruises	www.starlitecruises.com
Tampa Port Authority	www.tampaport.com
U.S. Army Corps of Engineers	www.usace.army.mil
U.S. Department of Transportation, FHWA	www.ops.fhwa.dot.gov
U.S. Maritime Administration	www.marad.dot.gov
Waterways Council, Inc.	www.waterwayscouncil.org
West Coast Inland Navigation District	www.wcind.net

Appendix B

Appendix B – Stakeholder Interview List and Interview Guide

The following stakeholders were interviewed to obtain information on Florida's intracoastal and inland waterways.

Entity Name	Interviewee
Florida Inland Navigation District	David Roach
Miami River Commission	Brett Bibeau
Port Canaveral	Wade Morefield
Port of Pensacola	Clyde Mathis Amy Miller
Port of Panama City	Wayne Stubbs
Port of Jacksonville	David Kaufman
Port Everglades	David Anderton Carlos Buqueras Manuel Almira
Port of Miami	Felix Pereira Becky Hope Lance Llewelyn
Port of Tampa	Ram Kancharla
U.S. Army Corps of Engineers, Jacksonville District	Jerry Scarborough
West Coast Inland Navigation District	Charles Listowski

The following interview guide was used for each meeting:

The Florida Department of Transportation (FDOT), like its counterparts throughout the United States, is responsible for the development and implementation of a balanced, integrated, and multimodal transportation program. Since 2000, FDOT has been working with all its partners to develop and integrate the transportation system that will enhance Florida's economic competitiveness, known as the Strategic Intermodal System (SIS). Working with the SIS, the Seaport Office is responsible for programs relating to seaports, intermodal development, and planning for freight movement/intermodal connections. To date, the Seaport Office has successfully positioned itself to integrate key elements of the 2025 Florida Transportation Plan to build upon the technical investigation of ports and port planning. The FDOT is now prepared to take the next steps in the update and development of Florida's waterway systems that serve each port.

To that end, the FDOT is undertaking an initiative to fill critical data gaps and consistent information for Florida's waterways through the development of a Waterways System Plan. This effort is meant to enhance the level of attention given to the waterways and the safe and efficient movement of cargo and cruises that utilize those systems to support Florida's economy. In conjunction with the Seaport System Plan, this effort will help to update Florida's waterway system profile, identify key challenges, and develop recommendations for ongoing waterway system improvements. This information will allow FDOT to better address the waterway's impacts on the regional transportation systems, economic development activities, and overall quality of life; better understand the relationships among the state of Florida; and better identify needed improvements that will facilitate the smooth and efficient flow of goods within the state.

Effective integration of the waterway system into the state's transportation program is critical as this will position the state to best compete for available transportation funds. Florida's overall transportation program has under gone significant changes over the last few years with the implementation of the SIS, the new Growth Management funding including the Transportation Regional Incentive Program (TRIP), ,and other initiatives. These programs address current trends in the movement of global trade, especially waterborne shipments and how they affect Florida's trade markets, and the competitive performance of Florida's ports with other ports in the region and their economic benefits to the State. As such, it is important for the state to have an established waterway element within its transportation program.

We are conducting interviews throughout the state with waterway stakeholders including inland navigation districts, water management districts, the United State Coast Guard, the United State Army Corps of Engineers, seaports, and various operators to more accurately understand how the existing waterway infrastructure is being used, what the strengths and weaknesses are, and provide all involved parties with the opportunity to participate in developing a list of recommended improvements.

The purpose of our interview today is to collect information from you on the roles and responsibilities of your agency and to give you an opportunity to identify any key issues facing the waterway transportation system. We would like to start by having you describe your agency's function, and wrap up with a discussion on what you think the strengths and weaknesses are of the existing waterway system.

Data Review and Collection

- Please describe what your office/job does/entails relating to waterway transportation planning and specifically to waterborne commerce (cargo, cruises) planning.
  - Land use
  - Economic development
  - Safety
  - Enforcement
  - Capacity
  - Operations
  - Etc.
- How is waterway transportation incorporated into your current program? In the regional transportation program? Have specific "waterway" projects been identified?
- What are the driving factors impacting the success of the waterway(s) in your region?
- As part of this study, we are reviewing existing waterborne policies/programs and developing recommendations for improvements. Do you have recommendations for changes to existing waterborne routing policies?
- Are you aware of any security protocols that are in place to specifically address waterborne transportation/commerce? Or any protocols that impact waterborne transportation/commerce? If so, please describe. If not, what do you think should be done?
- Do you see the use of waterway(s) in your region as a way to relieve highway and railway congestion? If so, how? If not, why not?

Opportunities and Challenges to the Waterway System

- Describe the condition of these waterways. Are there significant operational or structural limitations (maintained depth, poor reliability, vessel constraints, location, etc.)?
- How could the existing infrastructure physically be changed to improve regional waterborne commerce flows?
- How could the existing infrastructure be operated differently to improve regional waterborne commerce flows?
- Are you aware of any planned improvements that would impact waterborne flows in the region?
- What are the strengths of the region's waterway transportation infrastructure?
- What are the weaknesses of the region's waterway transportation infrastructure?
- What are the multi-modal (freight, air, rail, etc.) connections available to your waterway? Does this have an impact on the economic benefits of the transportation and commerce of your waterway?

- What are the strengths of the region's multi-modal connections available to your waterway?
- What are the weaknesses of the region's multi-modal connections available to your waterway?
- Are you aware of specific bottlenecks in the waterway system? Please identify specific locations, as appropriate, for each type of constraint.

Economic Conditions

- What kind of activities (commercial, recreational, environmental) are used on the waterway(s) in your region?
- What are the differences in activities on the intracoastal waterway(s) compared to the inland waterway(s) in your region?
- What are the types of traffic observed on the waterway(s) in your region?
- What is the economic growth potential for the inland waterway(s) in your region? Please identify any opportunities or limitations (physical, political, funding, or environmental that could improve or impede economic growth.

General Questions

- Please identify any data/resources/studies you believe we should be collecting and reviewing as part of this study.
- Are there any individuals in the public or private sectors that you believe we should make sure and speak with? If so, please provide contact information.
- What are your expectations for this study? What benefits can your agency derive from this study?
- Do you have any other comments or issues that you would like to discuss?

Appendix C

Appendix C – SIS Maps

The following maps detail all SIS and Emerging SIS Seaports, Waterway Corridors, and Waterway Connectors.

Figure C.1 provides insets for East Coast Seaports:

Inset A: Port of Jacksonville

Inset B: Port of Fernandina

Inset C: Port Canaveral

Inset D: Port of Palm Beach

Inset E: Port Everglades

Inset F: Port of Miami

Figure C.2 provides insets for West and Northwest Coast Seaports:

Inset G: Port of Tampa and Port Manatee

Inset H: Port of Pensacola

Inset I: Port of Panama City

Figure C.1 Florida Seaports on the Strategic Intermodal System (East Coast)

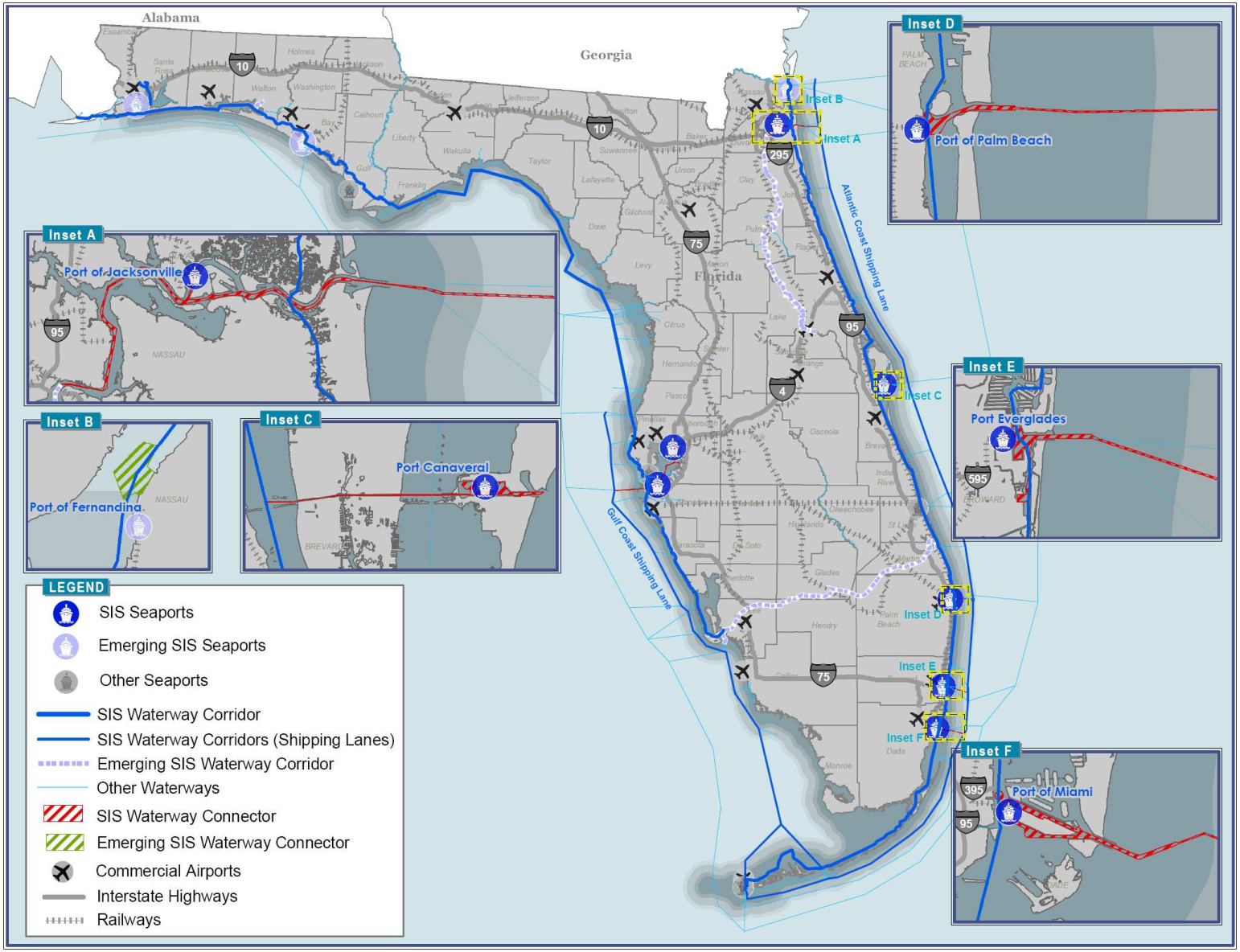
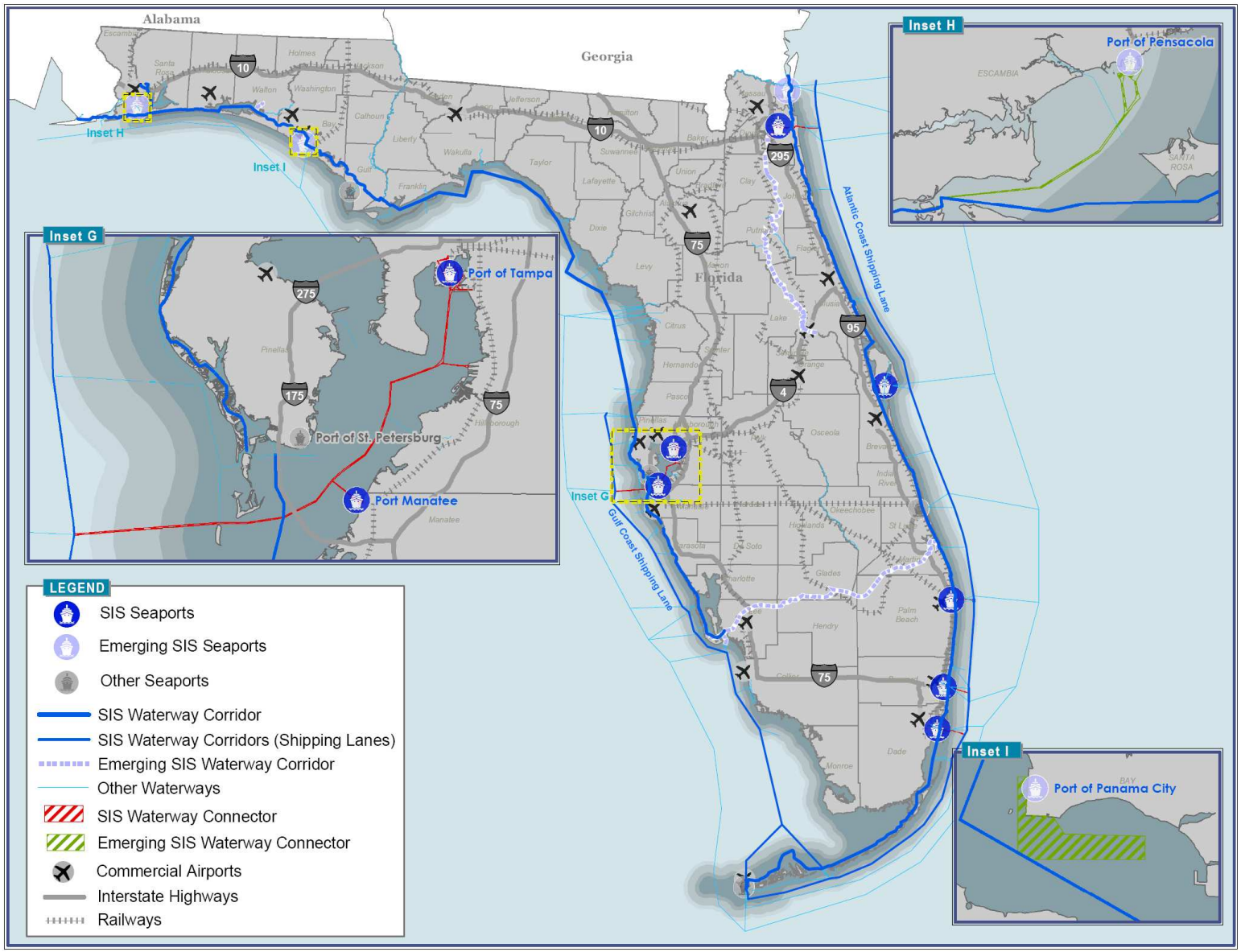


Figure C.2 Florida Seaports on the Strategic Intermodal System (West and Northwest Coast)



Appendix D

Appendix D – Glossary

Authorized depth at MLW – The federally set depth of the waterway at mean low water.

Barge – A shallow draft vessel used to transport goods along the waterway, usually towed or pushed.

Commercial waterway – A waterway that carries any amount of freight for the purpose of commerce.

Deep draft – A waterway whose draft depth is greater than 12 feet deep.

Domestic cruising – A cruise vessel that does not travel international waters for this leisure voyage.

Dredging – A method to scoop or suction material under the water to deepen or modify a waterway.

FIND – Florida Inland Navigation District

Inland waterway – A non tidal waterway such as a river, canal, channel, or harbor.

Intracoastal Waterway – A not tidal waterway such as a bay, canal, or river that is connected so that vessels do not have to travel on the open sea.

Invasive aquatic species – Plants such as hydrilla, water hyacinth, and water lettuce that have adapted to living in, on, or next to water and grow either submerged or partially submerged in water.

Jones Act – A law enacted in 1920 that protects American shipping, provides for equally competitive domestic marine trade, and maintains the operation and viability of U.S. shipyards.

Maritime Cabotage Task Force – A task force dedicated to educating the public on the economic, national security, environmental, and safety benefits of the Jones Act.

MLW – Mean Low Water

Navigable waterway – A body of water that is deep, wide, and slow enough for a vessel to pass through without obstruction.

Recreational waterway – A waterway used for leisure purposes such as boating, swimming, fishing, and natural appreciation.

Shallow draft – A waterway whose draft depth is less than or equal to 12 feet deep.

Shoaling – The deposition of sediments that cause a body of water to become shallower.

Short sea shipping – Primarily a non-deep sea complementary segment to truck and rail transportation.

Tidal current – The flow of water caused by ebbing and flowing tides.

Turning basin – An open area at the end of a water body that allows a vessel to turn around.

USACE – U.S. Army Corps of Engineers

USGAO – U.S. Government Accountability Office

USMARAD – U.S. Maritime Administration

Water surge – A coastal rise in water caused by wind.

WCIND – West Coast Inland Navigation District