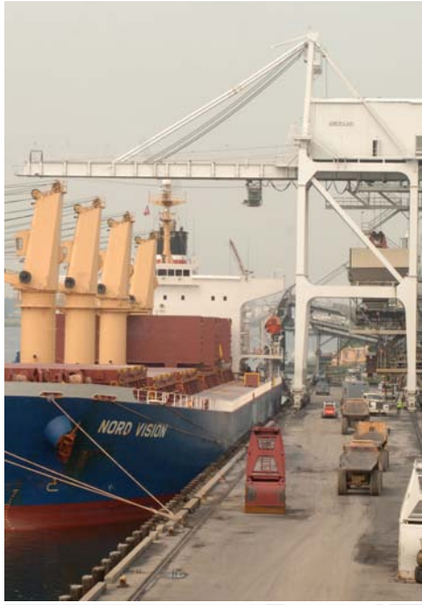

Louisiana Marine Transportation System Plan
State Project No 750-99-0130

Department of Transportation and Development
1201 Capitol Access Road
Baton Rouge, LA 70804-9245

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Shaw Environmental, Inc.

LOUISIANA
MARINE TRANSPORTATION SYSTEM PLAN

State Project No. 750-99-0130

Kathleen Babineaux-Blanco
Governor

Johnny Bradberry
Secretary
Department of Transportation and Development

September 2007

Submitted to the

Louisiana Department of Transportation and Development
Baton Rouge, Louisiana

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List of Acronyms

AHP	Above Head of Passes
APHIS	Animal and Plant Health Inspection Services
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CB	U.S. Census Bureau
CBP	U.S. Customs and Border Protection
CDC	Centers for Disease Control
CFS	Commodity Flow Survey
CG	Containerized grains
CN	Canadian
COB	Container on barge
CPP	Coastal Protection Plan
DDGS	Distiller Dry Grain Soluble (by-product of ethanol production)
DED	Louisiana Department of Economic Development
DEQ	Department of Environmental Quality
DHS	U.S. Department of Homeland Security
DNR	Department of Natural Resources
DoD	Department of Defense
DOT	Department of Transportation
DOTD	Department of Transportation and Development
DWT	Dead weight tons
EDA	Economic Development Administration
EDD	Economic Development District
EIA	Energy Information Administration
EPA	Environmental Protection Agency
EPACT	Energy Policy Act
FCC	Federal Communications Commission
FMC	Federal Maritime Commission
GIPSA	Grain Inspection, Packers, and Stockyard Administration
GIWW	Gulf Intracoastal Waterway
GSP	Gross State Product
HHS	Human Health Services
HMT	Harbor Maintenance Tax
ICE	U.S. Immigration and Customs Enforcement
IHNC	Inner Harbor Navigation Canal
ILA	International Longshoreman Associations
IP	Identity Preserved
IRS	Internal Revenue Service
ISTEA	Intermodal Surface Transportation Efficiency Act
IWR	Institute of Water Resources

List of Acronyms (Continued)

JARC	Jones Act Reform Coalition
LMR	Lower Mississippi River
LOA	Length overall
LPMS	Lock Performance Management System
LRA	Louisiana Recovery Authority
MARAD	Maritime Administration
MRGO	Mississippi River Gulf Outlet
MTBE	Methyl Tertiary Butyl
MTS	Marine Transportation System
NAICS	North American Industry Classification System
NEC	Not Elsewhere Classified
NESHEAP	National Emission Standards for Hazardous Air Pollutants
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
O&M	Operations and Maintenance
O/D	Origin/Destination
OT	Other Territories
PortSETP	Port Security Exercise Training Program
RFS	Renewable Fuels Standards
RPC	Regional Purchase Coefficients
SITC	Standard International Trade Classification
TEUs	Twenty-foot Equivalent Unit(s)
TSA	Transportation Security Agency
TTF	Transportation Trust Fund
TWIC	Transportation Worker Identification Credentials
USACE	United States Army Corps of Engineers
USCG	U.S. Coast Guard
USDA	U.D. Department of Agriculture
USDOT	United States Department of Transportation
USITC	U.S. International Trade Commission
WCUS	Waterborne Commerce of the United States
WRDA	Water Resource and Development Act
WQMP	Water Quality Management Plan

Executive Summary

Louisiana is a national leader in the maritime industry, and its expansive waterway system provides a natural advantage to the state. Waterborne commerce within the state accounts for 20% of the nation's total with the vast majority of this activity, 83%, occurring along the Lower Mississippi River and the Calcasieu Ship Channel. The corresponding port system consists of 39 separate public entities and numerous private docks and terminals. As a unit, this network handles approximately 485 million tons of cargo a year, of which 200 million tons is foreign trade. The waterway system and supporting infrastructure provide the following:

- 20% of the nation's import and export of petroleum and petroleum related products
- 53% of the nation's export of grains (corn, soybeans, wheat, and rice by value)
- 37% of the nation's commercial fisheries landings

Louisiana's marine transportation system is a highly integrated transportation system that connects the domestic markets of America's heartland with the international marketplace. The state's navigable waterway network of over 2,800 miles is second only to that of Alaska. The major beneficiary of this system is the agricultural marketplace within the system boundaries defined by the Mississippi River basin, approximately 40% of the continental United States.

The state's network of rivers, lakes, and bayous consists of twelve main river basins including the following:

- Mississippi River
- Calcasieu River
- Red River
- Atchafalaya River
- Ouachita River
- Lake Pontchartrain and Breton Sound
- Mermentau River
- Vermilion-Teche
- Barataria
- Terrebonne
- Pearl River
- Sabine River

Although it is not in itself a river system, the Gulf Intracoastal Waterway (GIWW) is a key component of Louisiana's waterways system. The GIWW extends more than 1,300 miles east-west from Florida to the Mexican border in Texas. Of those 1300 miles, 302 are within Louisiana. The GIWW passes through seven of Louisiana's coastal river basins, connecting coastal and inland waterways. The GIWW Louisiana portion alternates between a man-made canal, natural bayous, and coastal lakes. Its interconnection to the Mississippi River system and other coastal and inland waterways enables small craft and commercial tows to reach many points throughout the eastern and southern seaboards.

Objectives

Of Louisiana's 64 parishes, 44 lie along a portion of this waterway network. Despite the economic, environmental, and cultural significance of this network to the state, a comprehensive inventory and an analysis of the economic impact of the state's waterway system have never been undertaken. While much of the waterway system is used for recreational and ecosystem management and is culturally significant, this study focuses on major waterway segments used for navigation, waterborne commerce, cargo movements, and complementary economic components.

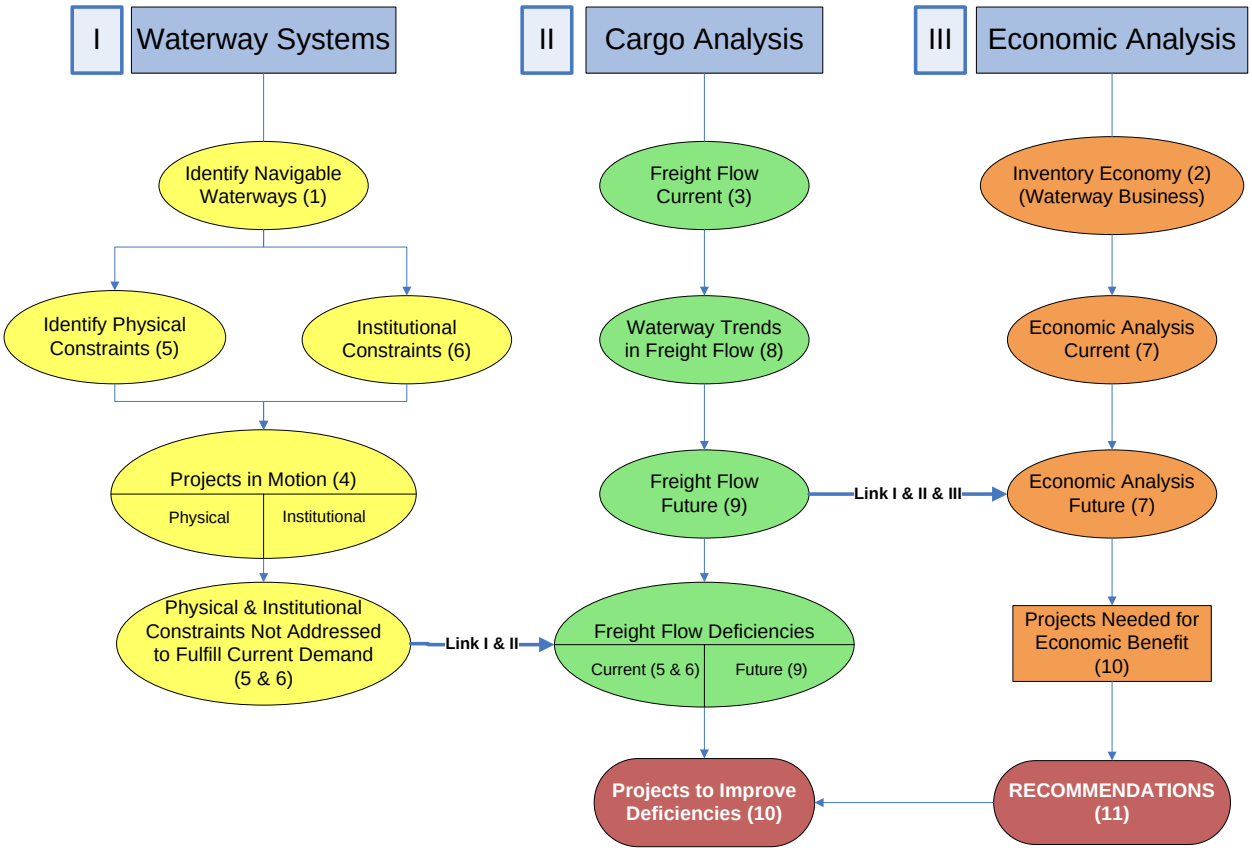
The link between the state's marine transportation system and the state economy is clearly evident. As noted, two-thirds of the parishes in the state are adjacent to navigable waterways, and one in seven jobs in the state are waterway dependent. Direct impacts from waterway related employment generate $3.8 billion in earnings and $22 billion in output, approximately 13% of the state's gross domestic product. The maritime industry contributes $1.9 billion in tax revenue to the state from direct, indirect, and induced sources.

This report provides a broad profile of the Louisiana maritime transportation system, including its physical infrastructure, operational framework, and significance for economic development. The first initiative was to provide a detailed inventory of the resource base, i.e., the navigable waterway system. This inventory led to an assessment of existing conditions and constraints—both physical and institutional constraints. Alternatives were then examined to identify means for minimizing or alleviating those constraints identified along the state's navigable waterways. Situations that constrain and/or minimize optimal operational efficiency and hinder the maximum economic potential of the state's navigable waterways are targeted. Potential solutions to those problems as well as economic opportunities are offered.

Concurrently, an in-depth cargo analysis was developed. Current freight flow was assessed and international and domestic freight flow trends were identified. The resulting future freight flow assessment was linked to the physical and institutional constraints identified in the waterway inventory, which lead to the identification of freight flow deficiencies. It was this waterway data in combination with the cargo analysis that identified projects to improve freight flow and other waterway deficiencies.

The primary economic analysis began with an inventory of waterway dependent businesses in the state. By way of a GIS system, a data set was created using a combination of selected waterway dependent NAICS business types and their relative geographic proximity to waterways. Once developed, this data was combined with the future freight flow data noted previously and was then used to develop future economic analyses. The result was the identification of navigable waterway projects needed for present and future economic development in Louisiana. The basic approach to this study is graphically depicted in Exhibit ES-1.

Exhibit ES-1. Process Flow and Data Analysis Approach Diagram



Findings

Overall, the Louisiana navigable waterway system provides a safe, environmentally sound transportation network for the nation. It also serves as a sustainable economic resource base, one that can be continuously harnessed for the benefit of economic growth and diversification, even more so today than in the past. However, numerous constraints within the system—physical and institutional in nature—hinder economic growth. For Louisiana to maintain a competitive advantage, these constraints must be addressed.

Major physical constraints along many of the state's waterways include but are not limited to channel depth limitations, dredge disposal issues, and outdated locks, all of which are typically addressed at the federal level through congressional mandates and implemented by the U.S. Army Corps of Engineers (USACE). These physical constraints limit the ability of the state's waterways to provide smooth passage and efficient cargo movement, thereby reducing competitiveness.

In the preparation of this study, domestic and foreign trade projections for Louisiana waterways were developed for a 25-year period—2005 to 2030. The total waterborne cargo growth for this period is projected to be 40.1%. The domestic and foreign cargo sectors are projected to grow by 33.5% and 57.6%, respectively. With growth projections such as these, Louisiana should work toward alleviating current waterway system constraints as quickly and efficiently as practical to enhance marketability in domestic and international commerce. Major public and private investments are required to accommodate future infrastructure needs.

For Louisiana to remain competitive on a global scale in cargo operations, which are expected to increase 33% in 10 years, the Louisiana waterway system must be prepared to handle increased cargo movements facilitated by the introduction of larger, more efficient vessels. Ocean container trade volume has outpaced gross domestic product growth by greater than 300% in the past 5 years and is expected to increase 186% in the next 20 years. Container trade is expected to grow faster than the world economy with 60% of all North American container trade originating in Asia and entering the U. S. in already congested Pacific Coast ports (Vickerman, 2006). This poses a tremendous opportunity for Louisiana to accommodate present and future excess international and domestic consumer demand on its waterways and to simultaneously expand its existing market share of container operations. The development of new port opportunities in southwest Louisiana as a major redevelopment scenario is worthy of additional consideration. Currently, Houston is the only Gulf Coast location that is a top 10 maritime container gateway.

Projects that will alleviate physical constraints and associated safety concerns are often burdened by institutional issues. By way of example, one series of constraints results from federal procedures and processes. Specifically, cumbersome organizational structures, project selection procedures, funding approaches and methodologies, and implementation processes for public sector projects often generate years of bureaucracy prior to project implementation. Correspondingly, the funding process and the frequent lack of funding at the federal level exacerbate procedural concerns. At the state level, the primary institutional constraint limiting infrastructure improvements is the lack of adequate public funding mechanisms.

In addition, cargo movements along the state's shallow-draft waterways are more significant than reported. These activities are under-reported because of the standard reporting procedures used by federal agencies, another clearly defined institutional constraint, and the lack of reporting along the state's inland waterways.

A classic example of how this under reporting issue affects Louisiana relates to waterborne commerce in support of offshore oil and gas activities. Much of the data collected by federal authorities used in setting funding priorities are tonnage based. Oil and gas service industries are often frequency-based operations rather than weight-based operations. The result is under-reporting of statistics needed as support for many projects at the federal level. One proposed solution is for the state to accept data gathering responsibility for a period sufficient to create a correlation between trip frequency and weight bearing cargo. In the meantime, federal authorities should be made aware of this situation. Additionally, other frequency based factors such as safety, personnel transfer, equipment mobility, and sustenance supply should be taken into account in waterway needs assessment and funding formulation. It is noteworthy that tonnage is not the only factor used in project justification; in-depth economic analysis also plays a significant role. Nonetheless, frequency of operations should be a weighted factor in project determination.

Projects to Address Physical Constraints

Throughout this report, specific physical projects and institutional issues have been identified as constraints to Louisiana's waterway transportation system. These projects and procedures are intended to achieve the following:

- Improve the efficiency of waterway operations by alleviating physical constraints
- Expedite project planning, authorization, and identification of funding mechanisms by streamlining current USACE and state procedures

- Benefit the state and national economies via waterborne cargo flow and international trade

These proposed projects and concepts directly impact waterways both now and in the future. They are necessary for Louisiana to keep pace and remain competitive with growing demands and economic changes in waterborne commerce on local, state, national, and international levels.

Proposals for construction projects are based on previously referenced U.S. based cargo data. Project selection and presentation do not reflect long-term cargo shifts specific to international economies such as those related to China and other Asian markets; such analysis is not within the scope of this report. Non-construction concepts are based on institutional constraints and economic trends that were identified.

Immediate Construction Projects

The projects listed below are imperative for efficient operation of the state's waterborne commerce system. All of the projects identified within this group address critical physical constraints that pose safety hazards or cause traffic congestion.

- Simmesport Railroad Bridge Alteration
- Bayou Sorrel Lock Replacement
- Inner Harbor Navigation Canal Lock Replacement

Details regarding these projects are provided in the context of this report. It is duly noted, however, that the IHNC Lock Replacement will be affected by congressional decisions regarding closure of the Mississippi River Gulf Outlet (MRGO). If and when the MRGO closure begins, the IHNC Lock must be operable as it offers the only alternate navigable route along the GIWW as it crosses the Mississippi River.

Future Construction Projects

The projects in this group are needed to maintain and improve waterway infrastructure, influence traffic capacity, and allow for minimal continued growth in waterborne commerce. These projects should begin as soon as practical. Channel deepening recommendations, in particular, require environmental impact and feasibility studies prior to implementation. Authorization for many of the following projects was included in the pending WRDA legislation.

- Atchafalaya River (Morgan City to the Gulf)—Channel deepening and alignment stability
- Bayou Lafourche—Channel deepening from Port Fourchon to Belle Pass
- GIWW/Commercial Canal/Port of Iberia Channel Deepening (AGMAC)—Channel deepening to -16 elevation
- GIWW/Port of West St. Mary—Channel deepening to –16 elevation
- Calcasieu Ship Channel—Widening to an optimally efficient dimension
- Calcasieu Ship Channel Dredge Disposal Issues—Identification of additional sites for dredge disposal material
- Red River (Old River Lock to Shreveport)—Channel deepening to -12 elevation
- Red River—Extension of the navigable channel north of Shreveport into Arkansas
- Houma Navigation Canal (HNC)—Channel deepening to -20 elevation from Houma to the Gulf of Mexico
- Baptiste Collette—Channel deepening to accommodate oil and gas industry traffic
- GIWW Locks—Lock replacement for the Calcasieu Lock and the Algiers and Harvey Locks in the New Orleans area

Additional detail for each of the projects is provided within the report. However, generally speaking, all of these projects would alleviate existing traffic congestions and delays and would offer improvement to waterborne traffic. It should also be noted that these are primarily maintenance based projects and are not focused on developing future growth potential.

Non-Construction Concepts to Improve Louisiana's Waterway System

Economic development for Louisiana's maritime industry will depend on strong, coordinated commitments from state agencies, ports, and maritime interests. Commitment to growing and strengthening the maritime industry will increase the state's competitiveness regionally, nationally, and internationally. During the 2005 hurricane season, the magnitude of the nation's dependence on Louisiana for maritime trade cargo in New Orleans and Lake Charles and in the oil and gas industry along the coast became

apparent. The importance of our waterway system should continue to be emphasized and promoted with commitment from state and local entities.

Substantial economic improvement will begin to occur when the physical constraints and infrastructure improvements previously identified have been addressed. However, major institutional constraints are also preventing infrastructure improvement. Funding deficiencies for projects and backlogs in design and construction continue to impair the system, situations that stress the need for a statewide strategic initiative for the waterway system as a whole.

In addition to findings concerning funding and strategy based issues, cargo based trends, projected cargo growth, and world economic and marketplace issues, several concepts for economic improvement and development in the maritime system were identified. Strategy, funding, and other projects for economic growth based on these concepts are described below.

- **Develop a fully representative maritime transportation coalition** to work with federal, state, and maritime-related agencies to guide waterway improvements and economic based projects.

- **Develop a maritime marketing strategy** as a result of the maritime coalition to represent all stakeholders as described above. It appears that Louisiana does not have a long-term marketing strategy that considers the state waterways from a systematic perspective. Promotion of the Louisiana waterway system should expound upon its importance to the nation as both a gateway to international markets and a gateway into America's heartland through the Gulf of Mexico.

- **Streamline federal authorization and funding processes and restructure USACE procedures to minimize time constraints** (currently under legislative consideration). The present USACE budget process focuses narrowly on individual projects that are proposed by individual cost-shared sponsors. Funding of projects to completion often is uncertain for large, multi-year projects, and more projects have been authorized than have been funded.

  Based upon the present backlog, the current level of available O&M funding is inadequate. The Inland Waterways Trust Fund does not have an adequate budget to address the backlog of construction and O&M projects needed to maintain and improve the nation's waterway system. The Harbor Maintenance Trust Fund has a $6 billion surplus that Congress is not directing

to its intended use—maintenance and improvement of the nation's waterway system.

As a general trend, the national investment in water resources projects has not kept pace with the level of economic and social expansion.

- **Develop additional state funding sources.** In light of the federal failure to provide adequate funds to maintain and improve the waterway system, the state must prepare to accept partial responsibility for these tasks and establish funding sources accordingly. Competition for funding sources that already exist in the state dictates that new funding sources be identified.

  a. A trust fund for maritime transportation use can be established. This fund must not violate legal restraints to interstate commerce and should utilize fees generated from maritime operations. While billions of federal dollars are spent on waterway maintenance and improvement, state dollars presently provide a mere fraction of the expenditures on the state waterway system.

  b. Taxes associated with maritime operations that currently go into general fund accounts could and should be measured and a portion redirected to a maritime transportation fund such as that described above.

  c. A reduction in the marine fuel tax exemption can be implemented and the difference can also be used to seed the fund described above.

Success in developing new funding sources will come only as a result of concerted efforts among maritime related agencies in the state, which must work with state and federal legislators, garner industry buy-in and support, and promote the needs of Louisiana's maritime system. An agenda that clearly focuses on state maritime funding needs is required, and all previously listed private and public entities must be involved. With funding mechanisms directed to the maritime system, the following economic-based actions can proceed:

- **Increase value-added manufacturing** industry along the waterways e.g. iron ore and scrap metal, chemical manufacturing, goods manufacturing, ethanol industry, grain containerization, etc.. The limited consumer base within the state restricts market expansion similar to that already achieved in areas such as Houston. Louisiana must create a strategy that offers incentive to value-added service and manufacturing.

- **Develop and/or work with additional industry-specific coalitions** such as the Louisiana Chemical Association to capitalize on interstate and intrastate interests, transportation efficiency, and economic trends.

- **Increase private sector investment** through marketing, tax incentives, and state grants. Increasing private sector investments encourages a larger, stronger consumer base.

- **Develop comprehensive tracking systems for smaller waterways** that support the oil and gas and fisheries industries. A tracking system must be defined, created, and implemented to establish Louisiana's role in the national and international marketplace and to aid in justifying state and local projects. Frequency of use should be included as a performance measure as well as and, on occasion, in lieu of the measure of ton/miles as is used for larger waterways.

- **Accelerate Compliance with Homeland Security Mandates—**While the Transportation Security Administration will require other transportation modes to obtain security credentials, the maritime segment is required to implement the security requirements first. Louisiana has the largest combined port complex along the Mississippi River, employing several thousand workers, as well as other coastal and inland ports that employ thousands more workers. Louisiana should set the pace for security compliance and lead the nation in achieving top security ratings in the maritime industry.

- **Assess and Develop Short-Sea Shipping System**—One solution to congested truck and rail traffic may be an investment in a marine transportation system that fully integrates waterborne transportation into our nation's transportation system. Short-sea shipping functions as an alternative form of commercial transportation that utilizes inland and coastal waterways to move commercial freight from major domestic ports to destination sites.

  One major issue with short-sea shipping is the lack of U.S. flagged vessels capable of moving this domestic cargo in accordance with the Jones Act. To make short-sea shipping successful, creative methods of re-flagging small vessels or the possibility of amending the Jones Act must be explored.

- **Expand Container-on-Barge Operations**—Containerized shipping is not only the fastest growing technique for transporting all types of cargo, but it is also considered one of the most efficient and cost effective methods. International trade generally drives the surge in containerized cargo. With the

increasing role played by the foreign component of U.S. waterborne commerce, it is imperative that the Louisiana marine transportation system take advantage of this trend. Less than 2% of the nation's containerized cargo is handled in Louisiana, and it will be difficult for Louisiana to gain a competitive advantage over modern high-volume facilities such as those in Houston and Miami. However, the handling of niche container cargos such as perishables or steel may provide an effective means for Louisiana to become competitive. With the addition of value-added manufacturing industries along waterways, as mentioned above, increased containerized cargo can be expected and is encouraged. Developing a deep water coastal port complex nearer to the Texas market place may be advantageous.

- **Continue to Expand Red River Traffic Volume**—Completion of the Red River "opening" in 1994 allowed for several small-scale private sector operations to develop. Additional efforts to increase private sector industry at the waterfront should be explored. The fact that studies are being conducted in consideration of opening the Red River to navigation north of Shreveport into Arkansas adds momentum to future growth. It will also add to the value of the Red River complex below Shreveport as an avenue to other regional industries in the near future.

- **Improve Rail-Water Interface**—The maritime system is highly dependent on unobstructed transfer of cargos to and from the rail mode. While evaluating the rail-water interface is outside the scope of this study, surveys conducted as part of this study cited rail-water connections as an operational constraint. Deregulation of the rail industry in the early 1980s resulted in mergers between larger rail carriers that focused on high-density lines and prevented the shorter lines from full participation in the network. Carrier rates and market competition as they interface with transfer of waterborne cargos were affected. Federal incentives to improve rail to water transfers are needed.

- **Continue to Improve In-State Intermodal Transportation Centers and Interfaces—**An increase in value-added manufacturing requires an increase in distribution centers and an increase in intermodal connectivity for delivery to the consumer base. A strategy to expand the maritime industry sectors should be coordinated with improvement and expansion of infrastructure and intermodal connectivity centers.

Benefit/Cost Assessment of Construction Projects

As an economic tool, a benefit/cost analysis evaluates the desirability of an action in a marketplace, such as the Louisiana waterway system, and gauges the positive and/or negative effects of that action.

All of the construction and non-construction projects previously discussed have associated benefits and costs. For the purpose of this study, benefits and costs are discussed in terms of dollar or social value. Social value includes the overall qualitative value of improving the economic contribution of the waterway system or project to the state, the region, and/or the nation.

All of the construction projects identified address waterway system constraints or deficiencies. If no action is taken or no funds are spent to implement these projects, no benefits will be realized. However, safety issues along the waterways will escalate; operational efficiency will decline further; cargo flow capacity will stall at current levels limiting use of the waterways to smaller vessels and tows; and no economic expansion will occur. The Louisiana waterway system will not be able to upgrade or maintain its position as a leader in the maritime industry if no action is taken.

Completion of construction projects needed immediately such as the Bayou Sorrel Lock replacement, the IHNC Lock replacement, and the Simmesport Railroad Bridge Alteration will provide immediate benefits by alleviating safety hazards and traffic congestion. Completion of construction projects for future improvements to coastal and inland waterways and locks will provide benefits such as enhancing operational efficiency, allowing larger vessel and tow capacity, expanding economic impact and restoring or improving the state's competitive edge with neighboring Gulf States. The benefits that could result from implementation of these projects extend beyond the state line, positively affecting interstate and international maritime economies.

As noted, Louisiana's maritime system is key to both the interstate and international markets for petroleum and petroleum products, food and farm products, crude materials, and chemical products. Louisiana must strategize to expedite the federal process for funding and implementation to get these projects in place or step up state interest and support in the overall maritime industry. A lack of interest or monetary input from the state leaves the state at the mercy of federal practices. In contrast, increased interest and monetary input from the state puts the state in control of a strategy for the waterway system.

With projected growth in domestic and foreign markets that affect the maritime industry in Louisiana, it is not unrealistic to expect a highly significant economic impact

from future state investment in the state's maritime industry. Therefore, timeliness of project implementation is a factor in the return the state will realize. The longer it takes to get projects implemented, the more costly the projects will become. In the meantime, Louisiana will lose its edge to neighboring states, and it will take decades for the state to recover and establish a new dominance within certain markets. Louisiana can benefit extensively from implementation of waterway construction projects.

Qualitative Benefits of Non-Construction Concepts

Non-construction concepts that address institutional constraints and economic development opportunities based on cargo flow and other economic impact parameters were identified. Non-construction concepts include consistent federal and state funding sources; a fully representative maritime coalition; statewide maritime marketing strategies; and various industry expansions such as short-sea shipping, container on barge operations, private sector investment, and improved intermodal centers. No costs were assigned to these concepts as they are presented as functional concepts only. Nonetheless, the resulting benefits are described in a qualitative manner.

If no statewide strategy is developed, maritime related projects will continue to develop in piece-meal fashion waiting on federal dollars. The coastal restoration master plan set a precedent in this state for combining hurricane protection and coastal restoration into one plan with stakeholder approval. In the same manner, a unified strategy among stakeholders in the state's maritime industry is needed to provide a strong authority to support and drive legislative issues and obtain funding for waterway projects and concepts.

Conclusion

One-third of the concepts identified in this report are funding issues that require a federal action and/or response. The remaining concepts include state funding issues, strategy issues, and economic considerations that require state action and/or response. The state must be convinced of the economic impact potential of the waterway system and its need for state investment. As mentioned above, a unified strategy with stakeholder involvement will gain considerably more momentum than individual stakeholders seeking funds for individual projects. This effort should be an effort among all stakeholders to develop a statewide strategy and implement projects to benefit the maritime industry as a whole within this state. If this strategy is accomplished, both construction projects and non-construction concepts can more assuredly be accomplished. Texas, Florida, and Alabama have utilized increased state funding for port and waterway improvements, and their waterway systems are 30% to 50% smaller than Louisiana's waterway system.

Louisiana cannot wait as its ranking as one of the nation's maritime leaders continues to decline in favor of neighboring Gulf States. The state's geographical advantage in the maritime industry and its maritime culture dictate otherwise, and the state must begin to play a more active role in support of the industry.

1.0 INTRODUCTION

The purpose of this report is to provide an inventory of Louisiana's current waterway transportation system including its physical aspects, existing waterborne commerce (cargo, oil and gas, etc.), and economic components. This inventory is analyzed to identify constraints that restrict efficient use of the system thereby reducing economic benefits to the state and the nation. Based on existing conditions and the analysis of Louisiana's waterway system and operations, projected growth for the system is provided for a 25-year period. The resulting plan provides a framework for identifying projects needed to improve the current waterway transportation system and to improve the ability of the waterway system to meet projected growth needs.

1.1 Background

Louisiana is a national leader in the maritime industry. The state provides 20% of the nation's import and export of petroleum and related products, 50% of the nation's import and export of grains, and an average 37% of the nation's commercial fisheries harvest, all by way of its waterways and supporting infrastructure. An expansive waterway system provides the conduits upon which Louisiana's maritime transportation industry is built.

Despite the economic and cultural significance of this industry to the state, a thorough inventory and analysis of the state's waterway system had never been undertaken. A review of recent statewide maritime related studies and reports does, however, indicate an increased awareness of the value of the industry to the state and the need for further in-depth analysis. Examples of relevant publications include the following:

- Louisiana Statewide Transportation Plan by the Louisiana Department of Transportation and Development in late 2003
- Final Report—Maritime Advisory Task Force Summary of Proceedings & Recommendations prepared for the Louisiana Department of Economic Development, 2006
- Report to the Maritime Advisory Task Force by the Ports Association of Louisiana, 2006
- Report to the Joint Committee on Transportation, Highways and Public Works by the Ports Association of Louisiana, 2006
- Five-Year Capital Improvement Plan**,** a report which included 31 individual ports, prepared by and for the Ports Association of Louisiana as a result of recommendations generated by the above reports, presentations, and feedback obtained, 2007

Each of these studies and presentations stressed the economic impact of the maritime industry, which provides oil and gas services, moves cargo, and creates jobs, tax revenue, and other economic development opportunities. All of these benefits are made possible by the navigable waterways upon which the state's maritime infrastructure is built and cargo is moved.

1.2 Purpose/Objective

The contractually defined purpose of this study is to determine the impact of Louisiana's extensive navigable waterway system on the state's economy and to identify infrastructure improvements to optimize the system's operational efficiency for future economic growth and congestion mitigation. As an end result, the importance of Louisiana's waterways to this state and the nation are defined in terms of waterborne commerce and economic impacts. Additionally, projects relative to the state's navigable waterway system that are needed for Louisiana to keep pace with the growing demand of regional, nationwide, and global market demands are highlighted. Improving the operational capacity of the waterway system and increasing the economic benefits to the state and the nation are the overriding objectives.

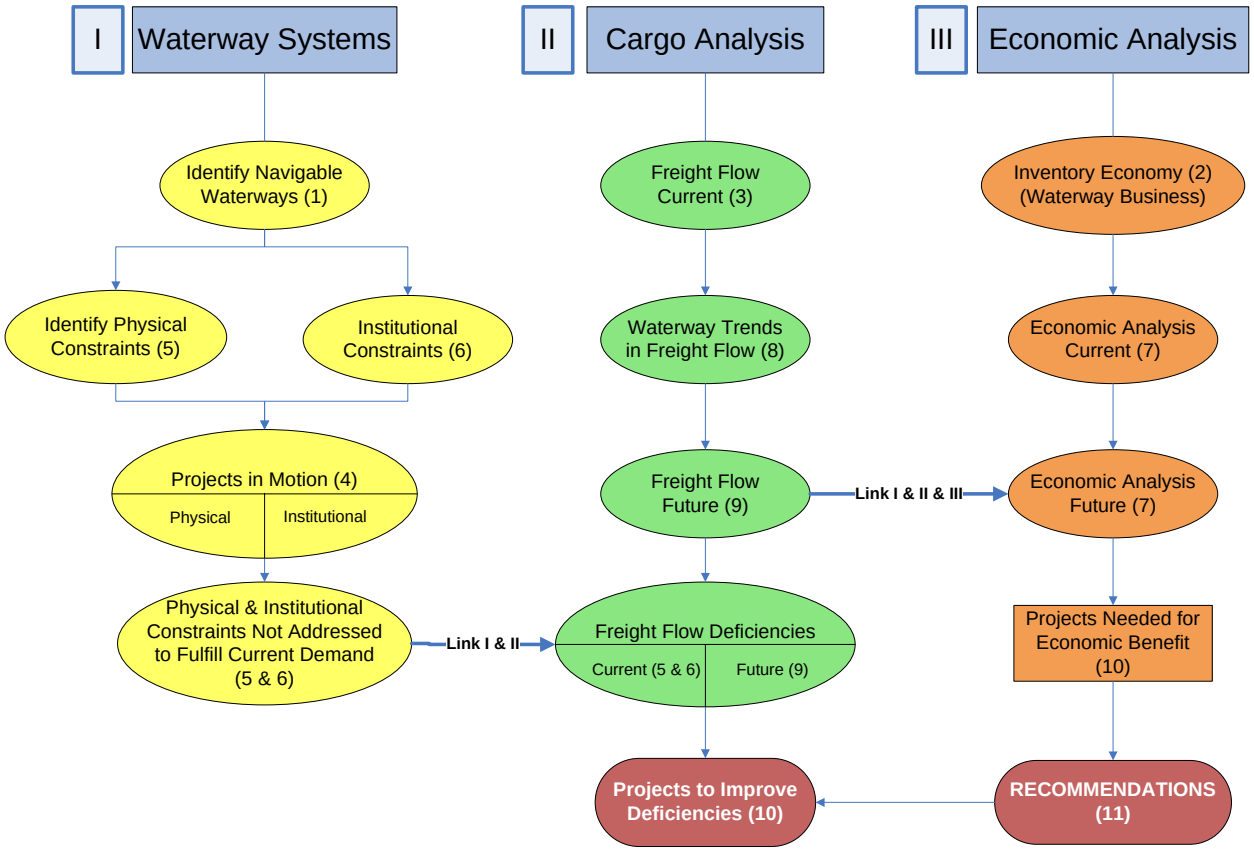
1.3 Scope, Approach, and Methodology

Eleven separate and distinct tasks were assigned by the Louisiana Department of Transportation and Development (DOTD) relative to accomplishing the objectives of this report. By way of summary and organizational logic, the respective tasks were grouped into three major sectors:

- Waterway Systems Inventory and Analysis
- Cargo and Activity Analysis
- Economic Analysis

This resulting approach and methodology is graphically illustrated in Exhibit 1-1 and described below.

Exhibit 1.1 - Project Management Approach
DOTD Marine Transportation System Plan



NOTE: NUMBERS "(1) REFER TO TASKS PER THE SCOPE OF THE WORK.

The **waterway systems inventory and analysis** began with the systematic identification of the status of navigable waterways. A navigable waterway was defined as one that can facilitate a tugboat and barge as well as commercial fisheries vessels. The definition excludes trails through swamps used by fishermen. In the waterways section of the report, physical and institutional (i.e., regulatory) constraints were identified. Typical issues identified include the following:

- Federal and state laws and regulations
- Maritime fees
  - Buoy
  - Dock
  - Harbor
  - Pilot
  - Port

  - Terminal
  - Wharfage
  - Anchorage
- Project authorization processes
- Funding procedures

Projects already initialized or under study, i.e., projects in motion, to alleviate known constraints were also analyzed to identify physical and institutional constraints needed to fulfill current demand. These projects were then linked to the cargo analysis segment.

The **cargo analysis** component began with an evaluation of historical and current freight flow into, out of, and through the state. Trends based upon that historical data were interjected into the analysis, and a view of future freight flows resulted. The types and volumes of cargo identified up to this point were then linked to the future economic analysis. Simultaneously, freight flow deficiencies, both current and future, were identified as a result of combining navigational system constraints not currently being addressed with the cargo flow analysis. The result is the identification of projects needed to improve maritime transportation system deficiencies. Examples include the following:

- Infrastructure rehabilitation/replacement needs
- Major navigation safety improvement needs
- System bottlenecks
- System expansion requirements
- Transportation services needs
- Intermodal connectivity
- Dredge disposal issues
- Security issues

The **economic analysis component** drew attention to the business side of the navigable waterway system as it relates to jobs created and maintained (direct and indirect), revenue generated, taxes generated, and future economic opportunities provided by the state's waterway system. Current and future economic scenarios were compared and contrasted with the results being combined with the constraints and freight flow deficiencies established previously. The result is a list of waterway-based projects needed for economic benefit to the state. These projects are presented as recommendations to alleviate deficiencies and to provide major economic enhancement to the state and the nation.

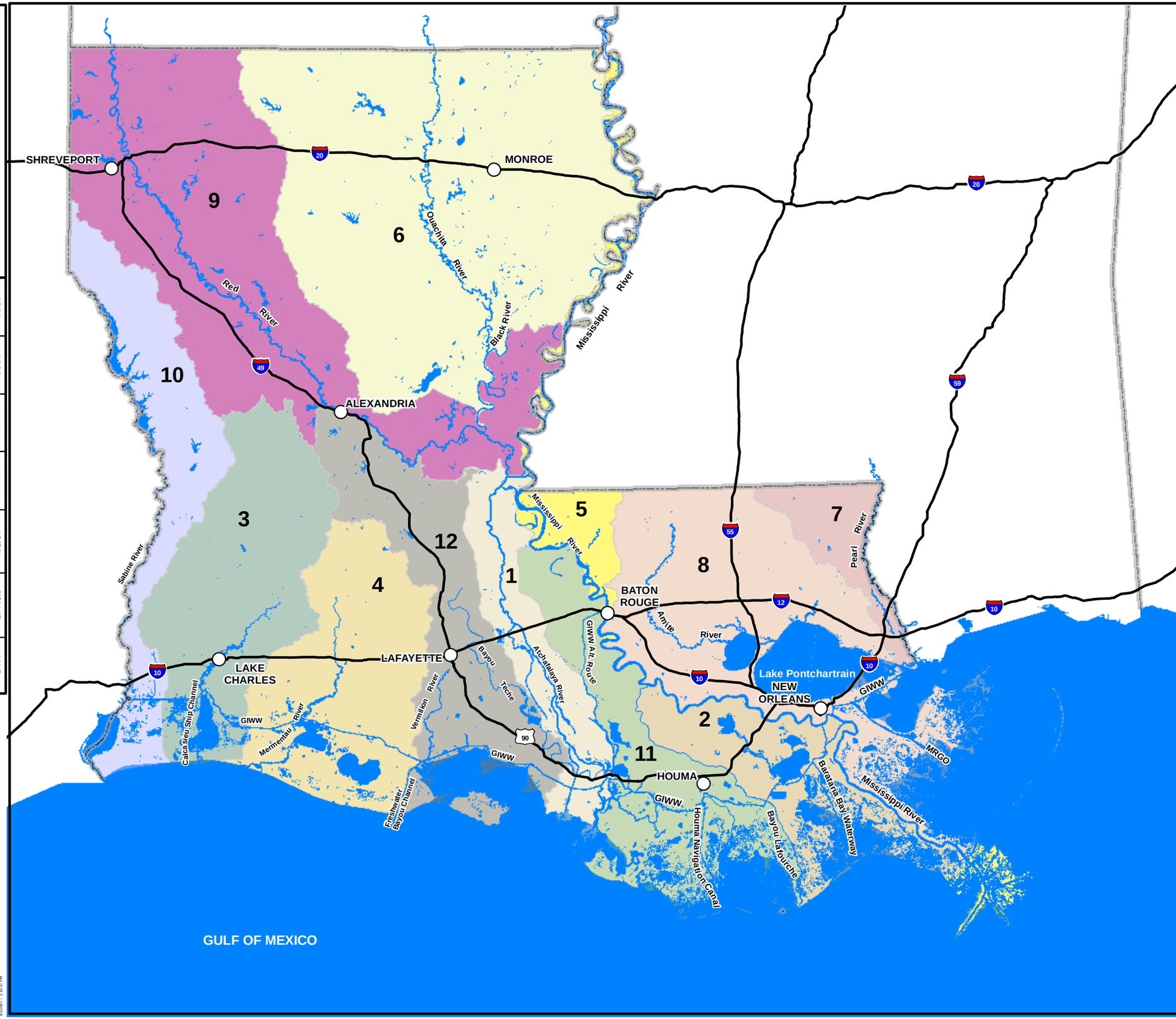
2.0 WATERWAY SYSTEM ANALYSIS

2.1 Introduction

Louisiana's navigable waterway system consists of a natural network of rivers, lakes, and bayous which are part of twelve main river basins. These basins, which were initially defined by precursor agencies to the Louisiana Department of Environmental Quality in the late 1970s, are listed below and shown in Exhibit 2.1. The major waterways within each basin are listed in Table A-1, Appendix A. A diagram for each of the major waterways within each basin, and their associated infrastructure is presented in Appendix A.

- Mississippi River
- Red River
- Atchafalaya River
- Ouachita River
- Lake Pontchartrain and Breton Sound
- Calcasieu River
- Mermentau River
- Vermilion-Teche
- Barataria
- Terrebonne
- Pearl River
- Sabine River

The Mississippi River forms a major part of one of the largest inland waterway systems in the world. Together, the Mississippi River and its tributaries such as—the Red River, the Platte River, the Yellowstone and Missouri Rivers, the Illinois River from Lake Michigan, the Wabash River, the Ohio River, and the Tennessee River—form the largest riverine system in the U. S., draining more than 40% of the nation. The Mississippi and its branches drain a great basin extending from the Appalachian Mountain to the Rocky Mountains, an area of about 1,250,000 square miles.



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Louisiana Watershed Basins

- Interstate System
- State Boundary
- 1. Atchafalaya
- 2. Barataria
- 3. Calcasieu
- 4. Mermentau
- 5. Mississippi
- 6. Ouachita
- 7. Pearl
- 8. Pontchartrain
- 9. Red
- 10. Sabine
- 11. Terrebonne
- 12. Vermilion-Teche

REFERENCE:
Louisiana Department of Environmental Quality, 200406, Basin Subsegments from LDEQ source data, Geographic NAD83, LOSCO (2004) [subsegments_2004]: Louisiana Department of Environmental Quality, Baton Rouge, LA. (modified)

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LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

EXHIBIT 2-1

LOUISIANA STATEWIDE DRAINAGE BASINS

DOTD MARINE TRANSPORTATION STATEWIDE SYSTEM PLAN

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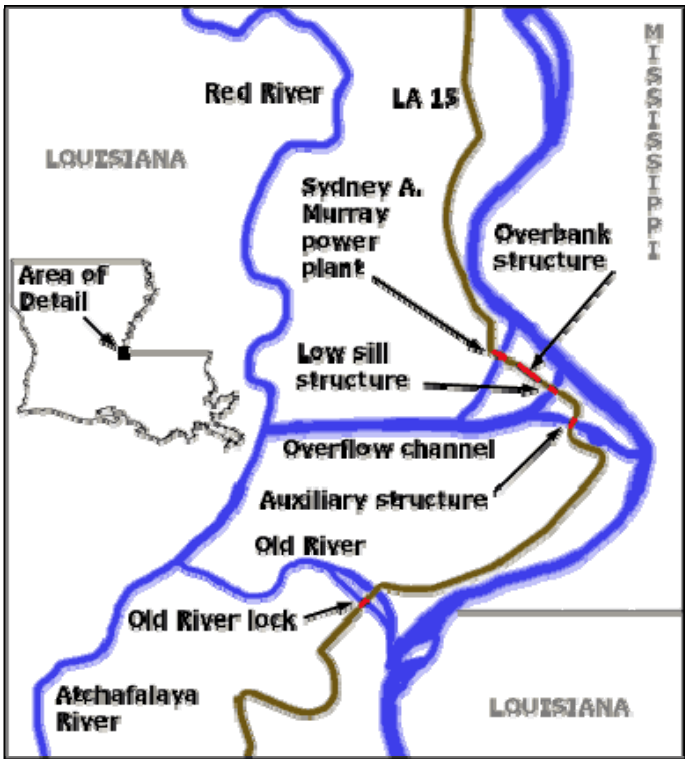
Mississippi River Drainage Basin (Spearing, 1995)

Because of the levees constructed to harness the Mississippi River in Louisiana, this system is one of the smallest drainage basins in the state in area but remains the largest in water flow volume. Its banks also accommodate five of the state's six deep-water ports which together form the largest cargo port complex in the world. The river ends as it enters the Gulf of Mexico southeast of New Orleans.

The Red River system, as part of the overall Mississippi River complex, originates in easternmost New Mexico flowing north along the Texas-Oklahoma boundary through southwest Arkansas and into Louisiana. At the Old River Control Structure, it joins the combined Mississippi-Atchafalaya systems. The drainage basin is over 1,200 miles long and covers approximately 90,000 square miles.

Beginning near Little Rock in the Ouachita Mountains, the Ouachita flows east and then south into Louisiana where it joins the Tensas River to form the Black River. This river then enters the Red River at its lower reaches near Old River. This system is commonly referred to as the Ouachita/Black system.

By congressional mandate, at the Old River Control Structure 30% of the combined flows of the Red River and the Mississippi River are joined to become the Atchafalaya River system. Today, this boundary of the Atchafalaya Basin is defined by federally maintained levees that extend south to Morgan City where the silt-laden waters of the Atchafalaya then spread into freshwater marshes and brackish bays leading to the Gulf of Mexico. North of Morgan City, the 500,000 acre freshwater swamp of the Atchafalaya Basin is renowned as the largest freshwater swamp in the U. S., supporting the classic cypress-tupelo and alligator "infested" ecosystem for which Louisiana is known.



Old River Control Structure—Regulates flow between the Mississippi River, Red River, and Atchafalaya River.

Two primary waterways significant to this study flow through the Atchafalaya Basin, the channels of the Atchafalaya as well as the Gulf Intracoastal Waterway (GIWW) Alternate Route. The GIWW Alternate Route flows from the Mississippi River across the northern reaches of the Terrebonne Basin and follows the Atchafalaya east guide levee entering the Atchafalaya system at the Bayou Sorrel Lock. The primary GIWW traverses the Atchafalaya drainage basin from east to west at Morgan City. The GIWW primary route also traverses all of the state's drainage basins that reach the coast.

The Terrebonne Basin is situated east of the Atchafalaya system and west of the Mississippi River. At Donaldsonville, the eastern boundary becomes the natural levee system of Bayou Lafourche, a channel of the Mississippi River that was abandoned as recent as 800 years ago. Its flow is generally limited to storm water runoff in the northern reaches near False River in Pointe Coupee Parish. The basin drains southward to the Gulf of Mexico. The Houma Navigation Canal begins at the GIWW in Houma and leads to the Gulf. In the northern section, the GIWW Alternate Route enters this basin at its headwater locks south of Port Allen.

Following Bayou Lafourche as its western boundary and the Mississippi River western levee south of Donaldsonville to the Gulf is the Barataria Basin. Bayou Lafourche and the Barataria Bay Waterway are the two main navigable waterways in this basin.

East of the Mississippi River Basin is the Pontchartrain Basin. Its primary water bodies are the Amite River and Lakes Maurepas and Pontchartrain. Its eastern boundary is formed by the natural ridge of the Bogue Chitto River, which also forms the western boundary of the Pearl River Basin. Both the Pearl and Pontchartrain systems begin in Mississippi. The Pearl River forms the eastern boundary of Louisiana south of the 31st parallel.

West of the Atchafalaya Basin and beginning at the Red River to the north is the Teche-Vermilion system. The Vermilion River and Bayou Teche are the two primary natural navigable streams in the basin with the GIWW also crossing this system at its southern extreme from the western to eastern boundary. Freshwater Bayou at the western most extreme of the basin is a key navigable waterway connecting the Intracoastal Canal to the Gulf.

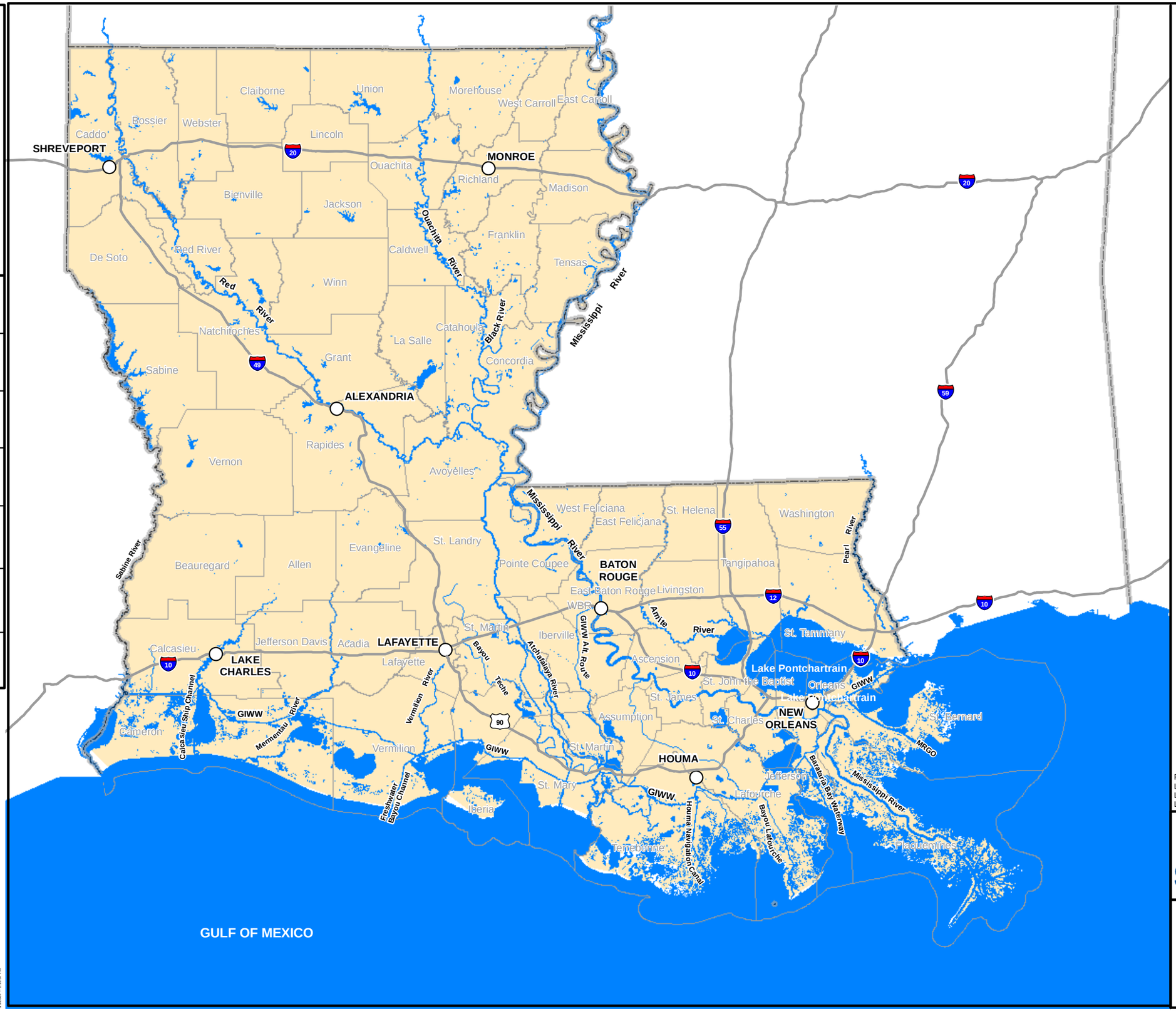
To the west of the Vermilion-Teche Basin is the Mermentau River Basin. Several minor waterways and the Mermentau River form the basis for this system, which includes two large lakes, Grand Lake and White Lake. As with other basins which follow the coast, the GIWW also crosses this basin.

The Calcasieu River in the Calcasieu Basin is the second of Louisiana's deep-water river systems. The Calcasieu Ship Channel extends northward from the Gulf to the coastline and then through Calcasieu Lake to the city of Lake Charles. The GIWW intersects the ship channel and traverses the basin north of Calcasieu Lake.

The final Louisiana basin is the Sabine along the state's western border with Texas. Navigability relative to commercial use is generally limited to the areas nearest the coast and Sabine Lake.

The basins as described above are also subdivided into hydrologic unit codes (HUC) by the United States Geological Survey. The HUC divisions are based on river drainage sub basins at a much smaller scale. However, for the purpose of this study, the larger scale regional drainage boundaries are used consistently.

From a commercial navigation viewpoint, the Lower Mississippi River system and the Gulf Intracoastal Waterway (GIWW) are key components of the system. The GIWW extends more than 1,300 miles east-west from Florida to the Mexico border in Texas with 302 miles within Louisiana. The GIWW passes through seven of Louisiana's coastal river basins, connecting coastal and inland waterways. The GIWW Louisiana portion alternates between a man-made canal, natural bayous, and coastal lakes. Its interconnection to the Mississippi River system and other coastal and inland waterways enables small craft and commercial tows to reach



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- Interstate System
- State Boundary
- Louisiana Parishes
- Major Waterbodies

REFERENCE:
Louisiana Department of Environmental Quality, 200406, Basin Subsegments from LDEQ source data, Geographic NAD83, LOSCO (2004) [subsegments_2004]:
Louisiana Department of Environmental Quality, Baton Rouge, LA. (modified)

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EXHIBIT 2-1a

WATERWAYS AND PARISHES

DOTD MARINE TRANSPORTATION
STATEWIDE SYSTEM PLAN

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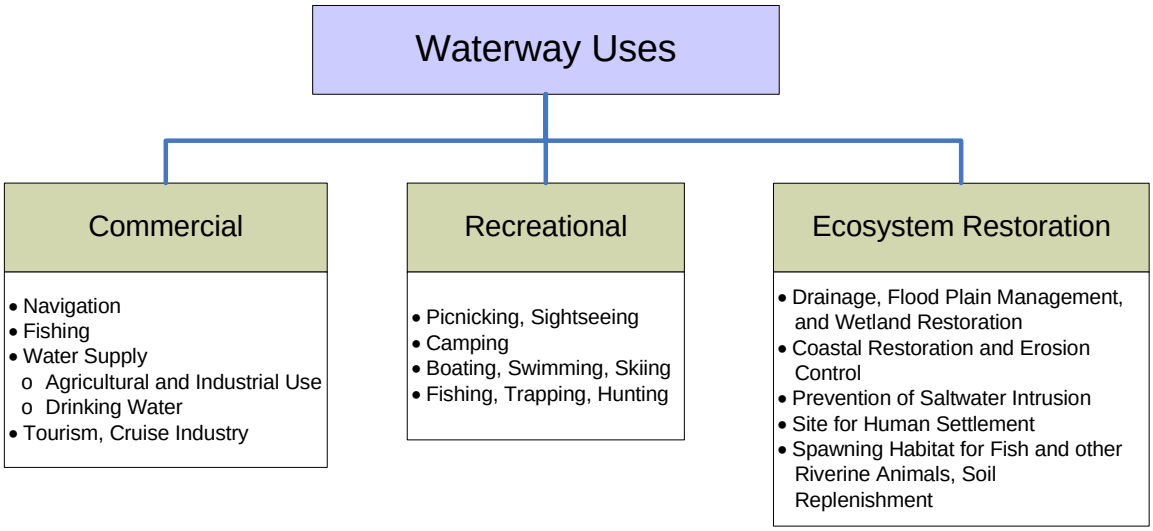
many points throughout the eastern and southern seaboards. Similarly, the Calcasieu River is also ranked highly as a commerce corridor in southwestern Louisiana.

2.2 The Waterway System as an Ecological and Economic Resource

The Louisiana waterway network is both an ecological and an economic resource. Of Louisiana's sixty-four parishes, forty-four parishes lie along a portion of the waterway network (Exhibit 2-1a). In many instances, whether a feature is ecological or economic can be debated. On the one hand, the state's water system is a vast renewable ecological resource yielding an array of benefits to the state and the nation. Interests and issues relate to aesthetics, water quantity and water quality, coastal restoration, salt water intrusion, fisheries, spawning habitat, drainage, and flood plain management. However, they are also economic factors related to the health, safety, and well-being of the state's citizenry. A partial listing of beneficial uses in terms of commercial, recreational, and ecosystem management is noted in Exhibit 2-2 which underscores the diversity of uses and the wide spectrum of stakeholders sharing the system benefits.

Exhibit 2.2 - Waterway Uses
DOTD Marine Transportation System Plan



However, the waterway system's capacity to generate benefits is often limited, and some uses are mutually exclusive. Therefore, trade-off decisions in waterway management are often necessary. Such was the case in 2006 and 2007 as Louisiana was confronted with factions debating the concepts and projects to be included in its Coastal Protection and Restoration Plan

brought about as a result of Hurricanes Katrina and Rita in 2005. Similar debates surfaced during other recent planning forums including the Louisiana Speaks Plan in early 2007.

In respect to this Marine Transportation System Plan, it is important to note that each and every project presented as an economic issue to improve the state's trade and industry objectives carries with it a broader based assessment, one that must include environmental as well as economic factors. For purposes of this report, however, environmental issues are not addressed specifically as they are beyond the scope of this study. Nonetheless, the framework for determining navigation improvements is conditioned by a series of choices dictated by other alternative uses, environmental considerations, and other resource constraints beyond those identified as economic benefit.

While much of the waterway system is used for recreational and ecosystem management, the remaining focus of this study is dedicated to the major waterway segments used for navigation, waterborne commerce, cargo movements, and complementary economic components of the waterborne and related industrial clusters.

2.3 The Waterway System and Components

As described, the overall network of waterways in the state consists of a dendritic system of rivers, bayous, and lakes. The network also includes man-made infrastructure improvements for navigation (ports and locks, for example) and navigable channels such as the Gulf Intracoastal Waterway as well as flood control features, environmental restoration projects designed for marsh creation, channel shoreline protection, and restoration that are also key components of the system. The resulting navigable waterway network referenced previously in Exhibit 2.1 includes both navigable segments of the natural waterway network as well as man-made improvements such as the GIWW. The navigable waterways system defined for purposes of this transportation plan can be divided into the following two main categories:

1. The federally maintained navigable waterway network
2. The non-federally maintained waterways

Both federally maintained and non-federally maintained waterways are listed in Table A-1 in Appendix A.

The federally maintained system functions with congressionally appropriated funds that are largely responsible for the construction and maintenance of the system. As a result, a substantial database on vessel and commodity movements is maintained. The waterways not federally maintained often lack data on vessel and commodity movements.

The Rivers and Harbors Appropriation Act of 1922 provide legal authority to USACE for the collection, compilation and publication of waterborne commerce statistics. All owners,

agents, masters, and clerks of vessels and other craft plying upon navigable waters of the U.S., and all individuals and corporations engaged in transporting their own goods upon navigable waters are required to report vessel, passenger, freight, and cargo tonnage data which the USACE disseminates through several publications (USACE, Waterborne Commerce of the U.S., Annual Reports 2000 to 2004).

Additional factors used to define and aggregate the waterways include spatial contiguity, similarity of maritime activities, and the traditional conventions followed in identifying waterway segments. The primary traditional divisions of state waterway systems are as follows:

1. Deep draft─draft of 25 feet or more
2. Coastal─shallow draft and deep draft situated on or near the coast
3. Inland─shallow draft not located or connected to the coast

Each of the waterway systems has wide variations in physical characteristics and in volume of economic activity. An important consideration in selecting smaller navigable waterway systems in this study is the vital nature of the waterway link to the main economic activity of the community. Several waterway systems in the south linking commercial fishing communities and oil and gas service industries fall into this category. Examples of smaller navigable waterways include Bayou Grosse Tete and Bayou Terrebonne.

Definitions of terms used in Appendix A are provided below.

- **Waterway Basin,** also referred to as "waterway system," is one of twelve river drainage basins in the state. The GIWW is presented separately as a navigational unit because it spans seven coastal basins.
- **Waterway** is a waterway segment that from a navigational standpoint is an integral part of the designated basin such as Freshwater Bayou is to the Vermilion-Teche Basin.
- **Reach** is a portion of the navigable, federally maintained section of the waterway, usually given in river miles.
- **Channel Length, Width, and Depth** are the physical dimensions of the waterways and are available only for federally maintained waterways.

Other waterway information presented in Appendix A includes major uses, the number of locks, and lock descriptions. In the state, 19 locks are federally maintained and 2 are state-maintained. Other federally maintained structures function as saltwater barriers or flood control

structures. A separate inventory of piers, wharves, and docks was completed for each waterway. A total of 830 were reported for the major waterways with approximately three quarters of the total located along the Mississippi River (*Summarized Port Series Reports by Report Year*. 2006).

2.3.1 Deep Draft Waterways

Deep draft waterways are those waterways that allow vessels with a draft of 25 feet or more. The deep draft channels in Louisiana are the Mississippi and the Calcasieu Rivers and the lower reach of Bayou Lafourche from Port Fourchon to the Gulf. The USACE New Orleans District maintains both rivers. Management of the Mississippi River officially began when the Congress created the Mississippi River Commission on June 28, 1879. The Mississippi River from Baton Rouge to the Gulf of Mexico is 236 miles in length and is the state's chief river, the heart of waterborne commerce, and the lifeblood of the southeastern part of the state.

The 275-mile long stretch of the Mississippi River from Baton Rouge north to the Arkansas state line is considered shallow draft and is discussed with "Inland Waterways" in Section 2.3.3. The river is of major importance to the state and to the nation as a gateway for waterborne commerce connecting the international maritime industry via the Gulf of Mexico with the heartland of the U.S. Mississippi River infrastructure at Louisiana ports south of Baton Rouge and private terminals compose one of the world's largest seaport complexes.

The Calcasieu River from Phillips Bluff to the Gulf of Mexico via the Calcasieu Ship Channel through Lake Charles is 102 miles in length and is the chief river in the southwestern part of the state. The commercially navigable Calcasieu Ship Channel is 36 miles in length. The port facilities in and around the Lake Charles area, which include the Calcasieu River and Pass, account for a large percentage of the waterway commerce in the southwestern part of the state. Cargos are principally petroleum, petroleum-related products, and break-bulk cargo.

2.3.2 Coastal Waterways

Coastal waterways are defined as those bodies of water situated on or near the Gulf coast and include embayments, wave and tide dominated estuaries, coastal lagoons, and tidal creeks. The major Louisiana coastal waterways situated on the Gulf of Mexico from west to east are the following:

- Sabine River
- Mermentau River
- Vermilion River
- Bayou Teche
- Lower Atchafalaya
- Houma Navigation Canal
- Bayou Lafourche
- Freshwater Bayou
- Barataria
- GIWW (primary route)

These coastal waterways and some of their associated tributaries are used less extensively for cargo transport as compared to the deep draft channels. However, these waterways combined transport significant cargo tonnages that occur along the coast and they also sustain the fisheries and oil and gas industries and are used extensively for recreation.

2.3.3 Inland Waterways

Inland waterways are defined as those bodies of water (shallow draft) that can be used by boats and barges, but are not directly connected to the Gulf. The five major inland waterways from west to east include the following:

- Red River
- Atchafalaya River
- Ouachita/Black River
- Mississippi River (Baton Rouge north to the Arkansas state line)
- GIWW Alternate Route (Morgan City to Port Allen)

These inland waterways, which provide a connection between coastal waterways and mainland waterways, are important for cargo transport between the major waterways.

2.3.4 Other Waterways, Lakes, and Bays

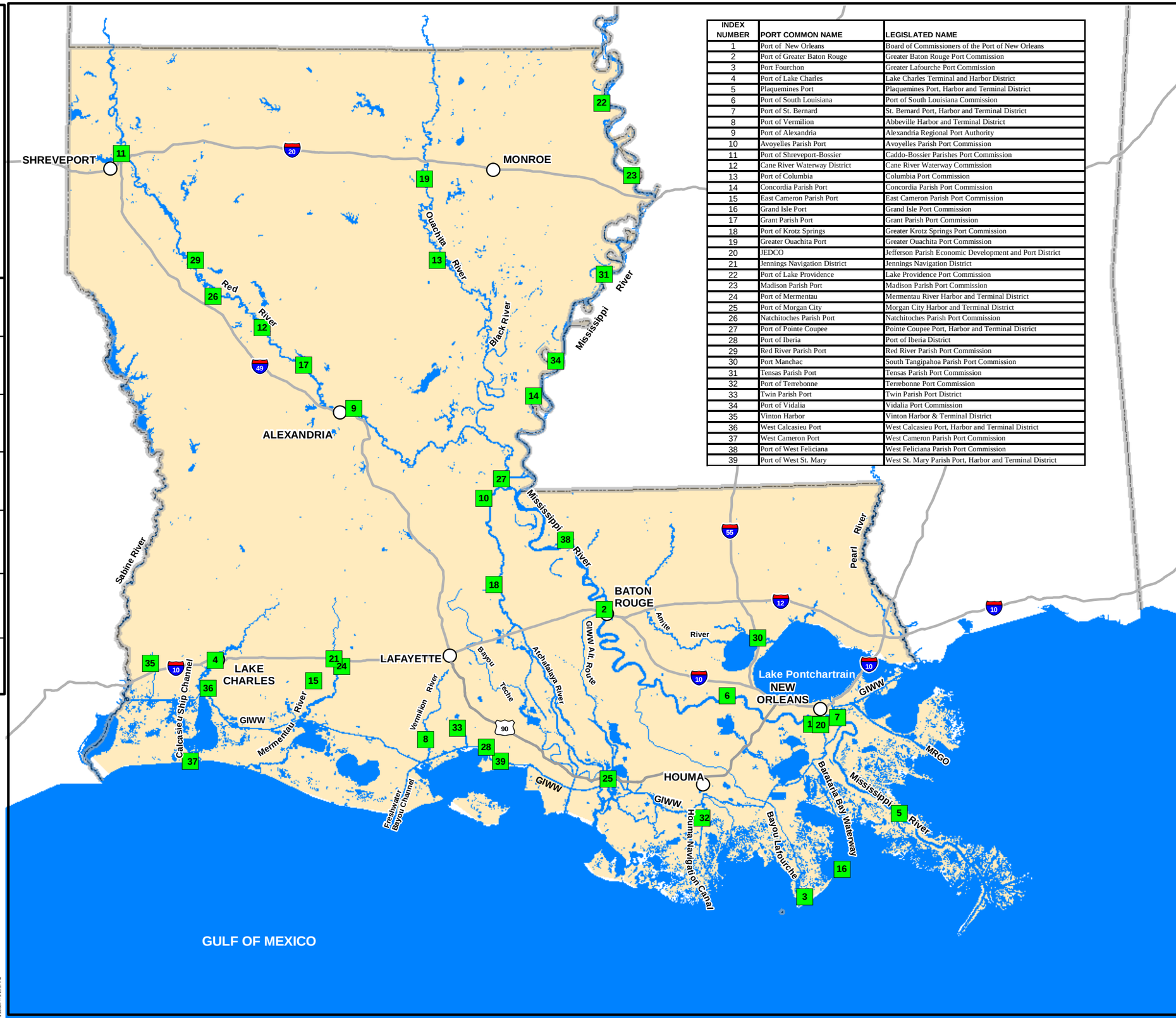
While the deep draft, coastal, and inland waterways identified above are the major contributors to waterborne commerce in Louisiana, lesser waterways also move small but significant amounts of cargo through the state. These water bodies include lakes, bays, and bayous. The Lake Pontchartrain Basin (inclusive of Lake Borgne, Lake Pontchartrain, and Lake Maurepas) is the largest system within this category. The major uses for these waterways include fisheries-related activity, support activities for the oil and gas industry, and recreation. Currently no method has been established to track or quantify cargo activity on these waterways.

2.3.5 Louisiana Ports

Louisiana has an abundance of ports and port related infrastructure as demonstrated by the number of piers, wharves, and docks spread along its navigable waterways. A large majority of this water-related infrastructure is privately owned and operated. However, numerous public ports also exist in the state. These ports are highly significant as they provide state owned cargo transfer facilities and equipment for many water related industries. They also provide a significant and positive economic impact in the form of jobs and tax revenues. The state has a total of thirty-nine ports of which thirty-seven are active public ports that move cargo or otherwise generate economic activity. A listing of the ports is presented in Table 2-1 below and illustrated in Exhibit 2-3.

Table 2-1
Ports of Louisiana

PORT COMMON NAME	LEGISLATED NAME	WATERWAY
Port of New Orleans	Board of Commissioners of the Port of New Orleans	Lower Mississippi River
Port of Greater Baton Rouge	Greater Baton Rouge Port Commission	Lower Mississippi River
Port Fourchon	Greater Lafourche Port Commission	Bayou Lafourche
Port of Lake Charles	Lake Charles Terminal and Harbor District	Calcasieu River
Plaquemines Port	Plaquemines Port, Harbor and Terminal District	Lower Mississippi River
Port of South Louisiana	Port of South Louisiana Commission	Lower Mississippi River
Port of St. Bernard	St. Bernard Port, Harbor and Terminal District	Lower Mississippi River
Port of Vermilion	Abbeville Harbor and Terminal District	Vermilion River
Port of Alexandria	Alexandria Regional Port Authority	Red River
Avoyelles Parish Port	Avoyelles Parish Port Commission	Atchafalaya River
Port of Shreveport-Bossier	Caddo-Bossier Parishes Port Commission	Red River
Cane River Waterway District	Cane River Waterway Commission	Cane River
Port of Columbia	Columbia Port Commission	Ouachita/Black Rivers
Concordia Parish Port	Concordia Parish Port Commission	Mississippi/Black Rivers
East Cameron Parish Port	East Cameron Parish Port Commission	Cameron Parish
Grand Isle Port	Grand Isle Port Commission	Gulf of Mexico
Grant Parish Port	Grant Parish Port Commission	Red River
Port of Krotz Springs	Greater Krotz Springs Port Commission	Atchafalaya River
Greater Ouachita Port	Greater Ouachita Port Commission	Ouachita/Black Rivers
JEDCO	Jefferson Parish Economic Development and Port District	Harvey Canal/Mississippi River
Jennings Navigation District	Jennings Navigation District	Mermentau River
Port of Lake Providence	Lake Providence Port Commission	Mississippi River
Madison Parish Port	Madison Parish Port Commission	Mississippi River
Port of Mermentau	Mermentau River Harbor and Terminal District	Mermentau River
Port of Morgan City	Morgan City Harbor and Terminal District	Atchafalaya River
Natchitoches Parish Port	Natchitoches Parish Port Commission	Red River
Port of Pointe Coupee	Pointe Coupee Port, Harbor and Terminal District	Atchafalaya River
Port of Iberia	Port of Iberia District	New Iberia Commercial Canal/GIWW
Red River Parish Port	Red River Parish Port Commission	Red River
Port Manchac	South Tangipahoa Parish Port Commission	Manchac, North Pass
Tensas Parish Port	Tensas Parish Port Commission	Mississippi River
Port of Terrebonne	Terrebonne Port Commission	Houma Navigation Canal
Twin Parish Port	Twin Parish Port District	Delcambre Canal off the GIWW
Port of Vidalia	Vidalia Port Commission	Mississippi River
Vinton Harbor	Vinton Harbor & Terminal District	Canal off GIWW
West Calcasieu Port	West Calcasieu Port, Harbor and Terminal District	GIWW
West Cameron Port	West Cameron Parish Port Commission	Cameron Parish
Port of West Feliciana	West Feliciana Parish Port Commission	Mississippi River
Port of West St. Mary	West St. Mary Parish Port, Harbor and Terminal District	GIWW



INDEX NUMBER	PORT COMMON NAME	LEGISLATED NAME
1	Port of New Orleans	Board of Commissioners of the Port of New Orleans
2	Port of Greater Baton Rouge	Greater Baton Rouge Port Commission
3	Port Fourchon	Greater Lafourche Port Commission
4	Port of Lake Charles	Lake Charles Terminal and Harbor District
5	Plaquemines Port	Plaquemines Port, Harbor and Terminal District
6	Port of South Louisiana	Port of South Louisiana Commission
7	Port of St. Bernard	St. Bernard Port, Harbor and Terminal District
8	Port of Vermilion	Abbeville Harbor and Terminal District
9	Port of Alexandria	Alexandria Regional Port Authority
10	Avoyelles Parish Port	Avoyelles Parish Port Commission
11	Port of Shreveport-Bossier	Caddo-Bossier Parishes Port Commission
12	Cane River Waterway District	Cane River Waterway Commission
13	Port of Columbia	Columbia Port Commission
14	Concordia Parish Port	Concordia Parish Port Commission
15	East Cameron Parish Port	East Cameron Parish Port Commission
16	Grand Isle Port	Grand Isle Port Commission
17	Grant Parish Port	Grant Parish Port Commission
18	Port of Krotz Springs	Greater Krotz Springs Port Commission
19	Greater Ouachita Port	Greater Ouachita Port Commission
20	JEDCO	Jefferson Parish Economic Development and Port District
21	Jennings Navigation District	Jennings Navigation District
22	Port of Lake Providence	Lake Providence Port Commission
23	Madison Parish Port	Madison Parish Port Commission
24	Port of Mermentau	Mermentau River Harbor and Terminal District
25	Port of Morgan City	Morgan City Harbor and Terminal District
26	Natchitoches Parish Port	Natchitoches Parish Port Commission
27	Port of Pointe Coupee	Pointe Coupee Port, Harbor and Terminal District
28	Port of Iberia	Port of Iberia District
29	Red River Parish Port	Red River Parish Port Commission
30	Port Manchac	South Tangipahoa Parish Port Commission
31	Tensas Parish Port	Tensas Parish Port Commission
32	Port of Terrebonne	Terrebonne Port Commission
33	Twin Parish Port	Twin Parish Port District
34	Port of Vidalia	Vidalia Port Commission
35	Vinton Harbor	Vinton Harbor & Terminal District
36	West Calcasieu Port	West Calcasieu Port, Harbor and Terminal District
37	West Cameron Port	West Cameron Parish Port Commission
38	Port of West Feliciana	West Feliciana Parish Port Commission
39	Port of West St. Mary	West St. Mary Parish Port, Harbor and Terminal District

30 15 0 30 Miles

1 inch equals 30 miles

Legend

- Port Locations
- Interstate System
- State Boundary

REFERENCE:
Louisiana Department of Environmental Quality, 200406, Basin Subsegments from LDEQ source data, Geographic NAD83, LOSCO (2004) [subsegments_2004]: Louisiana Department of Environmental Quality, Baton Rouge, LA. (modified)

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LOUISIANA'S ON THE MOVE. DOTD BUILDS THE WAY

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

EXHIBIT 2-3

PORTS OF LOUISIANA

DOTD MARINE TRANSPORTATION STATEWIDE SYSTEM PLAN

OFFICE	DRAWN BY		CHECKED BY		APPROVED BY		DRAWING NUMBER
BTR	B. Holt	4/5/07	XXX	XXX	XXX	XXX	ldotd_279_0021_la_ports

The majority of these ports are shallow-draft inland or shallow-draft coastal ports. Generally, the shallow-draft inland ports are cargo and/or industrially based while the coastal ports serve as industrial sites for water-related industries, for servicing the offshore oil and gas industry, and for commercial fishing in the Gulf of Mexico. The six deep draft ports in the state transfer large quantities of port related cargo and routinely rank among the top tonnage ports in the country according to the USACE (*Waterborne Commerce of the United States.* 2005). In 2005, the Port of South Louisiana ranked number one in the U.S., while the Port of New Orleans and the Port of Greater Baton Rouge ranked 8 and 9 respectively. Texas and New York ports were among the remaining top ten ports.

2.4 Waterway System Constraints

Waterway system constraints are defined as deficiencies within the system that hinder efficient governance, use, and maintenance of the system. The constraints are divided into two categories as follows:

1. **Physical constraints** include infrastructure rehabilitation or replacement needs, major navigation safety improvement needs, system bottlenecks (such as rail bridges, lock activity, inadequate channel depth, etc.), system expansion requirements, dredging issues, and traffic congestion.

2. **Institutional constraints** are defined as federal, state, or local laws, policies, and regulations that affect navigation interests and related stakeholders. A few examples are as follows:

   - The Clean Water Act
   - Maritime fees charged at the main ports and terminals
   - Project authorization and funding appropriation such as the Water Resource and Development Act (WRDA)
   - Tariffs and other fees

The approach used in identifying physical and institutional constraints was multifaceted. Waterway information and history were gathered for each of the waterways. The DOTD, through monthly status meetings, also provided input based on staff experience and active participation with waterway users and various waterway-related associations. Additionally, a survey was utilized to obtain input from port directors and various federal, state, and local agencies. The contact list and a survey form are presented in Appendix B. Results of the survey are included in the tabulated information for each waterway also presented in Appendix B. Finally, nautical charts and the United States Coast Pilot 5 (2006 34th Edition) were reviewed for

physical constraints resulting in the hindrance of vessel transportation. A brief analysis of physical and institutional constraints is presented below.

2.4.1 Physical Constraints

An inventory of physical constraints was prepared from a combination of the United States Coast Pilot 5 (2006) data, lock performance management system (LPMS) data, and survey responses. The United State Coast Pilot 5, a comprehensive list of "waterway obstacles" used to provide safe navigation along the maritime waterways, provides information listing physical constraints including anchorages, bridges, controlling depths, currents, dams, overhead cables, buried pipelines, congestion, etc. This inventory identified approximately 500 items which are presented in Appendix C.

The completed inventory was filtered to exclude items regarded as strictly mariners' notices or "speed bumps" encountered during routine navigation. These notices are considered possible future constraints if waterway usage changes significantly. Most of the Coast Pilot citations were cautionary rather than hazardous, and those were filtered out. For example, an entry in the Coast Pilot warning of an overhead cable that at high tide could prove to be a hazard to the mast of a passing vessel is not included. For purposes of this report this warning is not a constraint that hinders or stops navigation. It is merely a notice that reflects the need for caution while passing beneath the cable. However, if usage of the waterway changed requiring passage of taller vessels, then the cable would become a hazard and thus a constraint. The LPMS is managed by the USACE to provide data such as the number of vessels and tonnages that pass through each lock. The LPMS also provides vessel delay times and tow delays.

The filtered list of constraints identified by way of these sources was sorted into three categories noted below:

- **Critical**—The constraint presents a navigation safety and/or operations hazard.

- **Immediate**—The constraint is not a safety hazard, but it does restrict or otherwise impair waterway navigation at this time.

- **Future**—The constraint is not currently a safety or navigation issue, but it may become an issue if waterway user needs change.

The resulting list of twenty-five constraints identifies the critical and immediate needs along the waterways. These needs are primarily structural and include the following:

- Channel Dimensions—Thirteen channel deepening or widening related constraints were identified, none of which were deemed critical; however, all were deemed immediate.

- Infrastructure—Twelve infrastructure related constraints were identified, three of which are deemed critical and include the Simmesport Railroad Bridge, Bayou Sorrel Lock, and the IHNC Lock. The remaining constraints were deemed immediate. Of constraints listed, those along the GIWW were most prevalent.

A summary of these 25 major constraints and a detailed description of the relative issues are presented in Table 2-2. Constraint locations are shown in Exhibit 2-4. These 25 constraints are compared to projects-in-motion to identify those constraints not being addressed by the appropriate authorities.

2.4.2 Institutional Constraints

Public seaports and waterways in Louisiana, as in other states, are subject to numerous regulations imposed by federal, state, and local governing authorities. The following sections provide an overview of governing agencies, programs, maritime fees, and funding programs briefly describing each agency or program contribution to maritime related regulation.

2.4.2.1 Federal Agencies

Department of Agriculture

The role of the U.S. Department of Agriculture (USDA) is limited, with only two sections of the department performing regulatory activities related to the maritime industry. The two segments are the Grain Inspection, Packers and Stockyard Administration (GIPSA) and the Animal and Plant Health Inspection Service (APHIS). According to the GIPSA's web site, their role is to "facilitate the marketing of livestock, poultry, meat, cereals, oilseeds, and related agricultural products, and promote fair and competitive trading practices for the overall benefit of consumers and America agriculture." In this role, the GIPSA provides inspection and weighing services to maritime products to ensure fair trade practices. In addition to the services, the GIPSA also issues certifications, some of which are required for shipment of grain. Two primary examples are the Official Export Grain Inspection Certificate and the Official Export Grain Weight Certificate.

The APHIS monitors the import and export of goods including plants, animals, animal products, and biotechnology. Along with phytosanitary issues, the APHIS issues a number of certificates of inspection including the Export Health Certificate and the Phytosanitary Certificate.

Department of Commerce

Under the guidance of the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA) provides a number of services that are invaluable to the maritime industry. First and foremost, NOAA provides weather warnings and forecasts. Secondly, according to NOAA's web-site (National Oceanic and Atmospheric Administration),

Table 2-2: Waterway Constraints (Filtered) and Projects-in-Motion

No.	Basin	Waterway	Description	Constraint Issues	Rating[1]	Source	Project-in-Motion to Address Constraint
1	**Atchafalaya**	Atchafalaya River	Port of Morgan City channel deepening	Depth is often a constraint to vessels that support the offshore oil and gas industry.	Immediate	Survey, Coast Pilot	USACE
2		Atchafalaya River Route	Simmesport - RR Swing Bridge	The bridge is located on a curve of the river that makes navigation under the bridge very difficult; high water complicates navigation and the bridge has been hit several times.	Critical	Survey, Coast Pilot	USCG
3		American Pass	Channel deepening	Hazard to navigation, detriment to commercial fishermen, oil and gas interests, and commercial tour boat operators.	Immediate	Survey	USACE
4	**Barataria**	Bayou Lafourche	Channel Deepening (for drill rig activities)	Depth is often a constraint to vessels that support the offshore oil and gas industry.	Immediate	Survey	USACE
5	**Calcasieu**	Calcasieu River	Channel widening and anchorage areas	Congestion on the waterway is caused by the fact that only one-way traffic is possible, and there are insufficient anchorage areas with which to alleviate this issue	Immediate	Survey, Coast Pilot	USACE
6		Calcasieu River	Channel deepening or at least maintained to the 40'	Depth is often a constraint to vessels that support the offshore oil and gas industry.	Immediate	Survey	None
7		Calcasieu River	Dredge disposal issues	improved management; dredge material generated is not handled efficiently for putting it to good use	Immediate	Survey	USACE
8	**GIWW**	Inner Harbor Navigational Canal	Inner Harbor Navigational Canal	The canal is limited to shallow draft and cannot accommodate larger vessel traffic that typically would navigate this area.	Immediate	Survey, Coast Pilot	Port of West St. Mary
9		GIWW	Port of West St. Mary channel deepening to 16'	Depth is often a constraint to vessels that support the offshore oil and gas industry.	Immediate	Survey	USACE
10		GIWW	Port of Iberia channel deepening to 16'	Depth is often a constraint to vessels that support the offshore oil and gas industry.	Immediate	Survey	AGMAC
11		GIWW	Calcasieu Lock	Vessel delays occur 92% of the time.	Immediate	LPMS	USACE
12		GIWW	Bayou Boeuf Lock	Vessel delays occur 70% of the time	Immediate	LPMS	None
13		GIWW	Leland Bowman Lock	Vessel delays occur 88% of the time	Immediate	LPMS	None
14		GIWW Alternate Route	Bayou Sorrel Lock	The lock is the narrowest lock in the state, causing vessel delays 100% of the time	Critical	Survey, Coast Pilot	USACE
15		GIWW Alternate Route	Port Allen Lock	Vessel delays occur 88% of the time	Immediate	LPMS	None
16		Navigational Canal	Inner Harbor Navigational Canal Lock	The lock is outdated and often not operational causing traffic delays and congestion.	Critical	Survey, Coast Pilot	USACE
17		GIWW	Harvey Lock	Vessel delays occur 80% of the time	Immediate	LPMS	None
18		GIWW	Algiers Lock	Vessel delays occur 86% of the time	Immediate	LPMS	None
19	**Mermentau**	Mermentau River	Depth at the mouth of the river too shallow at low tide	Traffic delays and congestion occur often because vessels must wait for high water to navigate the channel.	Immediate	Survey	None
20	**Mississippi**	Mississippi River	Channel deepening from Gulf to BR	Type vessel traffic is limited by current depth	Immediate	Survey	None
21		Mississippi River	Baptiste Collette channel deepening	The channel is used as an alternate route from the east Gulf to the Mississippi River and is limited by depth to type vessel traffic	Immediate	Survey	Plaquemines Parish
22		Old River Navigation Canal	Old River Lock	Vessel delays occur 93% of the time	Immediate	LPMS	None
23	**Ouachita**	Ouachita River	Channel maintenance and alignment	Parts of the navigable channel are not maintained to authorized depths and channel alignment causes navigation difficulties	Immediate	Survey	None
24	**Red**	Red River	Channel deepening to 12'	Parts of the navigable channel are only 9 feet in depth, while the remainder is 12 feet; the 9-foot deep sections are a limitation to traffic	Immediate	Survey	None
25	**Vermilion-Teche**	Freshwater Bayou Bypass Canal	Freshwater Bayou Bypass Canal	Vessel delays occur 95% of the time	Immediate	LPMS	AGMAC
26		Atchafalaya River Route	Berwick Lock	Vessel delays occur 63% of the time	Immediate	LPMS	None

Notes: [1]Those contraints that receive a rating of "critical" present a navigation safety and/or operational hazard.
LPMS - Lock Performance Management System
AGMAC - Acadiana to the Gulf of Mexico Access Channel

No.	Basin	Waterway	Description
1	Atchafalaya	Atchafalaya River	Port of Morgan City channel deepening
2		Atchafalaya River Route	Simmesport - RR Swing Bridge
3		American Pass	Channel deepening
4	Barataria	Bayou Lafourche	Channel Deepening (for drill rig activities)
5	Calcasieu	Calcasieu River	Channel widening and anchorage areas
6		Calcasieu River	Channel deepening or at least maintained to the 40' depth
7		Calcasieu River	Dredge disposal issues
8	GIWW	GIWW	Port of West St. Mary channel deepening to 16'
9		GIWW	Port of Iberia channel deepening to 16'
10		GIWW	Calcasieu Lock
11		GIWW	Bayou Boeuf Lock
12		GIWW	Leland Bowman Lock
13		GIWW Alternate Route	Bayou Sorrel Lock
14		GIWW Alternate Route	Port Allen Lock
15		Inner Harbor Navigational Canal	Inner Harbor Navigational Canal Lock
16		GIWW	Harvey Lock
17		GIWW	Algiers Lock
18	Mermentau	Mermentau River	Depth at the mouth of the river too shallow at low tide
19	Mississippi	Mississippi River	Channel deepening from Gulf to BR
20		Mississippi River	Baptiste Collette channel deepening
21		Old River Navigation Canal	Old River Lock
22	Ouachita	Ouachita River	Channel maintenance and alignment
23	Red	Red River	Channel deepening to 12'
24	Vermilion-Teche	Freshwater Bayou Bypass Canal	Freshwater Bayou Bypass Canal
25		Atchafalaya River Route	Berwick Lock

30 15 0 30 Miles

1 inch equals 30 miles

Legend

- Physical Constraints
- Interstate System
- State Boundary

REFERENCE:
Louisiana Department of Environmental Quality, 200406, Basin Subsegments from LDEQ source data, Geographic NAD83, LOSCO (2004) [subsegments_2004]: Louisiana Department of Environmental Quality, Baton Rouge, LA. (modified)

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LOUISIANA'S ON THE MOVE DOTD BUILDS THE WAY

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

EXHIBIT 2-4

PHYSICAL CONSTRAINTS

DOTD MARINE TRANSPORTATION STATEWIDE SYSTEM PLAN

DRAWING NUMBER	APPROVED BY		CHECKED BY		DRAWN BY		OFFICE
ldotd_279_0020_physical_constraints	XXX	XXX	XXX	XXX	B. Holt	4/5/07	BTR

Map Document: (G:\Data\ngLOD\79\1222\79\DOTD_Marine Transportation\Art\Year\GIS_Documents\Paper_L\Maps\MXD\dotd_279_0020_physical_constraints.mxd)
4/5/2007 -- 9:18 AM

"in coordination with federal, state, local, tribal and international authorities, NOAA manages the use of these environments, regulating fisheries and marine sanctuaries as well as protecting threatened and endangered marine species." Of particular interest to the maritime industry, NOAA administers fishery management plan fees and fishing capacity reduction program fees. NOAA also provides the following:

- Nautical charts essential for navigation of all U.S. coastal waters
- Electronic navigation charts that provide additional navigation information
- Tide and tidal current tables and real-time water levels and currents in ports and harbors to aid in timely and cost-effective shipping of $500 billion worth of cargo annually
- Safe navigation promotion and ports monitoring systems
- Hydrographic surveys to determine configuration and bottom depths of water bodies as they relate to navigation including detection, location, and identification of wrecks and obstructions

Department of Defense (DoD)

The DoD is home to the USACE which provides engineering services for water resources and water related civil works projects. In this role, the USACE performs the following:

- Regulates the discharge of dredge or fill material into waters of the U.S., including wetlands
- Performs work on navigable waterways including dredging
- Operates locks
- Constructs dams, piers, locks, or other structures
- Monitors the ocean dumping of dredged materials
- Constructs navigable waterways, deepens channels, and maintains channels
- Permits docks, bulkheads, etc. (Section 10 permits)

In Louisiana, USACE issues dredge and fill permits jointly with the state's Department of Natural Resources (DNR). It consults other agencies depending on the projects and needs.

The USACE Civil Works Program addresses three primary missions:

- Navigation
- Flood damage reduction
- Environmental restoration

The program utilizes a clearly defined process to determine whether or not a project is warranted. The first phase of this process is a reconnaissance study to evaluate if a project is in the federal interest and whether a potential economic solution exists. A benefit to cost ratio of over 1:1 must exist. Congress must authorize the reconnaissance study. The second phase consists of a feasibility study. The feasibility study considers many variables in determining whether or not a project should be implemented. Some of these variables include environmental impact, economic benefits, and project cost. Provided the findings of the feasibility study are favorable, the USACE will provide approval and forward this to Congress which in turn authorizes a project in a WRDA. An approved WRDA bill is a precursor to the allocation of federal funds to design and construct a navigable waterway related project.

Under the USACE Civil Works program, numerous facets of operation are significant to the marine transportation sector, including but not limited to the following:

- **Navigation**—Supports navigation by constructing, maintaining, operating, and improving federally authorized channels. Operation and maintenance includes channel dredging and lock repairs. Dredging schedules are prioritized based on the ton/miles established for navigable waterway commerce along each waterway rather than the frequency of waterway usage which limits dredging programs for smaller waterway systems that transport "through" cargo tonnage. Maintenance dredging for smaller waterway systems is discussed further in section 3.3.2.
- **Flood Damage Reduction**—Provides support for protection from flood damage by building riverine and hurricane protection.
- **Environmental Stewardship**—Works to ensure compliance to Federal, state, and local environmental requirements. Additionally, the USACE works to conserve and preserve natural resources, in particular wetlands.
- **Wetlands and Waterways Regulation and Permitting**—Regulates activities on navigable waterways through the granting of permits.
- **Recreation**—Operates more than 2,500 recreation areas nationwide.
- **Emergency Response**—Provides emergency responses for Presidential disaster declarations.

Department of Human Health Services

The Centers for Disease Control and Prevention (CDC) is one of 13 components of the Department of Human Health Services (HHS). The CDC collects fees for sanitation inspection of cruise ships and rodent infestation inspections.

Department of Homeland Security

As a result of the National Strategy for Homeland Security and the Homeland Security Act of 2002, U.S. Department of Homeland Security (DHS) was created. Four sub-agencies in the DHS impact marine transportation. These agencies are the United States Coast Guard (USCG), the Transportation Security Administration (TSA), the U.S. Immigration and Customs Enforcement (ICE), and the U.S. Customs and Border Protection (CBP).

The USCG has jurisdiction over all navigable waterways in the U.S. Given this authority, the Coast Guard must review proposed structures such as bridges for potential impacts and obstructions to navigable waterways. The USCG also examines vessels to ensure that public safety standards are consistent with federal legislation. Some of the fees and certificates that the USCG administers are Commercial Vessel Inspection and Examination Fees, Water Pollution Certificates, Certificates of Registry, merchant officer licenses, and Merchant Mariner Documents. The USCG goal of safety is primarily served through the search and rescue program. However, navigation aids such as buoys, moors, and navigation lights are maintained by the USCG. The USCG, along with the Transportation Security Administration, administers the Transportation Worker Security Credential (TWIC) program described in the following paragraph.

The Transportation Security Agency (TSA) was created in 2001 and has since been most evident in air transportation screening; however, this is not the limit of jurisdiction within the organization. The TSA's mission includes all forms of transportation. In the maritime sector, as listed on their web-site (Transportation Security Administration Web-site) its mission is "To engage in information sharing and the collaborative development of security procedures and protocols with the USCG, CBD, other federal agencies, state and local governments and their port representatives, and stakeholders of the maritime industry." Some initiatives that have a direct impact on the maritime sector are the Transportation Worker Identification Credentials (TWIC), Screening Initiatives for Ferry Operations and Cruise Line Terminals, and the Port Security Exercise Training Program (PortSETP). An estimated 750,000 individuals will require TWICs, and while this program will be implemented across other transportation modes in the near future, the TWIC final rule published in the Federal Register January 25, 2006, set forth regulatory requirements to implement the program in the maritime mode first.

As listed on their web-site, the ICE's mission is "to protect America and to uphold public safety. The ICE fulfills this mission by identifying criminal activities and eliminating vulnerabilities that pose a threat to our nation's borders, as well as enforcing economic,

transportation and infrastructure security." (U.S. Immigration and Customs Enforcement Web-site) The CBP section of the DHS is responsible for the majority of maritime related fees, accounting for 80 percent of all fee related income in 2002. Of this 80 percent, 70 percent comes from the Harbor Maintenance Tax (HMT). The HMT was the result of the 1986 Water Resources Development Act and is the primary source of funds for operation and maintenance of federally maintained waterways in the U.S. The HMT is based on the value of goods transported in and out of the U.S. In 1994, the HMT on export cargo was found to be unconstitutional and was removed from the HMT. Some questions remain as to the validity and fairness of the remaining import HMT. Because it is significant in providing funds to maintain U.S. waterways, the tax will not likely be removed until some alternative source of funding is identified.

U.S. Department of Transportation

Under the direction of the U.S. Department of Transportation (DOT), the Maritime Administration's (MARAD) initiative is to make the U.S. Marine Transportation System (MTS) the world's most technologically advanced, safe, secure, effective, accessible, globally competitive, dynamic and environmentally responsible system for moving goods. Its new initiative is to promote waterborne transportation. One of the smartest and cheapest solutions to mitigate other transportation mode congestion is to invest in our marine highway system. The U.S. marine transportation system is a form of commercial transportation that utilizes inland, coastal waterways, and the Great Lakes to move commercial freight from one destination to another. With the North American Free Trade Agreement between Canada and Mexico, initial efforts are also underway to mitigate border congestion with these neighbors. MARAD programs promote the development and maintenance of an adequate, well-balanced U.S. Merchant Marine, sufficient to carry the Nation's domestic waterborne commerce. They carry a substantial portion of waterborne foreign commerce and are capable of service as a naval and military auxiliary in time of war or national emergency. MARAD also seeks to ensure that the U.S. maintains adequate shipbuilding and repair services, efficient ports, effective inter-modal water and land transportation systems, and reserve shipping capacity for use in time of national emergency."(MARAD Web-site)

United States Environmental Protection Agency (EPA)

The EPA is the lead federal agency with permitting and enforcement authority for federal environmental laws. The agency works closely with state and local governments in ensuring compliance with federal environmental laws. Ordinarily, EPA delegates permitting and enforcement authority for the nation's environmental laws to state governments with EPA-approved programs. Some federal environmental laws, however, require separate EPA permits. EPA has delegated its authority to DEQ in Louisiana with the exception of dredge and fill requirements in certain wetland areas which continue to be a multi-agency permitting activity including USACE.

Federal Maritime Commission

Established in 1961 by the Reorganization Plan No. 7, the Federal Maritime Commission (FMC) is responsible for the regulation of ocean commerce and promotion of the U.S. Merchant Marine. The primary statutes that the FMC enforces are the Shipping Act of 1984, the Foreign Shipping Practices Act of 1988, Section 19 of the Merchant Marine Act of 1920 (commonly referred to as the Jones Act), and Public Law 89-777. The Shipping Act of 1984 primarily establishes regulatory process for the carriage of goods by water in the foreign commerce of the U.S. The Foreign Shipping Practices Act of 1988 provides the FMC with the authority to investigate whether foreign policies or practices of maritime-related services adversely impact operations of the U.S. Public Law 89-777 provides the FMC with an oversight responsibility to ensure that each owner or charter of an American or foreign vessel having berth or stateroom accommodations has established the financial responsibility to meet any liability for death or injury to passengers. The Jones Act is discussed in detail in section 2.4.2.2.

Federal Communications Commission

Like the FMC, the Federal Communications Commission (FCC) is an independent government agency directly responsible to Congress. Established by the Communications Act of 1934, the FCC regulates all forms of broadcast in the U.S. and establishes channels for communication among the maritime community.

In this role, the FCC collects fees for a number of radio inspections and licensing for merchant vessels.

2.4.2.2 Federal Regulations

The federal agencies listed above serve as a policing force for federal laws. Some of these laws, which are often considered institutional constraints, follow.

- The Louisiana DEQ, Office of Environmental Services, has been approved by the EPA for the implementation of the Clean Air Act, in particular certain New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAPs) promulgated by EPA at Section 40 of the Code of Federal Regulations, Chapters 60, 61, and 63. The delegation of authority does not extend to sources located in Indian territory. Even though all air emission permits in Louisiana are issued by DEQ, the EPA retains oversight authority.

- The Federal Water Pollution Control Act, commonly known as the Clean Water Act, regulates discharges to waters of the U.S., a broadly defined term that encompasses any type of water body related to interstate commerce, including wetlands. Unlike the Clean Air Act, the EPA has not delegated the primary responsibility for the enforcement and permitting of Clean Water Act activities to DEQ. Accordingly, discharges to surface waters in Louisiana often require two permits, one from the

EPA under the Clean Water Act and one from DEQ under the Louisiana Water Discharge Permit System of Title 33, Part IX, Subpart 1 of the Louisiana Revised Statutes. The EPA does not have permitting responsibility under Section 404 of the Clean Water Act, which regulates the discharge of fill into waters of the U.S. The USACE issues permits under Section 404, although the EPA may veto such permits under Section 404 of the Clean Water Act. Permits for discharges of pollutants to the waters of the U.S. are subject to effluent limitations and permitting requirements of the National Pollutant Discharge Elimination System (NPDES).

- The Rivers and Harbors Act of 1899 contains many environmental-related provisions that are now regulated under the Clean Water Act. However, it retains its own vitality by prohibiting the construction of any bridge, causeway, dam, or dike over or in any port, road, haven, harbor, canal, navigable river or other waterway within the U.S. that does not receive Congressional approval. Permitting through USACE and the USCG also are required.

- The Truman-Hobbs Act establishes that all bridges over waterways pose obstructions for navigation. However, these bridges will be tolerated if they satisfy the following:

  1. Serve the needs of land transportation, and
  2. Do not pose an unreasonable obstruction for navigation

  A bridge can be identified as posing an unreasonable obstruction by the USCG due to an insufficient height or width of the navigation span or restrictions posed by the draw opening. Once identified, the USCG will provide notice and hold a public hearing. If alterations are deemed necessary, the USCG will issue an Order to Alter to the bridge owner.

  - An Order to Alter for a railroad or publicly owned highway bridge is issued under the provisions of the Truman-Hobbs Act. The USCG must approve plans, specifications, and contracts associated with bridge alterations that are governed by the act. The USCG will also approve the apportionment of cost of alterations between the United States Government and the bridge owner.

- The Jones Act, which is enforced by the Federal Maritime Commission, refers to a series of U.S. cabotage laws enacted in the 1920s. The act requires that all U.S. flagged vessels are built in the U.S., owned by U.S. citizens, and manned by U.S. crew-members. Along with these requirements, the act requires that the transport of goods between U.S. ports be carried by U.S. flagged vessels. Similar cabotage laws have also been enacted by 45 other countries. The regulations created by the Jones Act are found in Title 46 of the Code of Federal Regulations.

In the middle and late 1990s, a debate ensued about the continued need for U.S. cabotage laws and key among them the Jones Act. A group called the Jones Act Reform Coalition (JARC) claimed service shortfalls in every part of the nation and tried to essentially repeal the law but was unsuccessful in its efforts.

The theoretical reasoning behind the opposition to the Jones Act is that it is a restraint of free trade between nations, and free trade makes possible the development of a truly international division of labor which in turn allows countries to specialize in doing what they do best. As a result, countries can then have a "comparative advantage" in the production of certain goods and services. By specializing in the production of those goods which can be produced best in a given country, and trading for other goods it is not good at producing, individual national economies generate far higher incomes and living standards than if those countries did not trade. Because the Jones Act restricts trade between points within the United States, opponents argue that it is a restriction of free trade and is equivalent to a tariff on goods and services.

On the other hand, those who defend the Jones Act argue that it is the only way that U.S. environmental and labor laws can be enforced within American waters. These laws range from restrictions on trash dumping to ship designs which limit oil spills to minimum wage laws. In addition, national security reasons offer support for maintaining a domestic merchant marine capable of transporting military cargo during national emergencies. Supporters argue that the benefits of the Jones Act exceed the cost. Modification of the Act continues under debate at both national and international levels.

Dredge and Fill

Unless specifically exempted by statute or rule, all dredging and filling activities conducted in state waters require permits. At the state level, dredging and filling in waters are regulated by the DEQ and DNR. If a project has local importance, then local parish governments often get involved. Projects within port jurisdictions require port commission approval. The Louisiana Department of Wildlife and Fisheries also requires a permit in that no person or corporation can dredge or fill water bottoms of the state without first obtaining a permit and paying a fee. At the federal level, filling in waters is regulated by the USACE and the EPA. Before a dredge and fill permit is issued from DEQ, reasonable assurance must be provided that state water quality standards will not be violated and the proposed project will not be contrary to the public interest. DEQ's jurisdiction does not extend to isolated wetlands which are not connected to defined waters via a dominance of wetland vegetation.

The wetlands jurisdiction of the USACE, however, is more extensive and includes isolated wetlands not within the jurisdiction of the DEQ. In determining whether to issue or

deny a permit for filling in waters, the USACE considers conservation, economics, aesthetics, historic value, fish and wildlife, navigation, recreation, and other factors affecting public interest. Other federal agencies including the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and EPA comment on USACE dredge and fill applications.

The EPA has the authority to specify disposal sites for discharges of dredge and fill material into waters of the U.S. The EPA, in addition to independent enforcement authority, may also exercise its veto power to prohibit or otherwise restrict a site where the discharge of dredge or fill material will have an unacceptable adverse effect on municipal water supplies, shellfish beds and fishing areas, or recreational areas.

The permitting process for dredge and fill involves filling out a Joint Permit Application that is submitted to the Louisiana Department of Natural Resources Coastal Management Division (CMD). The joint application was developed to facilitate the state and federal permitting process administered by CMD and USACE for work done within the Louisiana Coastal Zone. The joint application may be used to apply for a Coastal Use Permit and/or a Department of the Army Permit under Section 10 of the Rivers and Harbors Act and/or Section 404 of the Clean Water Act.

Environmental Mitigation

Environmental mitigation is an integral part of permitting under Section 404 of the Clean Water Act. The Water Quality Assessment Division of Louisiana DEQ is responsible for quality of waterways in the state. Basic water quality program processes and activities are addressed in the state Water Quality Management Plan (WQMP) and Coastal Protection Plan (CPP). Environmental mitigation is most frequently considered within the context of wetland alterations and construction. The most common usage includes the creation, enhancement, restoration, or preservation of wetlands or unique vegetative communities to offset adverse construction consequences.

The USACE oversees mitigation in the context of Section 404 dredge and fill permitting by coordinating comments from federal resource agencies, most notably the EPA. Any projects in wetland areas also require a DNR permit.

2.4.2.3 State Laws, Regulations, and Programs

The primary state government agencies and other associated programs are noted below.

Louisiana Department of Transportation and Development

The DOTD was created to serve the transportation and public sector development needs of the state. Water resources needs are included. DOTD's mission statement defines the DOTD's role as "to administer and implement the water resources programs and projects related to ground and surface water, dam safety, cooperative agreements with various federal agencies,

interstate compacts, flood plain management, flood control, navigation, drainage, hurricane protection and other water related programs." To carry out this mission, DOTD utilizes its Office of Public Works, Hurricane Flood Protection and Intermodal Transportation. The overall DOTD mission is "to deliver transportation and public works systems that enhance the quality of life and facilitate economic growth and recovery."

With regard to maritime resources, the Port Priority Program Unit and Water Resources Section manages the Port Construction and Development Priority Program (PCDPP). The Intermodal Transportation Division focuses on airports, marine, and rail modes of transportation as well as public transit. The Marine and Rail Section is the local non-federal sponsor for USACE navigation projects and oversees the Louisiana Marine Transportation System and all navigation projects.

Louisiana Department of Environmental Quality (DEQ)

The administrative staff of DEQ is responsible for the general operations of the agency as well as legislation, regulations, and policy development. This includes review and approval of permits, development of quality assurance documents and reports, development and revision of water quality standards, issuance of water quality certifications, execution of enforcement actions, development of water program grant work plans and water quality management strategy, and development and implementation of permit delegation. The administrative activities consist primarily of developing policy and making decisions concerning program activities. In addition, the administrative staff is involved with personnel management, budget, acquisitions, and inventory control.

The various water pollution control activities undertaken by DEQ require a coordinated effort among many federal, state, and local agencies, as well as private entities. The administrative activities are key in establishing communication channels between the department and other groups. Some of the key activities that require a concerted effort include spill response, water quality monitoring, water resource planning and management, flood control, and best management practices for the control of non-point sources of pollution. Many other aspects of water pollution control and coordination require considerable time and effort to ensure that the objectives of the department are accomplished. However, some coordination activities involve regularly convened groups in which DEQ may be required or simply chooses to participate. The primary purposes of this coordination are the transfer of information and technology to ensure that proposed and planned activities of other groups are complementary to or consistent with the department's policy and regulations.

Maritime Advisory Task Force (MATF)

The MATF acts in an advisory capacity to coordinate planning and obtain funding through the Louisiana Department of Economic Development (DED) and other federal, state, and local agencies for studies and/or projects that relate to ports and waterways. Support staff,

facilities, and resources for the MATF are provided by the Department of Economic Development.

Duties of the task force include but are not limited to the following:

- Recommending legislation designed to enhance and protect the economic viability of Louisiana's maritime industry
- Recommending economic development programs designed to foster and promote growth in Louisiana's maritime industry
- Suggesting a means to enhance the competitiveness of Louisiana's maritime industry in national and international markets
- Evaluating maritime industry safety concerns and recommending safety measures that will benefit both the general population and Louisiana's maritime industry

2.4.2.4 Maritime Fees

Public ports in Louisiana are generally owned and operated by port authorities that are administered by the respective port commissions. The port authorities are created by the state legislature and are governed by legislation provided at the creation of the entity. As autonomous entities, port authorities have the right to impose tariffs for services provided within their respective jurisdictions. Given each port's uniqueness such as location, channel depth, industry, infrastructure, labor, etc., these tariff rates vary across the state. The value of the services the ports and harbors provide to vessels generally drives these fees. An example of tariff fee schedules and other ancillary costs to shippers is included in Table 2-3.

Table 2-3 Example of Actual Maritime Fees for Vessels Calling on a Louisiana Port[1]

Dockage ($/ton/day or $/foot/day)				
Derived from gross registered tons (GRT) or length overall (LOA), whichever is greater				
		LOA to 250'		LOA 250' & Over
		GRT	LOA	GRT	LOA
Vessels	First day	$0.08	$0.32	$0.10	$0.40
	Each Extra Day	$0.04	$0.16	$0.05	$0.20
Barges	First day	$0.04	$0.16	$0.05	$0.20
	Each Extra Day	$0.02	$0.08	$0.025	$0.10
Conventional Barge Fleeting Charges ($/day)				
		First Day		Each Extra Day
Inland Barges		$15		$8
SEABEE Barges		$8		$4
LASH Barges		$5		$2.50
Wharfage ($/ton)				
				Commodity Rate
All Commodities, Not Otherwise Specified				$0.50
Bagged Goods, Edibles, Coffee, & Animal Feed				$0.40
USDA				$0.30
Bulk Not Otherwise Specified				$0.10
Container, Empty				$0.40
Container, Loaded				Based On Contents
Vehicles, All Kinds				$3.00
Demurrage ($/ton/day)				
		Day 1 to 7	Day 7 to 14	Day 14+
All Commodities, Not Containerized		$0.08	$0.15	$0.50
All Commodities, Containerized		$1.50	$3	$5
Vehicles, All Kinds		$1	N/A	N/A
Empty Container		$1.50	$3	$5
Vessel Costs				
Example: 800' Crude Oil Tanker with 60,000 tons of product traveling from the mouth of the Mississippi River to New Orleans				
Pilotage		$15,800		
Tugs (two tugs)		$6,200		
Line Handlers		$1,200		
Agency Fee		$3,000		

Notes: N/A - Not applicable; not available

[1]Reported fees are actual as specified in a Louisiana port's tariff or provided by vessel support service firms.

Typical tariff items and their definitions include the following (The Greater Baton Rouge Port Commission, 2006, *General Tariff*):

- **Pilotage Fees**—Fees charged to vessels for local pilot assistance in the navigation of vessels from an open waterway to a berth or through a confined channel.
- **Tug Boat Fees**—Fees charged to a vessel for the use of an assist tug boat.
- **Harbor Fees**—Charges assessed against a vessel to assist in defraying the expense of administration and maintenance of the port and harbor including the supervision of shipping in the jurisdiction, to prevent collisions and fires and coordinate with the USACE and USCG to maintain proper channel depth and navigational aids.
- **Anchorage Fees**—Charges assessed against a vessel for the use of the port's anchorages.
- **Security Fees**—Fees assessed to vessels to assist in defraying the expense of the administration of DHS requirements.
- **Dock Operation Charges**—Charges assessed to vessels loading or unloading cargo over, under, or across the general cargo docks.
- **Dockage Fees**—The charges assessed against a vessel for berthing at a wharf, pier, bulkhead structure, or bank or for mooring to a vessel so berthed.
- **Wharfage Fees**–Charges assessed against the cargo or vessel on all cargo passing or conveyed over, onto, or under wharves or between vessels (to or from barge or water) when berthed at a wharf or when moored in slip adjacent to a wharf. A Wharfage fee is solely the charge for use of a wharf and does not include charges for any other service.
- **Line Handling Fees**—Fees charged to vessels for assistance with the lines required to berth a vessel.
- **Demurrage Fees**—Charges assessed against cargo remaining on wharves, in the warehouses, transit sheds, or open storage space beyond the limit of free time allowed. Vessels, their owners, and agents are responsible for demurrage charges.
- **Export Cargo Drayed Off Dock**—Charges assessed against cargo placed on the dock for a vessel call at the port and subsequently drayed or shipped to another location.

In addition, ports also have the authority to lease port land to other service operators and industries of any sort. In turn, these operators are empowered to employ their own tariff structure for services rendered.

2.4.2.5 Funding Programs

Improvements and maintenance of the Louisiana statewide waterway system are funded by public and private entities. Several public agencies are noted below.

1. The USACE is the main federal agency responsible for the operation and maintenance of the navigable waterway system, inclusive of dredging channels and lock repair.
2. The main responsibility for navigational aids and security is with the USCG.
3. Major state agencies making investments in the system are public ports and state agencies such as DOTD and DED.
4. Local bodies such as flood control boards, cities, and communities also maintain some waterways and, in some cases, sponsor projects along with state and federal agencies.
5. Private sector investment in maritime trades via building terminals or investing in tugs, boats and barges, etc., is estimated to be only second to the investments made by the federal government (The 1992 Inland Waterway Review, October 1992).

2.4.2.5.1 Federal

<u>Energy and Water Development Appropriations Act and WRDA</u>

This act makes appropriations for energy and water development to USACE, the Department of the Interior, and the Department of Energy for various programs. For water development programs in particular, USACE receives appropriations for civil functions pertaining to rivers and harbors, flood control, shore protection, storm damage reduction and aquatic ecosystem restoration.

WRDA does not fund projects; it is an authorization bill that provides the USACE with the authority to study water resource problems, construct projects, and make major modifications to projects. Since 1974, the WRDA has been authorized by legislation commonly referred to as omnibus legislation. Omnibus legislation also includes projects under regulatory purview of various Flood Control Acts and Rivers and Harbor Acts. Such legislation is usually enacted every two years, although Congress is not legally bound to do so, and a WRDA bill has not been enacted since 2000. Its purpose is to deem a project eligible for future funding. The USACE performs independent reviews and recommends studies and projects to be included in a WRDA

bill. The process includes a one-year reconnaissance study followed by a multi-step feasibility process (at least 3 years) to determine if a project is the solution to a problem. If a project has a local funding partner and is economically beneficial to the nation and environmentally sound, it may make the WRDA list of projects. The WRDA bill is then submitted to Congress which authorizes the projects before appropriating funding. Once a project has been authorized, the time frame in which it may be funded is not guaranteed.

The provisions and contents of WRDA are cumulative and new acts do not replace or supersede previous acts. WRDA bills in past Congresses have contained provisions to change how USACE formulates, reviews, and implements projects, but no significant changes have been enacted since 1986.

USACE—Inland Waterways Trust Fund

The Inland Waterways Trust Fund was created in 1986 and pays half the cost for construction and major rehabilitation of specific inland waterway projects. The monies are received from a tax on fuel from vessels engaged in commercial transportation on inland waterways. The tax currently is $0.20 per gallon and earned $105 million in 2006 including $92 million paid by the barge and towing industry and $13 million in interest. In FY 2005, the USACE received $149 million for construction projects, leaving a balance of approximately $307 million. In FY 2006, the USACE planned to spend $394 million on current maintenance projects, a sum that will reduce but not alleviate the backlog of pending repairs that exceeds $600 million. The current fuel tax will not replenish the fund sufficiently to keep pace with spending for needed projects and is expected to be insolvent by 2009. The USACE currently is considering dissolution of this fund and creation of a new fund to be generated from barge fees. Dissolution of this fund may extend beyond the Corps purview to the legislative level.

USACE—Harbor Maintenance Trust Fund (HMTF)

Congress enacted the Harbor Maintenance Tax (HMT) and established the HMTF in the Water Resources Development Act of 1986. The HMTF was intended to pay 100% of USACE eligible operations and maintenance expenditures for commercial harbors and channels. Section 201 of the 1996 WRDA expanded the use of HMTF to pay federal expenditures for construction of dredged material disposal facilities necessary for the operation and maintenance of harbors. The tax-nourished HMTF was intended to cover these federal government obligations to maintain channels and has grown over the years, but the USACE yearly allocation for spending from the HMTF has been millions of dollars less than requested. Several factors regarding use of the HMTF and its effect on navigation are outlined below:

- No literal trust fund (money being held in account) exists; the fund is on paper only. Federal government collections of this fund and other sources all go into one money coffer and there is no connection between how much is collected for HMTF and how much is spent.

- No statutory requirement for how Congress spends specific monies for specific purposes has been established.

- Under funding for dredging needs that could be covered by the HMTF compromises safety and efficiency, causing ship channels to silt up and vessels to carry lighter loads. Under the USACE Civil Works Program, underfunding for channel maintenance has resulted in a growing backlog of maintenance needs and translates to larger ports receiving more attention while smaller ports wait indefinitely for dredging.

- Tonnage and distance are not relevant to the tax collection process. The tax is a port-use tax paid at the time of unloading, and one shipper may pay the tax two-fold if unloading occurs at several ports. This fact discourages short sea shipping which could reduce congestion issues and create more waterfront jobs.

Total HMTF revenues for FY 2005 were $1 billion. The total fund balance, however, was $2.6 billion as of September 30, 2004. Congress did not approve spending down the balance of the HMTF at that time. Reportedly $6 billion exists in the fund today, and the American Association of Port Authorities recommended $1 billion be spent in FY 2008. However the administration's budget called for only $735 million to be spent. This amount falls short by almost a third of what is critically needed to maintain navigability in the nation's ports, harbors and shipping channels.

USACE Civil Works Budget

Typically, an annual recommended budget is transmitted to Congress for new federal funding for the Civil Works program of the USACE. The budget emphasizes these three critical Corps activities:

1. Construction and completion of water resources projects that will provide a high return on the nation's investment in the USACE primary mission areas of commercial navigation, flood and storm damage reduction, and aquatic restoration

2. Increased funding for the USACE regulatory program to help protect and preserve the nation's waters and wetlands

3. Proactive support for USACE critical emergency preparedness and response missions by funding in the regular budget process and not through emergency transfers or supplemental funding

The federal funding in the civil works budget is provided in the Energy and Water Appropriations Bill.

USDOT—MARAD

Although MARAD does not provide a funding source for waterway and infrastructure improvements, it does provide policy-related decision making and interagency support for recommended waterway projects and improved economic benefits via the waterway industry. MARAD reports annual capital expenditures nationally for the public port industry.

Nationally, MARAD has projected almost $8 billion in U.S. port capital expenditures between 1998 and 2002. Of this total, almost $1.6 billion is expected to be invested in the Gulf Coast area while $1.7 billion is expected for the South Atlantic region (Parsons, 2000).

U.S. Department of Commerce, Economic Development Administration (EDA)

The Public Works Economic Development Act of 1965 as amended by the Economic Development Administration Reform Act of 1998 establishes several grant and loan programs for infrastructure development, local capacity building, and business development. The EDA was established to generate jobs, help retain existing jobs, and stimulate industrial and commercial growth in economically-distressed areas of the U.S. EDA assistance is available to rural and urban areas of the nation experiencing high unemployment, low income, or other severe economic distress.

The agency helps to address problems in communities that are associated with long-term economic distress and sudden or severe economic dislocations including recovering from economic impacts of natural disasters, closure of military installations and other federal facilities, changing trade patterns, and the depletion of natural resources. Programs within EDA accomplish the following:

- Locally-developed public works infrastructure projects to allow communities to establish and support private sector businesses are funded.
- 320 economic development districts (EDD) and 65 Indian tribes staffed and operated locally to help communities build capacity to focus on long-term economic challenges are supported.
- A nationwide network of twelve trade adjustment centers offers effective, cost-shared professional assistance to trade-injured firms including manufacturing firms injured by imports. These firms are assisted in the development of strategies for competing in the global market place.
- Provide post-disaster assistance to areas affected natural disasters.
- Revolving loan funds are provided to enhance the local capacity to invest in community-identified commercial development to create jobs. Upon repayment, principal and interest stay in the community for re-lending and further economic

development activity. Local technical assistance grants are also offered to help fill knowledge gaps that inhibit communities from responding to development opportunities or solving specific economic problems. A common purpose of these grants is to determine the feasibility of proposed economic development investments.

Department of Homeland Security/USCG

The Department of Homeland Security (DHS) provides grants for port security and for eight recently designated Tier 1 (high risk) port groups to receive security grants. Continued funding for security programs at ports nationwide is expected. Ports on the Lower Mississippi River will continue efforts to improve port security with a $17.3 million grant from DHS.

2.4.2.5.2 State Funding Programs

DOTD - Port Construction and Development Priority Program (PCDPP)

The PCDPP is designed to provide guidance and supplemental funding to assist the development of port facilities. The funding originates from the Transportation Trust Fund. In administering this program, DOTD provides value to citizens of Louisiana by creating jobs, improving safety, and reducing maintenance costs of transportation systems in the state. Additionally, the feasibility of port construction and development programs is taken into account in determining the ranking/priority of projects supported by the DOTD. Traditionally the program provided an average annual $20 million contribution to port and infrastructure projects. According to the DOTD, the average economic return from these projects has been $6 for every $1 spent.

Capital Outlay Program

The capital outlay process requires that state agencies file a request to the state Division of Administration while local government agencies may file requests through appropriate state legislators. Project/budget requests are due November 1 of each fiscal year. Requests are reviewed for content and costs by the Office of Facility Planning and Control for legislative use. The Office of Facility Planning and Control formulates recommendations for the Governor's office review and the capital outlay bill (with recommended projects) which is first introduced to the House. The House has two committees, the Ways and Means Committee that reviews bond projects, and the House Appropriations Committee that reviews cash projects. Following House committee reviews, the Senate Committees for bond and cash projects review the recommended requests. After House and Senate reviews and amendments concurrence, the Governor may sign the capital outlay bill onto law. From that point, the Office of Facility Planning and Control administers all project funding processes through design, bid, and construction phases except for DOTD projects which they handle. This is the only source of money DOTD receives for sponsoring projects such as deepening of Baptiste Collette, the Houma Navigation Canal, and the Acadiana to the Gulf of Mexico Access Channel (AGMAC).

Transportation Trust Fund (TTF)

In 1990, the TTF was established. Legislation established that gasoline and motor fuel taxes and special fuel taxes (diesel and LNG) would be credited to the fund. Most of the TTF monies and some self-generated funds go to pay for the operations of DOTD including salaries, retirement, equipment, and supplies to fix roads. Some of the monies go to state police and a transportation fund for parishes. Ports and airports also share the TTF monies. Monies have been funneled into the fund via a $0.16 per gallon tax on fuel sales. Another $0.04 per gallon is assessed for specific projects under the Transportation Infrastructure Model for Economic Development (TIMED).

Maritime Advisory Task Force (MATF)

Although the MATF does not provide funding, it acts in an advisory capacity for coordination of planning and obtaining of funds through the Louisiana Department of Economic Development (DED) and other federal, state, and local agencies for studies and/or projects that relate to the ports and waterways.

Most recently the MATF released a "Summary of Proceedings and Recommendations" report that was prepared by the University of New Orleans for the DED (March 2006). The purpose of the report was to identify maritime related infrastructure constraints, shortfalls in funding commitments, potential methods to attract additional funding, conflicts of interest with other stakeholders if any, and institutional constraints to be overcome. Specifically for funding issues, the report recommended the following:

- Increase PCDPP to $35 million per year.
- Seed the 2005 Louisiana Waterway Infrastructure and Development Fund with $10 million to support bond issues up to $100 million; this would enable a viable funding option; however, it has not yet been funded.
- Appropriate $20 million per year to the DED Port Development Program to be allocated exclusively for capacity expansion projects where private sector investment is more than the fund investment.
- Provide a one-time allocation of at least $300 million from the Louisiana Recovery Authority (LRA) to address uninsured damages to port facilities and costs associated with the MRGO dependent business relocations caused by the hurricanes (being addressed by the LRA).

All of the funding mechanisms identified have the capacity to contribute funds to waterway infrastructure and economic improvement projects. However, in many cases, other federal, state, and local agencies compete for the same funds which typically are not available in sufficient dollar amounts to address all project funding requests.

2.5 Projects-in-Motion

2.5.1 Approach and Methodology

For the purpose of this study, projects-in-motion were derived from federal and state agencies including but not limited to USACE, USCG, DOTD, DNR, and public and private ports and terminals. Projects-in-motion meet one or more of the following requirements:

- Project has been conceived and is on the "drawing board."
- Project is under formal study.
- Project has a cost estimate.
- Project is in a design or construction phase.
- Project has funding or has requested funding.

Once they were determined to meet this threshold, projects-in-motion were segregated into five categories as listed below.

1. Flood control
2. Environmental protection and enhancement
3. Rehabilitation of the existing structures and systems
4. Commercial navigation projects
5. Operation and maintenance

An initial round of data collection identified a total of 200 projects sorted into the above five categories (Appendix C). Projects that are solely operation and maintenance based were not considered projects-in-motion because each is an on-going, routine project. The initial list of 201 projects was sorted according to a project rating system.

The rating of projects was based on the following:

- Direct impact to navigation of waterways and efficient flow of waterborne commerce
- Indirect impact to navigation and efficient flow of waterborne commerce
- No impact to navigation or waterborne commerce

Those projects considered as having a direct impact to navigation and waterborne commerce were carried forward for further analysis in assessing physical constraints and then compared with the cargo and economic growth deficiencies (Section 3.0 and Section 4.0 respectively).

2.5.2 Listing of Projects-in-Motion

The initial results of the project evaluation process including all 200 projects are noted below.

- 14 of the projects (7%) were related to flood control issues such as levee repair/improvements and new levee alignments.
- 65 of the projects (32%) were environmental protection and/or restoration-enhancement projects. Most of these projects are intended to restore coastal and marsh areas along the coast and waterways that have been degraded by either natural circumstances (subsidence and sea-level rise) or by man-made influences, particularly along the waterways (boat wake generated waves and wave break energy, ship disposal, energy use, ballast water management/invasive species, etc.).
- 21 of the projects (11%) were related to channel improvements such as channel widening and/or deepening and infrastructure improvements, particularly at the locks.
- 100 of the projects (50%) were commercial navigation projects (primarily located at port facilities).

The majority of projects in the initial projects list were commercial operations and ports facilities projects, most of which would increase the capacity to move cargo (intermodal exchange) or increase storage/holding capacity at the ports themselves. These projects were considered to have an indirect impact on the waterways.

The filtered list of 16 projects (Table 2-4) includes all channel and navigation infrastructure related projects. The Houma Navigation Canal Lock and the Bayou Sorrel Lock are considered both flood control and infrastructure and were included with the infrastructure group. No other flood control projects or environmental related projects were listed that would directly impact waterway navigation.

Table 2-4: Projects-in-Motion With Direct Impact to Waterways

Basin	Waterway	Functional Agent	Project/Study Name	Status	Additional project info
Mississippi River	Mississippi River	Plaquemines Parish	Channel deepening at Baptiste Collette	Planning	N/A
Calcasieu River	Calcasieu River	USACE	Study to widen the channel and add anchorage areas	Planning	N/A
	Calcasieu River	USACE	Dredge disposal management plan	Planning	N/A
Atchafalaya River	Atchafalaya	USCG	Simmesport Railroad Bridge Alteration	N/A	U.S. Coast Guard has determined a hazard to navigation
	Atchafalaya	USACE	Channel deepening study	Planning	Ongoing study , Port of Morgan City needs deeper channel access to attract more business (deepening to 35 feet)
	American Pass	USACE	Channel deepening	Design	Hazard to navigation
Red River	Red River above Shreveport	USACE	Extend navigation north from Shreveport into Arkansas	Planning	N/A
Lake Pontchartrain and Breton Sound	MRGO	USACE	Closure study - USACE	Planning	N/A
Barataria and Terrebonne Basins	Bayou Lafourche	USACE	Floodgate conversion to navigation lock	Construction	N/A
	Bayou Lafourche	USACE	Channel deepening to 50 feet, Port Fourchon to the Gulf	Planning	For support to oil and gas rigs, rig repairs and inspections
	Houma Navigation Canal	USACE	Houma Navigation Canal Lock	Design	Navigation and flood control-part of the Morganza to the Gulf Protection Plan
	Houma Navigation Canal	USACE	Houma Navigation Canal channel deepening	Planning	N/A
GIWW	Morgan City to Port Allen	USACE	Bayou Sorrel Lock Preconstruction/E&D	Design	N/A
	GIWW (Calcasieu)	USACE	Calcasieu Lock	Planning	Limiting capacity; congestion issues
	Inner Harbor Navigation Canal	USACE	IHNC Lock	Construction	The EIS is being redone by court order.
	Freshwater Bayou/GIWW/Commercial Canal	USACE	Port of Iberia, Acadiana to the Gulf of Mexico Access Channel (AGMAC)	Design	Widen and Deepen the access channel by dredging the Commercial Canal, GIWW and Freshwater Bayou to allow for deeper draft vessels The project would include upgrading the Freshwater Bayou Bypass Canal.

Notes: N/A - Not available; not applicable

The following list of these 16 projects summarizes the findings:

No. of Projects	Designated Waterway
1	American Pass
4	GIWW
2	Atchafalaya River
1	Mississippi River Gulf Outlet
2	Houma Navigation Canal
2	Bayou Lafourche
1	Red River
2	Calcasieu River
1	Mississippi River

Other waterway projects developed specifically to enhance waterborne commerce and economic factors are presented in Section 3.0 and Section 4.0.

2.6 Other Constraints Not Addressed by Projects-in-Motion

Not all current physical constraints identified are addressed by current projects-in-motion. Channel deepening for the Red River and the Mermentau River, for example, do not have associated projects-in-motion. Additionally, seven locks identified as constraints because of lockage and tow delays do not have associated projects-in-motion. Five of those locks are located on the GIWW. The remaining two locks are the Old River Lock and the Berwick Lock.

Nonetheless, more than half of the constraints identified have associated projects-in-motion indicating an overall awareness of system deficiencies by users and governing agencies involved in project selection. However, an increase in waterborne traffic and limited waterway and lock capacity will continue to develop as the dynamics of the waterway industry change.

For institutional constraints, increasing awareness of environmental issues (e.g. invasive species introduction from bilge discharge) and developing greater security-related regulations will add to the strain on waterway users required to remain ever-compliant with regulatory controls. Competition for project funding through traditional funding mechanisms elicits the need to identify other sources for funding or to develop new sources of funding.

2.7 Summary of Waterway System Analysis

The previous sections outline waterway identification, infrastructure, physical and institutional constraints, and projects-in-motion. The analysis of constraints and projects-in-motion indicates that planning for additional projects-in-motion is needed to address today's deficiencies and to accommodate future growth within the waterway system. Already identified

future deficiencies in the system will potentially limit growth capacity and the ability of Louisiana to remain competitive with other coastal states.

Planning for future growth includes predicting system shortfalls to avoid future physical constraints in the system as conditions of the waterways directly affect cargo transport and the economic growth capacity. The following section provides an overview of current and future freight flow along Louisiana waterways. The future growth projection for freight flow provides insight for Louisiana to address increasing freight movement along its waterways and to achieve future economic growth and links to the physical and institutional constraints.

3.0 STATEWIDE FREIGHT FLOW ANALYSIS

3.1 Introduction and Scope

The objective of this section is to provide a general overview of the statewide freight transportation system and to analyze the nature and role of waterborne commerce in the integrated multi-modal system. The conceptual approach is to treat the waterway system as a network of freight corridors and to analyze the commodity structure and other related economic activities on the waterways. The analysis concentrates on four major areas.

1. An overview of the statewide freight transportation system and the intermodal structure of the integrated network (Section 3.2).
2. A view of the existing waterborne cargo flow network based on the regional distribution of waterway systems, origin/destination analyses, commodity structure of waterway traffic, and volume levels (Section 3.3).
3. A brief economic analysis of each of the major commodity sectors to examine the economic link between the economic activities and the waterway systems (Section 3.4).
4. A summary of the waterway analysis and a discussion of several strategic issues and challenges confronting the state's maritime sector (Section 3.4.7).

3.1.1 Approach and Methodology

By way of approach and methodology, a substantial volume of available quantitative and descriptive data relevant to water freight flow was collected. The information was gathered from databases, published and unpublished research papers, port master plans, and other reports issued by federal and state agencies. The principal databases used in the analysis are as follows:

- The *Waterborne Commerce of the United States* (WCUS) maintained by the Navigation Data Center of the USACE (www.iwr.usace.army.mil)
- The *Commodity Flow Survey* (CFS) 2002 Database from the USDOT, Bureau of Transportation Statistics, for domestic freight movements by various modes (www.bts.gov)
- The interactive foreign trade database on imports and exports maintained by the U.S. International Trade Commission (USITC) (www.usitc.gov)

- The database on coal and other energy related issues maintained by the Energy Information Administration (EIA) of the U.S. Department of Energy (www.eia.doe.gov)

To orient these databases to statewide transportation planning, it was necessary to identify all databases on waterborne commerce relative to this study. Four good databases were identified. For example, one database is maintained for waterway planning purposes with a focus on freight flow aspects. In addition, the CFS database provides freight profiles for different regions and states in terms of modal structure, average shipment distances, and intermodal movements. Also, the USITC database is primarily used to assist exporters. Finally, the focus of the EIA database is on energy planning aspects. In short, all data used, evaluated, and incorporated from these sources were appropriate for this study.

Since most of the databases were complete only through 2002, that year was selected as the base year for cargo flow analysis. The CFS database, which is updated every five years, was available for 2002, and the waterborne data that is updated annually was available for 2004. Therefore, the complete freight scenario was developed for 2002 and projected to 2004 where practical. Where available, 2004 data is also presented. This data set, therefore, reflects stable year-to-year freight flow trends.

3.2 The Statewide Freight Flow Network-- An Overview

The basic elements of a typical freight transportation network are classified into two broad categories—physical and institutional infrastructure. Both of these components are equally important in creating an efficient freight system that fosters regional growth and economic development. Therefore, the focus of this section is to describe the physical facilities.

In general, freight networks are identified by transportation mode which is being used. The transportation modes are; ship (waterborne), road, air, rail, and pipeline. Every network consists of a system of links and nodes. The links represent the transportation mode, and the nodes function as interchange points (ports).

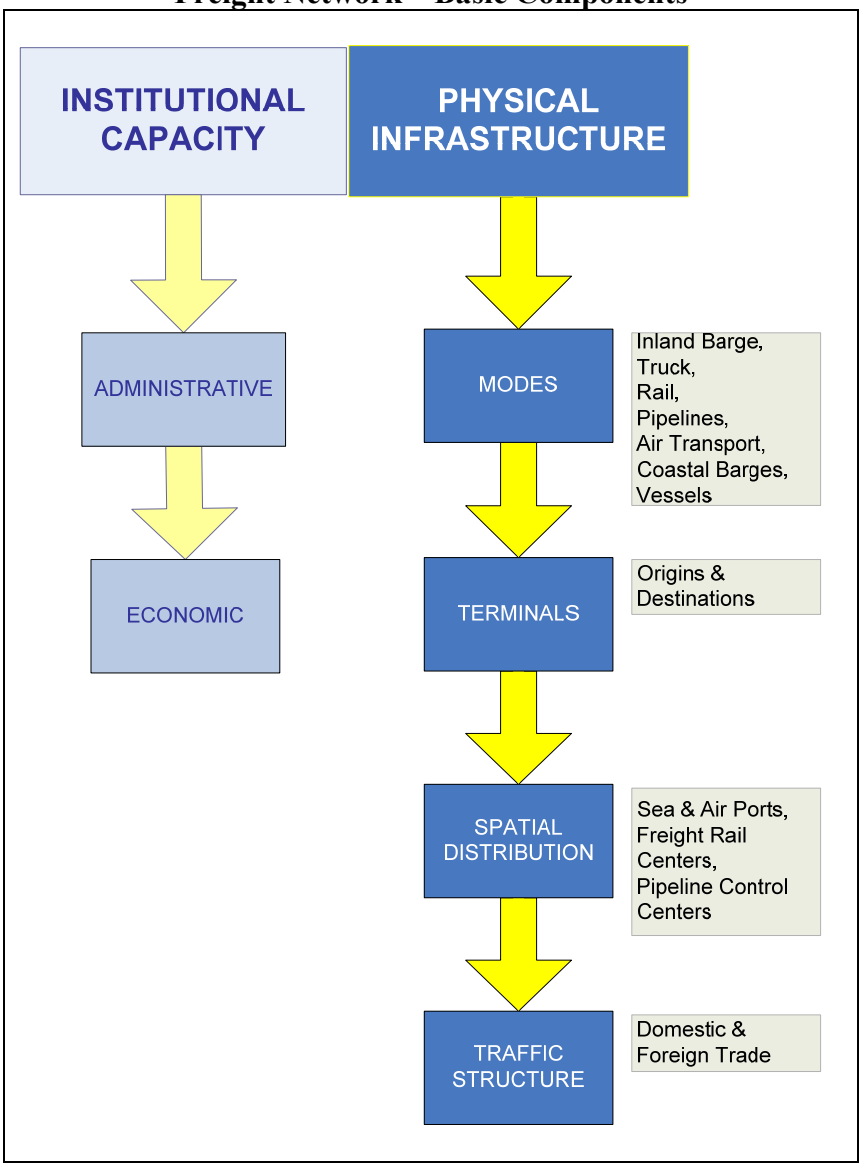
The spatial distribution of the networks and the associated commodity structure is a function of the following:

- goods movement from original forms to manufactured or processed forms
- the location of these goods and
- the timing of distribution of these goods according to the regional economic needs

For a basic abstract analysis, such as that required for this study, the physical networks are illustrated as separate intermodal systems as shown in Exhibit 3-1. However, it is important

to note that recent trends are toward the development of seamless statewide intermodal transportation systems combining various modes.

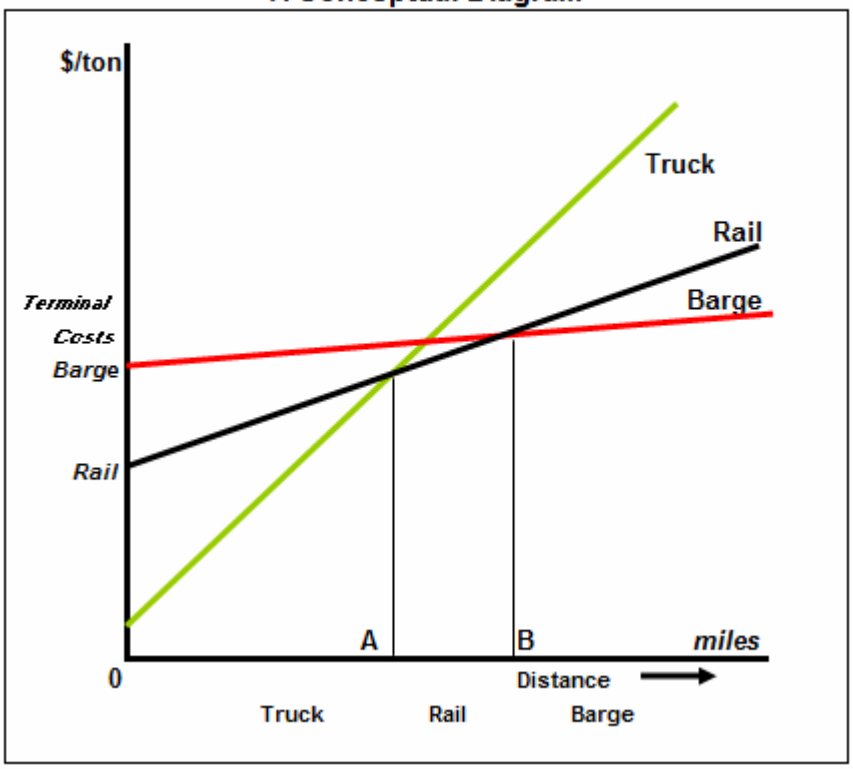
Exhibit 3.1
Freight Network—Basic Components



The various modes of transport exist and operate because of differing cost/distance relationships associated with different modal operations. These differences in relation to truck, rail, and barge transport are illustrated in Exhibit 3-2. Trucks that carry relatively smaller loads

have low unit costs for shorter distances, but the costs rise sharply as distance increases, making it less cost-efficient as compared to rail. Similarly, barge transportation is cost-competitive as distance increases. While economies of scale help the rail and barge transportation modes to control cost, trucking provides door-to-door service and delivers goods faster than other modes for shorter distances. In summary, each modal system delivers a specific service to shippers.

Exhibit 3-2
Cost-Distance Relationships for Various Modes
A Conceptual Diagram



Source: USDA, Inland Waterborne Transportation, "An Industry Under Siege", 2000.

3.2.1 Commodity Structure of Freight Networks

The primary function of a freight flow network is to combine the factors of production (i.e., those elements that go into making marketable products) and the factors of distribution. When viewed from this perspective, the commodity structure provides a synopsis of the economic role of the commodity network, its degree of integration with the regional economy, and the transportation network. In fact, the transportation network has been partially instrumental in defining the boundaries of the regional economic system. The contribution of the commodity structure to the transportation network is of interest in this study as it provides

information relative to possible directions of growth in the economy, and it enables estimates for future transportation needs.

From a statewide economic development perspective, an expansion of the cargo handling sector of transportation is considered an area for future growth. While it is not appropriate to estimate the effects of this potential development on the links or nodes of the intermodal system, major planning efforts often focus on the terminals or cargo interchange points. This approach is valid in this case as transportation costs are the third largest cost in the economic process of production and distribution exceeded only by the costs of labor and materials (*Domestic Transportation: Practice, Theory and Policy.* Sampson Roy J. and Martin T. Farris, Third Edition, Houghton Mifflin Company, Boston, 1975).

Also, the cargo terminal layout, equipment used, and nature of operations are quite different for major cargo categories defined as liquid-bulk, dry-bulk, break-bulk, and container cargo (Exhibit 3-1). In addition to the differences in physical facilities, institutional infrastructure becomes increasingly important for the development of intermodal transportation systems and container trade. As noted, the aspects of institutional infrastructure are discussed in Section 3.4 with waterborne traffic presented by commodity sector.

3.2.2 Statewide Cargo-Flow Patterns: All Modes

Based on the CFS database, the data shown in Exhibit 3-3 depicts the cargo distribution of Louisiana's statewide freight transportation system. Analysis of this data provides several important conclusions, many of which are presented in the following sections.

Exhibit 3-3
Louisiana Freight Profile
All Modes

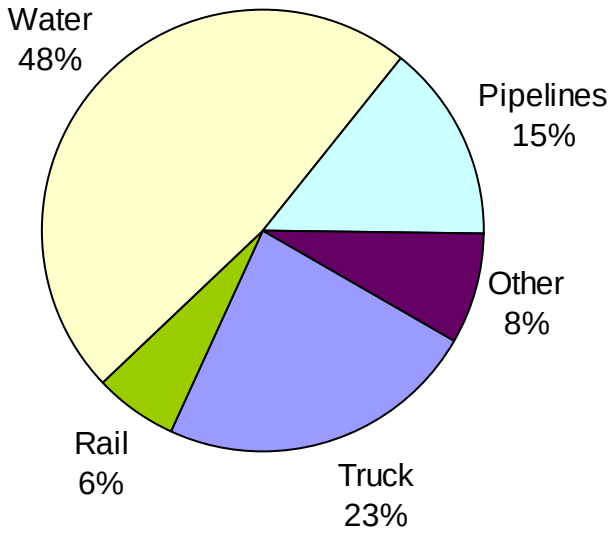
Mode of Transport	Tonnage		By Value		Ton/Miles		Avg. miles /Shipment
	(1,000)	(%)	($ Millions)	(%)	(millions)	(%)	
Total , all modes	561,053	100.0	159,495	100.0	253,014	100.0	405
Single modes	513,109	91.5	143,695	90.1	192,738	76.2	168
Truck	131,068	23.4	79,306	49.7	21,366	8.4	135
Truck for hire	67,335	12.0	46,938	29.4	15,180	6.0	343
Private trucks	63,655	11.3	32,198	20.2	6,168	2.4	51
Rail	33,355	5.9	10,302	6.5	36,063	14.3	683
Water	266,795	47.6	34,333	21.5	132,906	52.5	428
Water-shallow draft	159,474	28.4	21,145	13.3	128,842	50.9	712
Water -deep-draft	107,320	19.1	13,187	8.3	4,063	1.6	s
Air (including truck & air)	15	0.0	964	0.6	24	0.0	1,645
Pipelines	81,887	14.6	18,791	11.8	s	0.0	s
Multiple modes	s	0.0	12,623	7.9	s	0.0	s
Parcel, USPS, courier	313	0.1	10,153	6.4	217	0.1	806
Truck/rail	350	0.1	792	0.5	335	0.1	1,076
Truck/water	s	0.0	876	0.5	s	0.0	1,855
Rail/water	s	0.0	647	0.4	s	0.0	1,690
Unknown modes	s	0.0	s	0.0	s	0.0	s

Source: Commodity Flow Statistics, 2002, Louisiana Table 15. Bureau of Transportation Statistics, www.bts.gov
Note: s denotes small amounts

3.2.2.1 Modal Share Analysis

The data provided on modal shares by weight (Exhibit 3-3a) is critical for transportation planning purposes. With 48% of the tonnage moving as waterborne cargo, barge transportation is a vital part of the freight sector. In contrast rail handles only 6% of the statewide cargo movements.

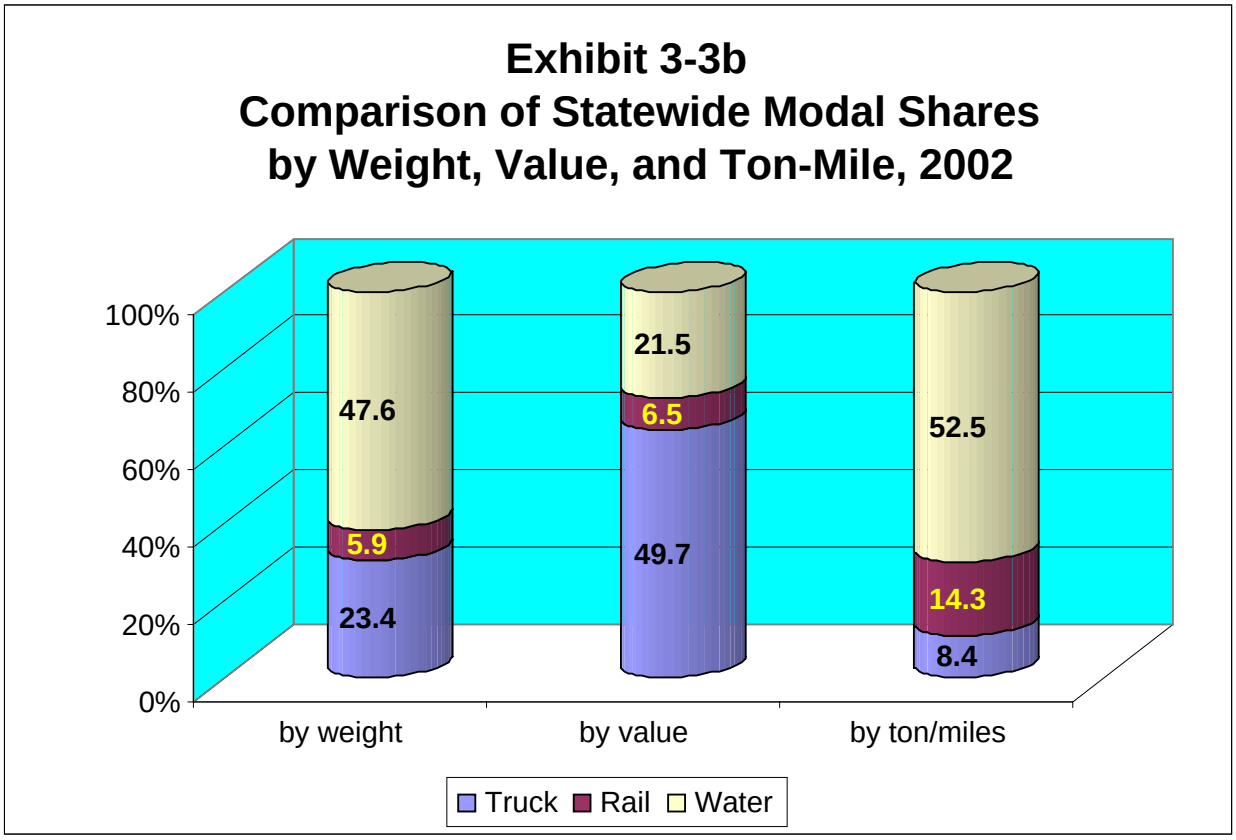
Exhibit 3-3a
Statewide Modal Shares by Weight, 2002



Source: Commodity Flow Statistics, 2002, Louisiana Table 15. Bureau of Transportation Statistics, www.bts.gov

3.2.2.2 Weight, Value, and Cost/Distance Relationships

The CFS data for 2002 substantiates the cost/distance relationships that were presented at a conceptual level in the preceding section (Exhibit 3-2). For example, the trucking modal share of transportation is 23.4% by weight as compared to a share of 49.7% by value and compared to 8.4% ton-miles (Exhibit 3-3b). This data confirms the theoretical assumption that trucking is advantageous for transporting valuable cargo for relatively short distances. Similarly, the inland barge modal share based on value of goods carried is only 21.5% as compared to 47.6% by weight and 52.5% ton-miles.



Source: Commodity Flow Statistics, 2002, Louisiana Table 15. Bureau of Transportation Statistics, www.bts.gov

3.2.2.3 Freight Characteristics Specific to Louisiana

The data presented in Exhibit 3-3 is summarized as follows:

(a) 91.5% of the cargo movements occur through single modes, while less than 1% of the cargo movements use multiple modes.

(b) The share of cargo handled by rail is very low (6%), and a stronger rail participation may be key to developing intermodal container transport.

(c) The CFS database is focused on domestic movements, and the share of deep-draft waterborne cargo is 19.1% of freight by weight (but is not assigned any travel distance perhaps because it is treated as foreign commerce).

3.3 Statewide Waterborne Cargo Flow Network

The total tonnage of waterborne cargo that moved through the statewide system in 2002 is estimated to be 485 million tons (Exhibit 3-6). The estimate excludes duplications (double-counting) that tend to occur when cargo passes "through" more than one waterway.

The waterborne cargo movements are almost equally divided between domestic and foreign trade with 102 million tons versus 105 million tons in 2002, and 110 million tons versus 98 million tons in 2004. Louisiana, which traditionally ranks at the top for handling waterborne cargo, was replaced by Texas in 2004. Louisiana lost 1.6% while Texas gained 0.8%. However, the state freight system was structurally sound with all four sectors (domestic receiving and shipping and foreign receiving and shipping) being relatively balanced for Louisiana. For Texas, the data is highly skewed to imports with more than 60 % of the tonnage classified as foreign trade on the receiving end. The total waterborne tonnage reported in the CFS database (267 million tons) is significantly lower than the WCUS estimate of 485 million tons because the WCUS database estimate includes cargo transfers from domestic modes to ocean-going vessels while the CFS does not.

Exhibit 3-6
Waterborne Commerce in Louisiana and Texas
2002 and 2004

U.S./State	Grand Total[1]	Shipping		Receiving		Intrastate	Share of US Total
		Domestic	Foreign	Domestic	Foreign		
Year 2002 (million tons)							
U.S. Total	2340	723	384	723	935	298	100.0
Texas	442	43	64	19	261	54	18.9
Louisiana	485	102	105	128	111	39	20.7
Year 2004 (million tons)							
U.S. Total	2552	734	416	734	1089	313	100.0
Texas	502	45	72	25	303	57	19.7
Louisiana	488	110	98	118	119	43	19.1

Note:
[1] Grand total excludes duplications
Source: WCUS, 2002 and 2004

3.3.1 Cargo Flow Distribution--Major Waterways

For the purpose of this report, cargo flow data is presented in these categories:

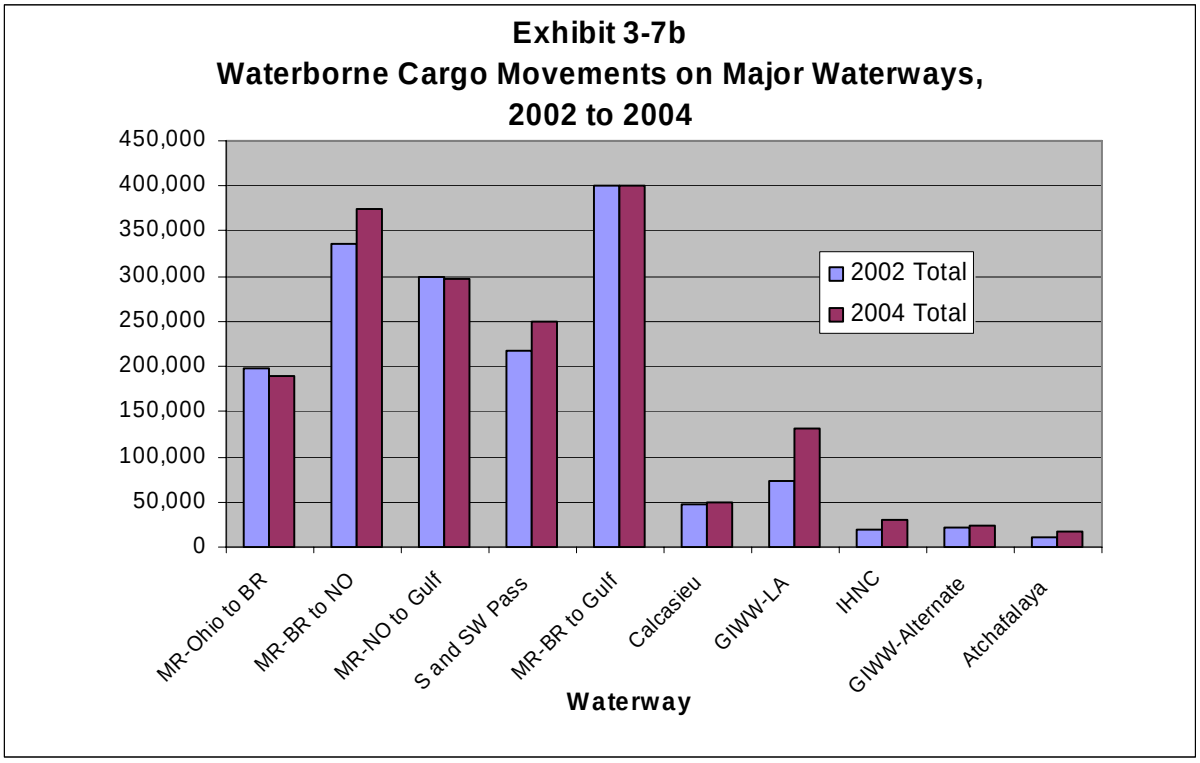
- Major Waterways
- Waterways with medium levels of traffic
- Other waterways

The major corridors of the statewide waterborne freight network and the freight flow characteristics are presented in Exhibit 3-7a and 3-7b. Major waterways are defined for this study as those waterways that transport greater than 10 million tons of total cargo annually. (The data presented is summarized below.)

Exhibit 3-7a
Waterborne Cargo Movement Analysis for Major Waterway Systems
2002 and 2004

Waterway Systems	2002 Total	2004 Total	2002 Movement Analysis			
			Foreign	Domestic	Through	Through (%)
	(1,000 Short tons)					
Mississippi River						
Mouth of Ohio River to Baton Rouge	198,049	188,595	--	198,049	159,909	81%
Baton Rouge to New Orleans	336,770	374,931	114,355	201,688	58,888	29%
New Orleans to Gulf	300,326	296,680	185,482	81,887	29,311	36%
South Pass and Southwest Pass	218,009	250,257	185,482	32,415	32,360	100%
Baton Rouge to Gulf	401,137	399,485	185,482	215,655	32,384	15%
Calcasieu River						
Calcasieu Ship Channel	47,722	49,845	27,431	20,291	--	--
Gulf Intracoastal Waterway						
GIWW Louisiana Portion	72,409	130,887	--	72,409	58,478	81%
Inner Harbor Navigation Canal	18,941	30,774	--	16,056	14,718	92%
GIWW- Morgan City to Port Allen Route	20,798	24,313	--	20,798	19,568	94%
Atchafalaya River						
Atchafalaya River	10,699	17,303	--	10,699	6,604	62%

Notes: The locations of Mississippi River segments are as follows: Mouth of Ohio R. to Baton Rouge river miles 954-236, Baton Rouge to New Orleans river miles 236-106, New Orleans to Gulf miles 106 to 0 AHP (Above Head of Passes) and South and Southwest Pass, South Pass and Southwest Pass 14 .2 miles and 21.2 miles long, respectively, and Baton Rouge to Gulf extend from river miles 236 to 0 AHP as well as South Pass Southwest Pass.



3.3.1.1 Upper Mississippi River (Ohio River to Baton Rouge)

This segment of the Mississippi plays a major role in linking interior U.S. markets to the deep-draft operations on the Lower Mississippi River and the international market place. A total of 198 million tons of cargo moved along this segment in 2002, with 159 million tons of the total (81%) moving as through cargo. Thus, this segment of the river is used primarily as a link. The main operations in this segment located within Louisiana are confined to activities at the Port of Lake Providence, the Madison Parish Port, and the coal receiving operations at the Cajun Electric utility located in Pointe Coupee Parish.

3.3.1.2 Lower Mississippi River (Baton Rouge to Gulf of Mexico)

The core activity for waterborne commerce in the state is located in this segment. Maritime activities include port operations of five deep-draft public ports and several hundred private terminals. The data presented in Exhibit 3-6, Exhibit 3-7a and 3-7b illustrate several important freight movement characteristics for this segment:

1. The Baton Rouge to Gulf of Mexico (including South Pass and Southwest Pass) handled 401 million tons or about 83% of the 485 million tons that were handled statewide in 2002.

2. Baton Rouge to New Orleans and New Orleans to Gulf of Mexico are equivalent to Baton Rouge to Gulf of Mexico. However, the total domestic traffic for the two segments is equal to 283.5 million tons compared to 215.7 million tons shown for the Baton Rouge to the Gulf. The inconsistency between these two numbers is due to the replication of movements originating in one segment and then moving through the other segment.

3. In respect to waterborne domestic cargo and international shipping data, 185 million tons of international shipping volumes are handled by the inland barge transportation system. That portion of cargo data appears as domestic waterborne cargo as well as foreign trade.

3.3.1.3 Calcasieu River Ship Channel

The major activity for this waterway includes 27 million tons of foreign cargo movements for 2002, most of which were petroleum imports (24 million tons). Additionally, 20 million tons of domestic movements moved along the system (Exhibit 3-7a and 3-7b). The petroleum imports to refineries in the area feed the domestic movements. Approximately 15 million tons, or 75%, of the domestic movements are refined fuel or petroleum products. The public port handled close to 1 million tons of general cargo consisting of bagged rice, other grain products, and forest products and about 7.5 million tons of dry-bulk and liquid cargo. Activity for transport of LNG is expected to increase rapidly in the Calcasieu River area. At least five LNG plants are in the works in Cameron Parish or off its shores. The newest LNG facility operates special tankers that convert the liquid back into gas and offload it into a buoy pipeline system that takes it to shore. Limitations to vessel movements on the Calcasieu include one-way traffic at any given time because of the channel width and insufficient anchorage areas, a significant physical constraint.

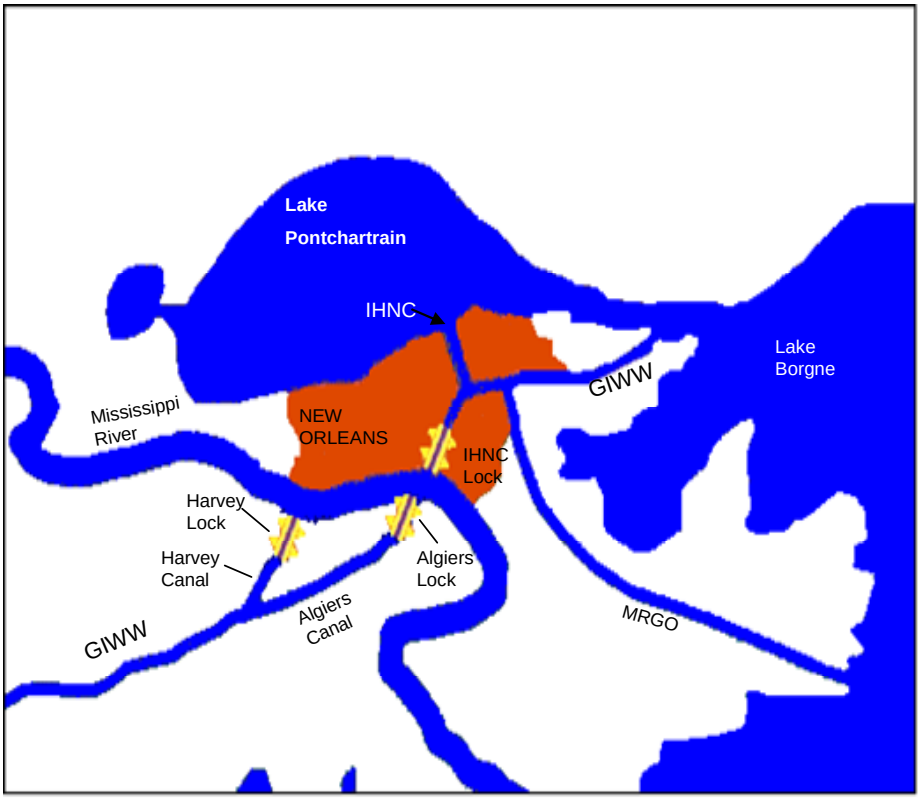
3.3.1.4 GIWW—Louisiana Portion and the Port Allen to Morgan City Route

The main function of both these waterway segments is to serve as major links to other segments of the state waterway system. Approximately 81% of the cargo movements on the Louisiana portion and 94% on the Morgan City-Port Allen Route are designated as through cargo. While a part of the through cargo on the Port Allen-Morgan City route might reach the Lower Mississippi River area, the through cargo on the GIWW Louisiana portion moves in and out of the state's system with minimal economic activities. Crude petroleum, petroleum products, industrial chemicals, non-metallic minerals, farm products, and crude petroleum generate more than 80% of the traffic on the two waterway segments. More than 35% of the movements are crude petroleum and petroleum products moving between refineries in the Houston area and Alabama. Based on 72 million tons of total cargo on the GIWW Louisiana portion and 58 million tons of through cargo, the overall GIWW contribution to the state freight

system is approximately 15 to 20 million tons. The through cargo on this waterway provides an opportunity to assess fees for services provided.

3.3.1.5 Inner Harbor Navigation Canal (IHNC)

Cargo movements from west to east were about 55%, and most were energy-related commodities such as coal, petroleum, and petroleum products. Cargo movements in the canal were about 69% industrial chemicals. The IHNC lock and canal connecting the eastern segment of the GIWW with the west is an important link in the cargo movement system. The importance of the IHNC Lock is such that when it is closed, GIWW traffic is rerouted down the Mississippi River, out through the Baptiste-Collette Pass, and back up via the MRGO to reconnect with the GIWW on the other side of the Mississippi River—adding significant time to vessel movements. Because the MRGO is slated for closure, the importance of the IHNC Lock replacement is heightened. As of this writing, the USACE had begun clearing and construction in the footprint of the IHNC Lock. However, the Environmental Impact Statement (EIS) requires revision. For this reason, both the IHNC lock and the closing of the MRGO pose significant potential constraints to the state's inland waterway system.



Relationship of the IHNC Lock with the Mississippi River, GIWW, & MRGO
Source: USACE, New Orleans District, IHNC Lock Replacement Project Web Site

3.3.1.6 Atchafalaya River (Old River to Morgan City)

The waterway segment of the Atchafalaya River from the Old River Lock at the Mississippi River to Morgan City is included in this section. Crude petroleum, non-metallic minerals, and petroleum products contributed 84% of the total tonnage on the Atchafalaya River in 1993 and a consistent 83% in 2002. Non-metallic minerals consisting of sand, gravel, rock, limestone, and waterway construction material increased its share by 10%, over the same period and the overall tonnage trend was an increase of 3.8% a year. Industrial chemicals increased in relative share and grew over time indicating favorable market conditions in the industry. Petroleum products that controlled 32% of the traffic volume decreased slightly to 30% by 2002. The share of crude petroleum decreased by 9%, indicating dwindling oil reserves and the problems faced by small-scale operators in the oil and gas drilling industry.

The potential for increased traffic along this segment of the Atchafalaya River has not been realized. Traffic that typically would navigate from the upper Atchafalaya River to this segment often does not do so because of the Simmesport Railroad Bridge has been determined a hazard to navigation by the U.S. Coast Guard. The bridge is located on a complex bend in the river and the moveable mid span, which is not in the middle, does not allow room for proper alignment of barges to pass under the bridge. Tug operators use the fixed span during low water, however, during high water, vessels cannot pass under the fixed span and must use the mid span requiring dangerous navigation maneuvers. The alternative, during high water, is for mariners to use the GIWW Alternate Route which increases the trip length to 1 ½ days or use the Mississippi River which increases the trip length by 2 ½ days. Additionally, traffic congestion at the Bayou Sorrel Lock which allows vessels using the GIWW Alternate Route to cross the East Atchafalaya Basin Protection Levee also causes delay issues.

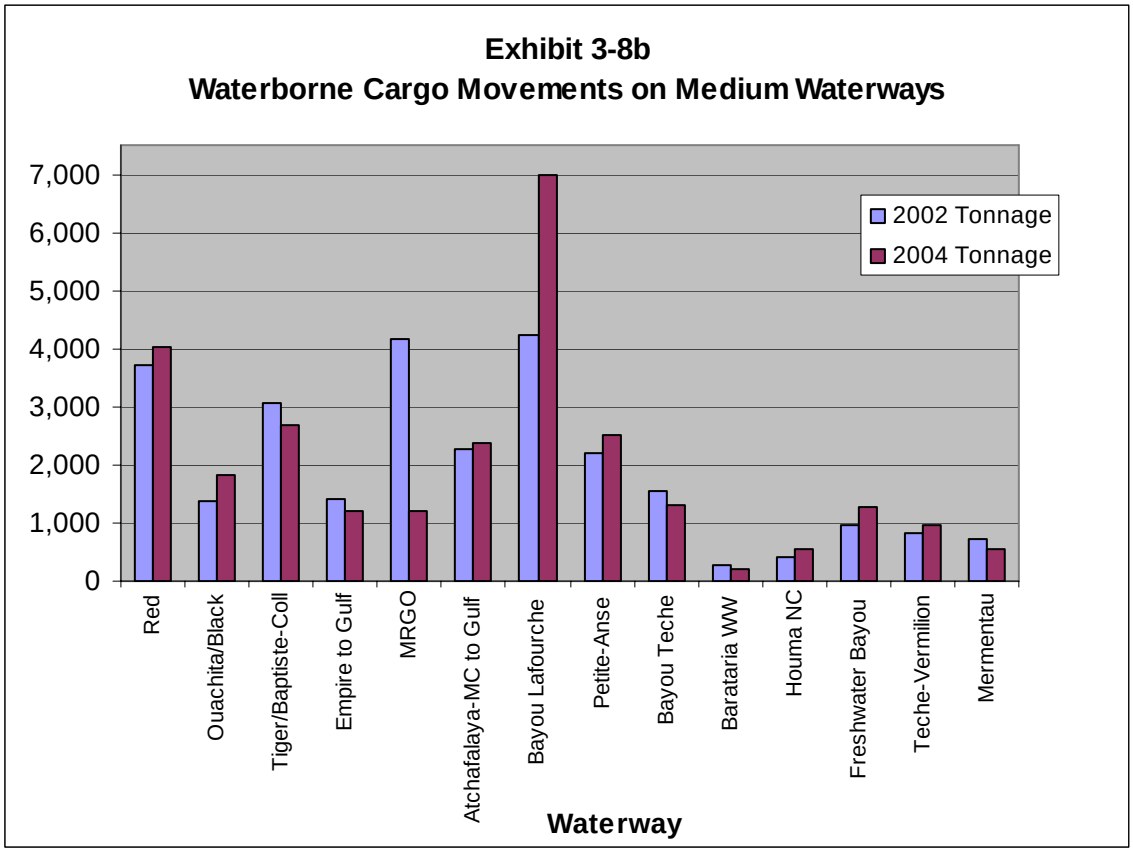
3.3.2 Waterways with Medium Levels of Traffic

Waterway systems with medium levels of traffic (less than 10 million tons of cargo annually) serve local needs as illustrated by the types of commodities shown in Exhibits 3-8a and 3-8b. These waterways are categorized as medium because of the consistency in their use for commerce. Other smaller remaining waterways may or may not generate traffic from year to year. Traffic levels on these systems ranged from about 5 million tons for the larger systems to about 200,000 tons for others. From 2002 to 2004, an overall 2% increase of tonnage movements on these waterways collectively was noted.

Exhibit 3-8a
Waterway Systems with Medium Levels of Traffic and Commodity Types
2002 – 2004

Waterway System	2002 Tonnage	2004 Tonnage	Main Commodity Types
	(1,000 tons)		
Red River Waterway below Shreveport	3,708	4,014	PP, CM, CP
Ouachita and Black Rivers	1,393	1,808	CM, PP, FF
Mississippi River Outlets (Tiger Pass and Baptiste Collette)	3,047	2,692	ME, PP, CM
Waterway from Empire to the Gulf	1,398	1,198	ME, PP, FF
Mississippi River Gulf Outlet (MRGO)	4,173	1,206	ME, PP, CM
Atchafalaya River, Morgan City to the Gulf	2,272	2,380	PP, FF, CM
Bayou Lafourche	4,220	6,975	ME, PP, CM
Petite Anse, Tigre and Carlin Bayous	2,210	2,503	PP, CM, ME
Bayou Teche	1564	1321	FF, CM, PP
Barataria Bay Waterway	270	219	ME, PP, CM
Houma Navigation Canal	408	556	PP, ME, CM
Freshwater Bayou	961	1,285	ME, CM, PP
Bayou Teche and Vermilion River	815	978	CM, PP, FF
Mermentau River, Bayous Nezpique and Des Cannes	736	547	CM, PP, FF

Note: The abbreviations used for commodities are as follows:
PP-Petroleum and petroleum products
CP-Chemicals and related products
CM-Crude materials, inedible except fuels
FF-Food and farm products
ME-Manufactured equipment, machinery and products
Source: WCUS, 2002 and 2004



3.3.2.1 Red River and the Ouachita/Black River

An expanse of inland territory is covered by the Red River and Ouachita/Black Rivers across the northern part of Louisiana. The Red River generally flowing southeast from the northwest part of the state has recently been developed for navigation from Shreveport to the Old River Lock. The Ouachita/Black Rivers extend from Camden, Arkansas, south across the northern and central part of Louisiana until it joins the Red River, approximately 40 miles downstream from Jonesville, Louisiana. Current operations in the Ouachita/Black River system are limited and handled 1.4 million tons in 2002. Cargo consisted of 40% petroleum products; 29% soil, sand, rock and gravel; and 20% food and farm products. Tonnages handled in 2004 showed a 13% increase over 2002 with commodity types having remained unchanged. Current operations on the Red River were limited to handling 3.7 million tons in 2002, consisting of 63% soil, sand, rock, and gravel, and 21% petroleum and petroleum products. Tonnages handled in 2004 showed an 8% increase over 2002 with commodity types having remained relatively unchanged. Future growth along the Red River is anticipated and will be enhanced by deepening the entire channel to 12 feet. Cargo flow limitations on the Ouachita occur because of bendways along the channel that do not provide an adequate turn radius for tows. These waterways have the potential to develop trade and commerce activity in the future.

3.3.2.2 Atchafalaya River from Morgan City to the Gulf

This segment generated 2.3 million tons in 2002, consisting of 43% petroleum and petroleum products; 28% food and farm products (mainly sugar); and 15% soil, sand, rock, and gravel. In 2004, the segment showed a 5% increase to 2.4 million tons. Within the manufactured equipment, machinery, and products category, 200,000 tons were transported, the bulk of which were prefabricated structures for the offshore oil industry. Several major manufacturers and haulers (e.g., McDermott, Bollinger, Tidewater, etc.) use this waterway segment to haul large oversized structures. However, official data regarding tonnage of oil and gas and related services cargo is not collected and was not available for the data collection phase of this study. This lack of information is a significant weakness and institutional constraint in the current system. An additional constraint limiting this segment is the difficulty of maintaining the authorized 20-foot channel depth.

3.3.2.3 Mississippi River Gulf Outlet (MRGO)

More than 85% of the cargo that moved on the MRGO was for foreign trade purposes. Domestic movements, which were limited to 1.2 million tons in 2004 as compared to 4.2 million tons in 2002, consisted of manufactured equipment and petroleum and petroleum products. The decrease of total tonnage on the MRG0 from 2002 to 2004 was 71%. Currently, the continued operation of the channel is under review by USACE in response to concerns about the environmental damage caused by the channel. To date, consensus has been reached at local, state, and federal levels that the channel will no longer be used for deep-draft vessels. If the MRGO is closed or limited for future cargo activity, a reduction and/or shift in cargo can be expected. The impact to local and regional economies is undetermined at this time. As noted, the MRGO is used as an alternate route for the GIWW vessels blocked by recurring IHNC lock problems.

3.3.2.4 Mississippi River Outlets (Grand Tiger Pass and via Baptiste Collette)

The total tonnage handled on the waterway in 2002 was 3.0 million tons consisting of petroleum products (57%) as well as manufacturing equipment, machinery, and other products (23%). Total tonnage handled in 2004 decreased 12% to 2.7 million tons. While the total manufacturing equipment tonnage was only 602,000 tons, a major part of that cargo is likely supplies for the offshore oil and gas industry, again typically an un-reported cargo. Equipment supply firms for major oil and gas exploration operations such as Chevron and Shell are located in Venice and the surrounding area. With the expansion of petroleum exploration in the eastern Gulf, increased waterborne commerce activity is expected in these segments. As such, issues related to deepening the waterways can be expected.

3.3.2.5 Bayou Lafourche

Along 50 miles of this waterway from Lockport to the Gulf, 4.2 million tons of cargo was handled in 2002 with 27% as petroleum and petroleum products; 25% as crude materials; and 29% as manufactured equipment, machinery, and products. From 2002 to 2004 tonnage handled on the waterway increased 40%, from 4.2 to 6.9 million tons. As previously discussed, cargo structures are defined by the demands and needs of the industry in the region. Port Fourchon on this waterway functions as a logistics support center for the deepwater oil and gas exploration in the Gulf of Mexico. The cargo structure of the waterway is based on these needs. The supplies of distilled fuels to offshore rigs (690,000 tons), drilling mud that is extensively used in offshore oil and gas exploration (682,000 tons classified under non-metallic minerals), and primary manufactured products that consist mostly of fabricated metal structures are responsible for most of the traffic. Other uncharted cargo includes personnel, water, equipment, and suppliers supporting oil and gas offshore operations. Because the federal funding formulas relative to waterborne operations are based on ton/miles and not frequency of operations, many of Louisiana's coastal ports, such as Port Fourchon, have difficulty justifying funds for federally funded projects.

3.3.2.6 Petite Anse, Tigre, and Carlin Bayous

These waterways lie between the Vermilion River and Bayou Teche and are connected to the GIWW. The traffic structure on these waterways is also dominated by movement of supplies needed by the offshore petroleum industry. Approximately 88% of the cargo handled on this segment falls into non-metallic mineral or drilling mud categories, and another 10% is categorized as petroleum and petroleum products.

3.3.2.7 Other Waterways

The remaining list of waterways, "other waterways," is defined by generally low traffic levels. In many cases, low traffic levels are caused by physical constraints such as floods, droughts, or low demand that occur seasonally. Cargo data for these waterways is presented in Exhibit 3-9a and 3-9b.

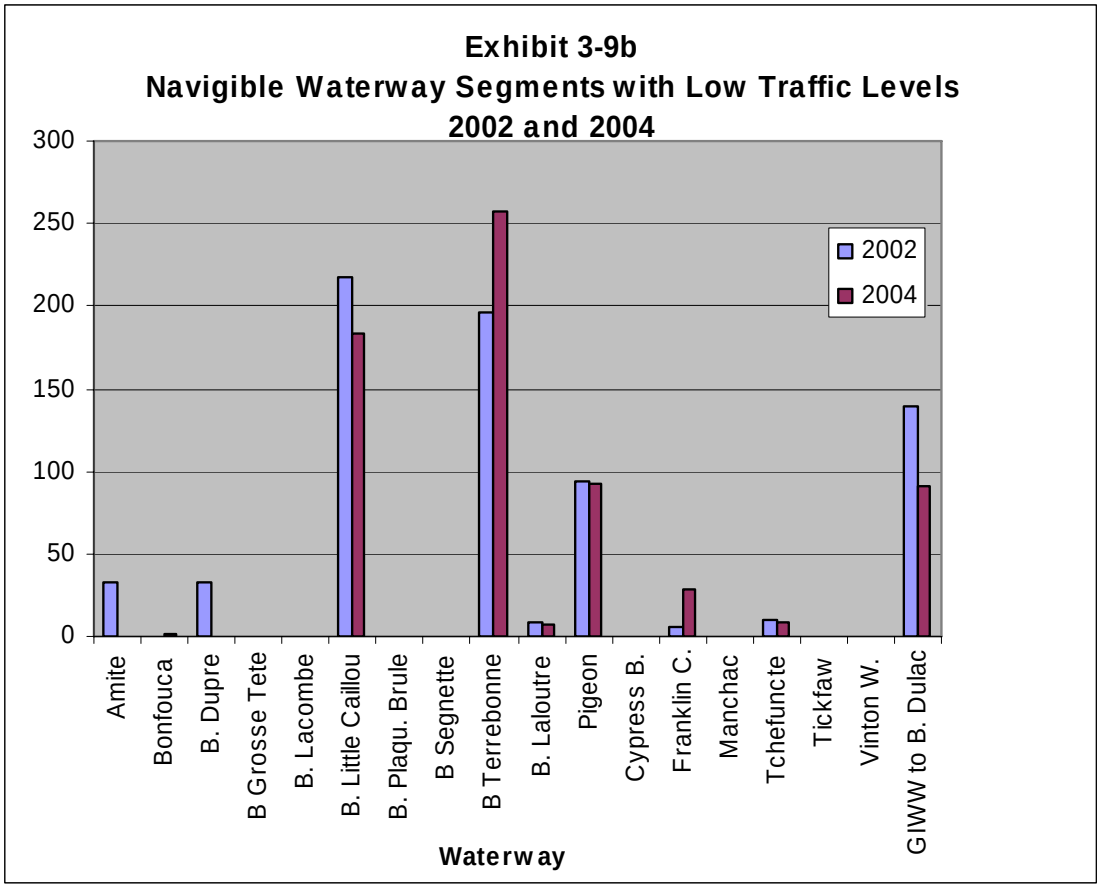
In most cases, these waterways play a larger role in local communities than the data from WCUS indicates. In certain waterways, the traffic volumes may be under reported as most movements are seasonal and moved by non-commercial cargo owners. For example, the waterways located in south and southwest Louisiana are used for transport of rice and sugar cane mainly during harvest season. Additionally, recreational uses and local fishing craft tend to be under reported. More on the economic contribution of recreational and commercial fishing is discussed in Section 4.3.

Because of under-reporting noted in cargo activity in the oil and gas industry and in the smaller (other) waterways, identifying physical constraints, a major part of this study, is dependent on anecdotal evidence and, therefore, may not be comprehensive. A system of monitoring these waterways, even by local bridge tenders, may be required if accurate data is to be maintained for future use, particularly for objective jurisdiction of constraint-related project improvements.

Exhibit 3-9a
Navigable Waterway Segments with Low Traffic Levels
2002 and 2004

Waterway	2002	2004
	(in 1,000 tons)	
Amite River & Bayou Manchac	33	N/C
Bayou Bonfouca	N/C [1]	1
Bayou Dupre	33	N/C
Bayou Grosse Tete	N/C	N/C
Bayou Lacombe	N/C	N/C
Bayou Little Caillou	218	184
Bayou Plaquemine Brule	N/C	N/C
Bayou Segnette Waterway	N/C	N/C
Bayou Terrebonne	196	258
Bayous La Loutre, St. Malo and Yscloskey	9	7
Big Pigeon and Little Pigeon Bayous	94	92
Cypress Bayou	N/C	N/C
Franklin Canal	5	29
Pass Manchac	N/C	N/C
Tchefuncte and Bogue Falaya Rivers	10	9
Tickfaw, Natalbany, Ponchatoula and Blood Rivers	N/C	N/C
Vinton Waterway	N/C	N/C
Waterway from Intracoastal to Bayou Dulac	140	91

Notes:
[1] N/C - No commerce reported
Source: WCUS, 2002 and 2004



3.4 Waterborne Traffic by Commodity Sectors

The commodity structure of traffic flows is important in waterway analysis for several reasons. First, it indicates the degree of integration between different sectors of the regional economy and the waterways. Second, the types of commodities provide basic data for future forecasts, the barge-fleet structure, and the type of terminals necessary to handle the cargo. In short, the analysis of traffic data in terms of major commodity groups acts as the basic input for economic analysis.

The commodity groups classification in the WCUS database are standardized to reflect the structure of the Standard International Trade Classification (SITC), Revision 3, which allows direct comparison of domestic commodity groups for imports and exports. To form the basis for analysis in this section, the SITC has been aggregated to the two-digit level as follows:

- Coal
- Petroleum and Petroleum Products
- Chemicals and Related Products

- Crude Materials, Inedible except Fuels
- Primary Manufactured Goods
- Food and Farm Products
- All Manufactured Equipment, Machinery, and Products
- Waste and Scrap (Not Elsewhere Classified[NEC])

In contrast to the freight flow analysis presented in Section 3.3 where aggregate tonnage is the measurement index, the approach in this section is to analyze the structure of the freight flows in terms of major commodity groups. As noted above, this approach forms the basic foundation for economic analysis of waterborne commerce and for statewide waterway planning. To form the framework for this analysis, the Lower Mississippi River segment from Baton Rouge to the Gulf of Mexico, which handles close to 80% of the waterborne commerce in the state, was selected. The commodity structure analysis for domestic and foreign commerce is presented in Exhibits 3-10a and 3-10b and Exhibits 3-11a and 3-11b. Cargo carried by inland barges as import/exports appear in both charts (as domestic inland barge movements and as ocean-vessel movements); thus the domestic and foreign flows partially overlap one another. Additionally, the sheer volume of cargo, especially the large volumes of grains and petroleum products, are indicative of the integrated domestic and foreign network and its connection to operations in this segment.

Another more worthy characteristic is the sheer amount of detail provided by the WCUS database. With the information provided on cargo movement directions (up-bound/down-bound) and in terms of operational characteristics (inbound and outbound), it is possible to develop a detailed view of river operations.

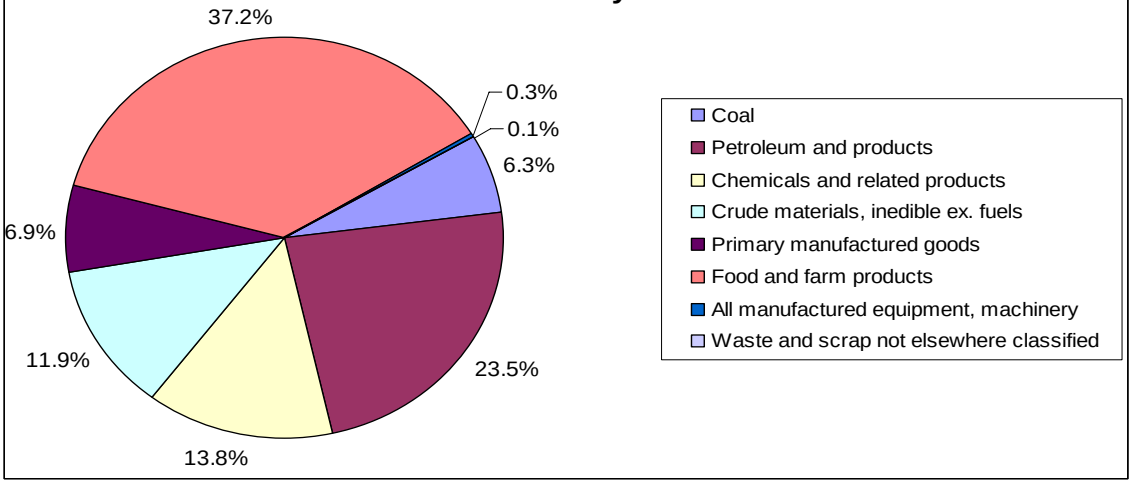
The data summary in Exhibit 3-10a and 3-10b shows that under all commodities, 95.9 million tons of inbound/down-bound cargo movements generally correspond with exports, and 50 million tons of outbound/up-bound cargo volumes correspond with imports. The top-four sectors together accounted for 86.2% of the domestic movements, with the food and farm products sector generating 37%; crude petroleum and petroleum products 23.5%; chemicals and related products 13.8%; and crude materials, inedible except fuels, 11.9%.

Exhibit 3-10a
Domestic Cargo Movements
Baton Rouge to Gulf
by Major Commodity Types
2002 (in 1,000 short tons)

SITC Code	Commodity Description	Total	Internal							
			Inbound		Outbound		Through		Intra	
			Upb	Dnb	Upb	Dnb	Upb	Dnb	Upb	Dnb
	Total, All Commodities	**215,655**	**9,400**	**95,917**	**50,041**	**9,611**	**16,746**	**11,969**	**9,255**	**12,716**
10	**Coal**	**13,634**	**29**	**8,515**	**1,849**	**23**	**159**	**2,082**	**126**	**852**
11	Coal lignite	10,693	--	8,399	210	2	1	2,069	4	9
12	Coal, coke	2,941	29	116	1,640	22	157	13	122	842
20	**Petroleum and products**	**50,665**	**6,702**	**3,844**	**13,788**	**6,037**	**3,654**	**2,204**	**5,592**	**8,846**
21	Crude petroleum	7,305	2,713	606	1,296	341	394	490	716	748
22-29	Petroleum products	43,360	3,990	3,237	12,491	5,696	3,259	1,714	4,875	8,097
30	**Chemicals and related products**	**29,861**	**1,877**	**1,685**	**12,547**	**2,320**	**4,809**	**937**	**3,091**	**2,596**
31	Fertilizers	7,988	3	33	6,925	325	465	86	78	73
32	Other chemicals and related products	21,874	1,874	1,652	5,622	1,995	4,344	851	3,013	2,523
40	**Crude materials, inedible ex. fuels**	**25,614**	**145**	**3,788**	**9,849**	**504**	**6,527**	**4,612**	**65**	**125**
43	Soil, sand, gravel, rock and stone	7,647	3	3,142	209	78	54	4,006	44	112
46	Iron ore and scrap	6,080	59	208	4,479	125	985	221	2	2
50	**Primary manufactured goods**	**14,812**	**172**	**409**	**11,159**	**640**	**726**	**1,524**	**145**	**37**
53	Iron and steel products	10,046	21	48	8,148	481	442	877	13	16
60	**Food and farm products**	**80,201**	**469**	**77,647**	**805**	**74**	**299**	**413**	**234**	**260**
62-64	Grain	47,420	42	46,625	275	46	9	267	61	94
65	Oilseeds	24,071	68	23,800	5	--	21	48	26	103
67	Processed grain and animal feed	6,671	--	6,302	117	12	71	10	133	27
70	**All manufactured equipment, machinery**	**728**	**5**	**30**	**45**	**13**	**434**	**196**	**3**	**1**
80	**Waste and scrap not elsewhere classified**	**140**	**--**	**--**	**--**	**--**	**137**	**2**	**--**	**0**

Source: WCUS, 2002

Exhibit 3-10b
Domestic Commodity Contribution



The freight commodity shares presented on the following page in Exhibit 3-11a and 3-11b for foreign trade are similar to the freight commodity shares for domestic trade (Exhibit 3-10a and 3-10b). The top four commodity sectors for both foreign and domestic trade are the same, with those top four in foreign trade accounting for 91.2% of the total trade movements. Trade movements are greatest for grain exports (food and farm products), accounting for 47.1%, and crude petroleum and petroleum imports, accounting for 29.9% of the foreign trade movements. Data in Exhibit 3-12 summarizes domestic, foreign, and intracoastal trade flows.

Exhibit 3-11a
Foreign Cargo Movements
Baton Rouge to Mouth of Passes by Commodity Type
2002 (in 1,000 short tons)

Code	Commodity Description	Total	Foreign		Canadian	
			inbound	outbound	inbound	outbound
	Total, All Commodities	***185,482***	***85,189***	***98,282***	***1,067***	***944***
10	***Total coal***	***2,203***	***1,356***	***847***	***--***	***--***
	Coal lignite	1,619	775	845	--	--
	Coal, coke	584	582	3	--	--
20	***Total petroleum and products***	***55,451***	***47,339***	***6,942***	***351***	***820***
	Crude petroleum	37,728	36,850	559	319	
	Petroleum products	17,723	10,488	6,383	32	820
30	***Total chemicals and related products***	***13,027***	***8,834***	***3,810***	***258***	***125***
	Fertilizers	3,812	2,866	833	88	25
	Other chemicals and related products	9,214	5,968	2,977	170	99
40	***Total crude materials, inedible except fuels***	***13,482***	***12,804***	***237***	***441***	***--***
	Soil, sand, gravel, rock and stone	1,924	1,683	1	240	--
	Iron ore and scrap	3,455	3,227	65	163	--
50	***Total primary manufactured goods***	***13,102***	***12,779***	***323***	***--***	***--***
	Iron and steel products	8,302	8,236	66	--	--
60	***Total food and farm products***	***87,393***	***1,450***	***85,943***	***--***	***--***
	Grain	51,505	348	51,157	--	--
	Oilseeds	25,554	6	25,548	--	--
	Processed grain and animal feed	7,273	104	7,169	--	--
70	***Total all manufactured equipment, machinery & prod.***	***669***	***506***	***146***	***--***	***--***
80	***Total unknown or not elsewhere classified***	***154***	***121***	***33***	***--***	***--***

Source: WCUS, 2002

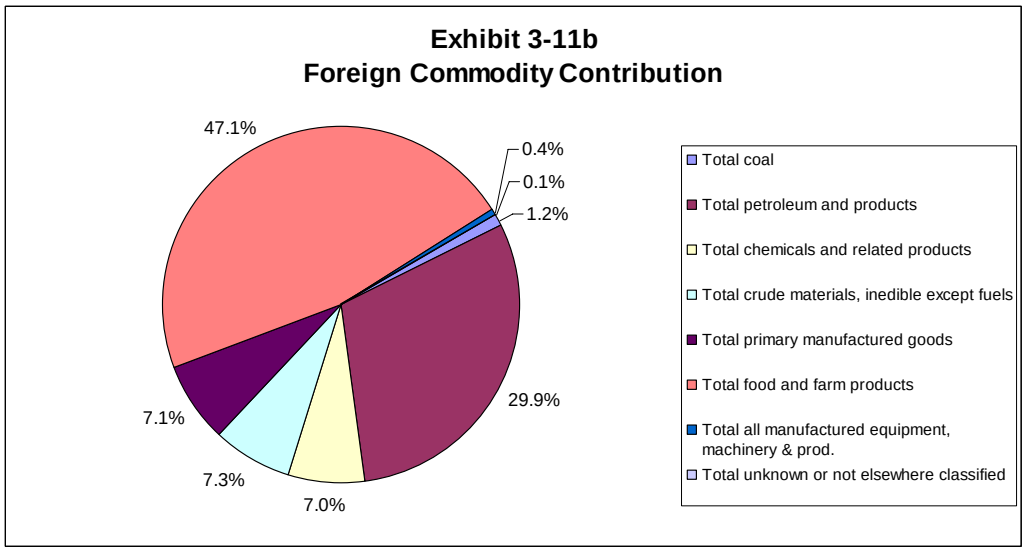


Exhibit 3-12
Sector Analysis of Freight Flows
Baton Rouge to the Gulf
2002 (1,000 tons)

Commodity Classification	Internal		Foreign		Coastwise		Total Share %
	Tonnage	Share %	Tonnage	Share %	Tonnage	Share %	
Total All Commodities	***215,655***	***100***	***185,482***	***100.0***	***32,957***	***100.0***	***100.0***
Total coal	***13,634***	***6.3***	***2,203***	***1.2***	***8080***	***24.5***	***3.9***
Coal lignite	10,693	*5.0*	1,619	0.9	8038	24.4	*3.1*
Coal, coke	2,941	*1.4*	584	0.3	42	0.1	*0.9*
Total petroleum and products	***50,665***	***23.5***	***55,451***	***29.9***	***18359***	***55.7***	***26.5***
Crude petroleum	7,305	*3.4*	37,728	20.3	63	0.2	*11.2*
Petroleum products	43,360	*20.1*	17,723	9.6	18296	55.5	*15.2*
Total chemicals and related products	***29,861***	***13.8***	***13,027***	***7.0***	***1913***	***5.8***	***10.7***
Fertilizers	7,988	*3.7*	3,812	2.1	1225	3.7	*2.9*
Other chemicals and related products	21,874	*10.1*	9,214	5.0	688	2.1	*7.7*
Total crude materials, inedible except fuels	***25,614***	***11.9***	***13,482***	***7.3***	***3711***	***11.3***	***9.7***
Soil, sand, gravel, rock and stone	7,647	*3.5*	1,924	1.0	3657	11.1	*2.4*
Iron ore and scrap	6,080	*2.8*	3,455	1.9	35	0.1	*2.4*
Total primary manufactured goods	***14,812***	***6.9***	***13,102***	***7.1***	***3***	***0.0***	***7.0***
Iron and steel products	10,046	*4.7*	8,302	4.5	3	0.0	*4.6*
Total food and farm products	***80,201***	***37.2***	***87,393***	***47.1***	***887***	***2.7***	***41.8***
Grain	47,420	*22.0*	51,505	27.8	90	0.3	*24.7*
Oilseeds	24,071	*11.2*	25,554	13.8	28	0.1	*12.4*
Processed grain and animal feed	6,671	*3.1*	7,273	3.9	653	2.0	*3.5*
Total all manufactured equipment, machinery & prod.	***728***	***0.3***	***669***	***0.4***	***1***	***0.0***	***0.3***
Total waste and scrap nec.	***140***	***0.1***	***154***	***0.1***	***3***	***0.0***	***0.1***

Source: WCUS, 2002

Trade with Canada is classified as foreign and is typically cataloged separately. Canadian cargo movement logistics are similar to the freight movement network operating within the contiguous states. Also, they are indicative of what the contiguous states system must provide to accommodate the Canadian cargo coming into the U.S. network.

The coastwise shipments of 32.96 million tons noted in Exhibit 3-12 are either receipts or shipments from the Lower Mississippi to other U.S. overseas territories (Puerto Rico, Hawaii) or shipments using the coast for part of the movement such as New Orleans to Florida, Alaska, and other ports on the U.S. east and west coasts. The major commodity categories of coastwise cargo movements are coal movements to Florida and the movements of petroleum products by tanker barges.

3.4.1 Coal Movements

Coal is the single largest commodity handled by U.S. railroads and the second largest commodity carried by the U.S. inland waterway network. While the railroads carried 815.9 million tons in 2005 (*Railroad Service in the United States, 2005.* Association of American Railroads, Nov. 2006, www.aar.org), the U.S. waterborne tonnage in 2004 was 306.1 million tons (Waterborne Commerce of the United States, Part 5- National Summaries, Calendar Year 2004). Although, coal movements accounted for 6.3% of the domestic movements and 1.2% of the foreign trade share in 2002, historically much larger volumes were handled on the Lower Mississippi River (Exhibit 3-10).

The extensive distribution network for coal exists because production is limited to a few states but the demand for coal is nationwide. A state-to-state origin-destination (O/D) analysis indicates that all three major producing areas in the U.S. supplied coal to Louisiana in 2002 (Exhibit 3-13).

Exhibit 3-13
Coal Origin Destination Analysis
Waterborne Movements of Coal
2002

To LA		From LA	
State	Tons (1,000)	State	Tons(1,000)
IA	4	AL	18
IL	12,246	FL	8,082
IN	452	IL	60
KY	1,425	IN	843
PA	94	KY	338
WV	1,846	MO	143
		OH	87
		PA	10
		WV	330
Total	16,067		9,911
Intra-State	1,032		1,032
Imports	1,356		
Exports			847
Inbound	18,455		
Outbound			11,790

Source: USACE:Navigation Data Center, 2002

Appalachian coal, primarily with low to medium sulfur content, moved from West Virginia, Kentucky, and Pennsylvania. Interior coal with high sulfur content moved from Illinois and Indiana. Low-sulfur Western coal that originates in the Powder River Basin in Wyoming is transported by multiple modes to Louisiana. According to CLECO officials, the coal initially moves from the mines by rail, to river terminals on the Mississippi, and then by barge to Louisiana.

More than 90% of the U.S. coal supply is utilized for power generation by electric utilities. Therefore, national coal movement patterns are basically determined according to the coal consumption requirements of electric utilities. Coal consumption for industrial purposes is about 6% of the total supply. The major determinants that shape coal movement patterns in Louisiana are the demand for coal by in-state utilities and the coal supplies to Florida electric utilities. Historically, some of Florida's coal supplies pass as trans-shipments from the Lower Mississippi River terminals.

The coal movement patterns in Louisiana have three principal characteristics. These characteristics are described below.

In-State Lignite Production

Significant mineable lignite (coal) occurrence is limited to seven parishes, Desoto, Caddo, Bossier, Sabine, Bienville, Natchitoches, and Red River. The lignite (coal) production in northwest Louisiana averaged 3.5 million tons (Energy Information Administration, Coal Industry Annual, (Various years)) in the 1990s, with about 1 million tons of this production entered the waterway system in 2002 (Exhibit 3-11). The remainder of production was used by the local electric utility (CLECO). The movement from the mines to the plant is by tramways, conveyors, large trucks, and slurry pipelines. The Lafayette Utility System (LUS) also receives coal supplies locally. Currently CLECO is planning construction of a new facility that will use petcoke. Ten million tons of petcoke are produced in Louisiana by the oil-refining industry, and CLECO plans to transport this fuel source on Louisiana waterways.

Out of State Coal Supply to Power Utilities

The Cajun Electric utility located on the Mississippi River in Pointe Coupee Parish has three 540-megawatt steam electric stations fired by low-sulfur Western coal. This coal is moved to the plant from the Powder River Basin in Wyoming by rail to a river terminal location in Illinois. The river terminal, owned and operated by the electric utility, sends about 6 million tons annually to a terminal located adjacent to the plant. The 12 million tons of coal shown in Exhibit 3-13 as moving from Illinois in fact includes approximately 6 million tons of Western coal. According to the EIA estimates, in 2003 Louisiana and local utilities (including the Lafayette Utility System and CLECO Rodemacher Power Station) received 8.84 million tons of Wyoming coal, 5.7 million by barge and 2.5 million by rail, directly from Wyoming to Louisiana (Energy Information Administration, Coal Industry Annual, 2003). Except for this movement, all other coal movements to/from Louisiana are by inland barge.

Coal Movements to other States

Eight million tons of coal moved to Florida from the U.S. interior production region and from the Appalachian Region via Lower Mississippi terminals in 2002. These consignments moved as coastwise shipments from Louisiana to Florida using ocean-going barges operated by the TECO terminal located south of New Orleans.

Approximately 2.1 million tons of coal that moved west to east on the GIWW and IHNC Lock in 2002 were destined for Florida. The declining trend in coal movements using the IHNC leads to many implications with regard to IHNC planned expansion. For example, in 1992, 7.9 million tons of coal passed through the canal accounting for a 38% share of all cargo movements through the lock. In 2002, coal contributed 12% (based on tonnage) of the total movements. The total cargo volumes transiting the canal also declined from 21 million tons in 1992 to 17

million tons in 2002. Increased coal movements on the Tennessee-Tombigbee (Tenn-Tom) Waterway have led to economies of scale. The Tenn-Tom is a principal navigation route which connects the Tennessee River in its upper reaches with the Mobile River to the Gulf of Mexico in its lower reaches. Capacity expansions in coal handling terminals in Mobile, Alabama, also pose challenges to coal tonnages passing through the IHNC Lock. The long-term constraint posed by the IHNC Lock noted previously may be part of the cause of this market decline.

3.4.2 Refinery Related Commodity Traffic: Crude Petroleum, Industrial Chemicals, and Petroleum Products

The production of industrial chemicals and petroleum products is directly related to the crude petroleum refining activities. While gasoline is derived as the main product from refining crude oil, other petroleum products and petroleum-based industrial chemicals are produced as by-products in subsequent stages of processing. Since the production processes as well as the location of plants are greatly influenced by large refineries, the three commodity groups are analyzed together as refinery-related commodities.

The combined category of refinery-related commodity groups accounted for 37.2% of the total volume of waterborne cargo (Exhibit 3-12). In the case of domestic movements, the petroleum products movements were responsible for 89% of the tonnage (Exhibit 3-14). Crude oil imports account for the largest amount of imports, 37.7 million tons, or 68% of the total oil imports (Exhibit 3-15). However, when domestic and foreign sectors are added together, the petroleum products sector is the largest sector, accounting for 79 million tons. If chemicals and related products are added, this tonnage moves to 125 million tons, which is then the largest single category (of combined sectors).

Exhibit 3-14
Crude Petroleum & Products
Domestic Movements, 2002

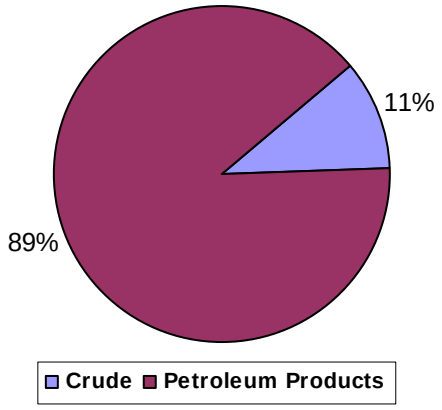
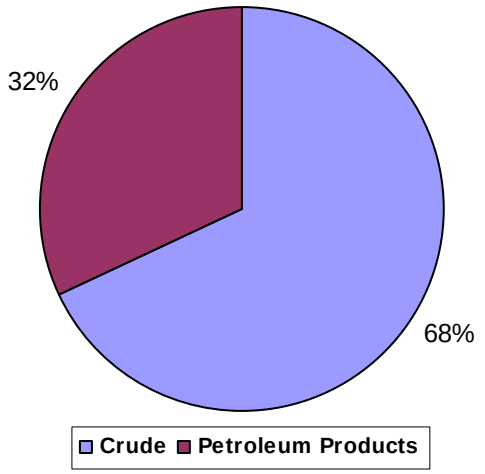


Exhibit 3-15
Crude Petroleum & Products
Foreign Trade Movements, 2002



Petroleum and petroleum products remained the top-tonnage commodity on the inland waterways network accounting for 1.1 billion tons in 2004, while the chemicals and related products sector contributed 180 million tons. Compared to 2.6 billion tons of total waterborne commerce handled in that year, the combined share of the two commodities is more than 50% of the U.S. total.

The data for O/D analysis of refinery-related products is shown in Exhibits 3-16, 3-17, and 3-18. The crude oil movements into the state account for 55 million tons of imports, 4.3 million tons from other states and 7.7 million tons of intra-state movements. The amount of crude oil moving out of the state was negligible with 860,000 tons to other states and 600,000 tons as exports.

Exhibit 3-16
Origin Destination Analysis
Waterborne Crude Petroleum Movements
2002

To LA		From LA	
Origin	**Tons (1,000)**	**Destination**	**Tons (1,000)**
Alabama	1,004	Alabama	196
Canadian	696	Other Territories	204
Mississippi	49	Texas	460
Other Territories	731		
Texas	1,833		
Total	4,313		860
Intra-State	7,718		7,718
Imports	55,093		
Exports			598
Inbound	67,124		
Outbound			9,176

Source: USACE:Navigation Data Center, 2002

Exhibit 3-17
Origin Destination Analysis
Waterborne Petroleum Products Movements
2002

To LA		From LA	
Origin	**Tons (1,000)**	**Destination**	**Tons (1,000)**
AL	712	AL	539
AR	25	AR	213
Canada	32	CA	198
IL	1,059	Canada	937
IN	62	DE	40
KY	389	FL	19,211
MN	55	IL	1,935
MS	1,530	IN	925
NJ	295	KY	3,091
OH	4	MO	830
OK	62	MS	1,663
Other Territories	132	NY	349
TN	219	OH	242
TX	5,882	OK	118
WV	22	Other Territories	282
		PA	262
		PR	130
		TN	1,937
		TX	6,947
		WV	219
Total	10,480		40,068
Intra-State	19,270		19,270
Imports	13,411		
Exports			8,953
Inbound	43,161		
Outbound			68,291

Source: USACE, Navigation Data Center, 2002

Exhibit 3-18
Origin Destination Analysis
Other Chemicals and Products
2002

To LA		From LA	
Origin	**Tons (1,000)**	**Destination**	**Tons (1,000)**
AL	402	AL	518
Canada	170	AR	103
IL	175	Canada	174
KY	22	FL	278
MS	663	IA	116
Other Territories	6	IL	1,481
TX	2,367	KY	856
		MN	106
		MO	287
		MS	431
		NY	92
		OH	1,014
		OK	51
		Other Territories	24
		PA	330
		TN	437
		TX	2,463
		WI	24
		WV	390
Total	3,805		9,175
Intra-State	6,126		6,126
Imports	6,081		
Exports			4,085
Total Inbound	16,013		
Total Outbound			19,386

Source: USACE, Navigation Data Center, 2002

The majority of crude movements are destined for refineries located on the Gulf Coast, which has the highest concentration of refineries in the nation. While most of the refineries are affiliated with the three major oil companies (Exxon-Mobil, Chevron-Texaco, and Shell), some small refineries operate independently.

Petroleum and petroleum products fall into three major categories:

1. Fuels such as motor gasoline and distillate fuel oil (diesel fuel)
2. Finished non-fuel products such as solvents and lubricating oils
3. Feedstock for the petrochemical industry such as naphtha and various refinery gases

Other less obvious uses of petroleum include the manufacture of petroleum-based plastics, medicines, food items, and a wide variety of other items. The origin-destination (O/D) network for petroleum and petroleum products movements covers a wider network of states (compared to other commodity sectors), and shipments out of the state far out-weigh the shipments into the state (Exhibit 3-17), with 68 million tons going out of state and 43 million tons coming into the state.

Exhibit 3-19
Origin Destination Analysis
Wateborne Fertilizer Movements
2002

To LA		From LA	
Origin	**Tons (1,000)**	**Destination**	**Tons (1,000)**
Canada	88	AL	49
IL	17	AR	434
MS	98	Canada	25
TN	11	IA	460
TX	28	IL	1,216
		IN	221
		KY	457
		MN	1,069
		MO	707
		MS	260
		OH	495
		OK	816
		PA	42
		TN	319
		TX	537
		WI	9
		WV	19
Total	244		7,136
Intra-State	457		457
Imports	2,868		
Exports			837
Total Inbound	3,569		
Total Outbound			8,431

Source: USACE:Navigation Data Center, 2002

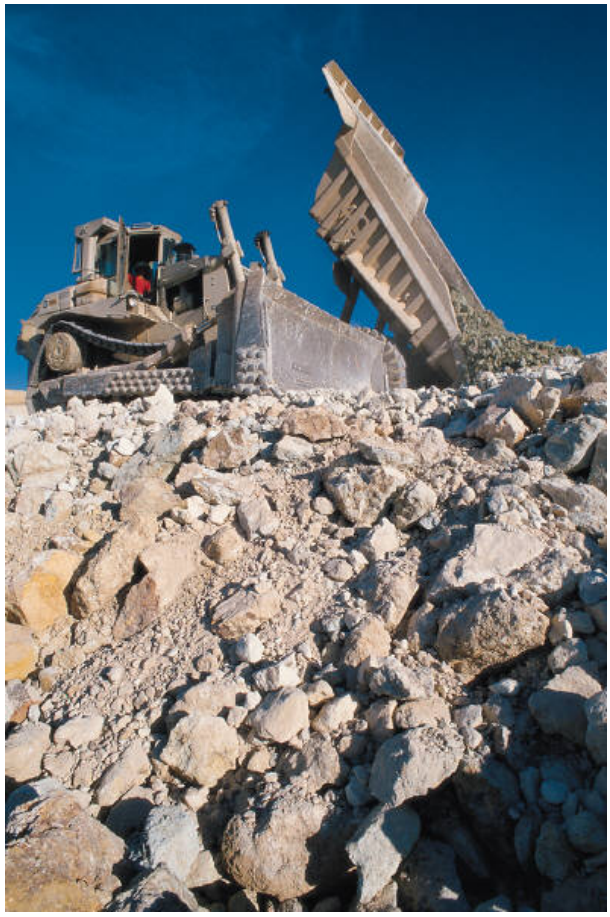
Data for the O/D networks of other chemical products and for fertilizer are presented in Exhibit 3-18 and Exhibit 3-19. The data shows that more of these products are distributed to other states than are received indicating a surplus by weight terms. The chemical products sector and the fertilizer sector are also engaged in foreign trade with imports of about 10 million tons and 3 million tons respectively. Combining nitrogen with hydrogen from natural gas commercially produces nitrogen, one of the most important categories

of fertilizers. With large reserves of natural gas, Louisiana, Texas, and Oklahoma are responsible for more than half the U.S production (USGS Fact Sheet FS-155-98. U.S. Geological Survey, September 1999).

In summary, the refinery-related industries produce large volumes of waterborne commerce and may be the most important sector to Louisiana's maritime system as well as the most important economic activity in Louisiana.

3.4.3 Crude Materials, Inedible Except Fuels

Approximately 10% of the cargo that moved within the waterway system is included in this category. Crude materials consist of construction materials such as sand, soils, and rocks along with cement, concrete, non-ferrous ores, and steel scrap materials.



While steel scrap is used as raw material in the local manufacture of steel in mini-mills and is collected by a well-organized system in the domestic market, additional need for scrap is met by imports. Similarly, the 95 million tons of domestic cement production in 2005 was supplemented with 23 million tons of imports (U.S. Geological Survey, Minerals Yearbook, 2005).

Large-scale public construction programs such as the highway construction program under the Intermodal Surface Transportation Efficiency Act and large housing programs are some sources that generate demand in this sector. The interstate O/D patterns for sand and gravel, non-ferrous ores, and scrap are shown in Exhibit 3-20. The major movements are limestone imports from Mexico and other Central American countries and domestic movements from Kentucky, Illinois, and Missouri to Louisiana.

Exhibit 3-20
Origin Destination Analysis
Soils, Gravel, and Sand Movements
2002

To LA State	To LA Tons (1,000)	From LA State	From LA Tons (1,000)
AL	55	AL	82
AR	55	AR	30
Canada	240	FL	40
IL	1,209	IA	246
IN	30	IL	1,288
KY	4,500	IN	302
MO	1,856	KY	416
MS	5	MN	684
Other Territories	395	MO	392
TX	40	MS	215
		OH	654
		OK	22
		Other Territories	364
		PA	556
		TN	806
		TX	123
		WI	98
		WV	225
Total	8,384		6,544
Intra-State	2,122		2,122
Imports	5,501		
Exports			62
Total Inbound	16,007		
Total Outbound			8,728

Source: USACE, Navigation Data Center, 2002

3.4.4 Primary Manufactured Goods: Iron and Steel Products

Iron and steel products accounted for 10.5 million tons of imports in 2002, and nearly all of these products were moved out of the state (Exhibit 3-21 and Exhibit 3-22). However, the period under review coincides with the tariff restrictions imposed by a presidential directive on imports of certain categories of steel products. The directive was in effect from March 2002 for three years and was not renewed after the initial period.

Exhibit 3-21
Origin Destination Analysis
Iron Ore and Scrap Movements
2002

To LA		From LA	
Origin	Tons (1,000)	Destination	Tons (1,000)
CN	163	AL	148
IL	43	AR	288
KY	22	IL	62
PA	58	IN	76
TN	12	KY	752
TX	60	OH	1,933
		PA	63
		TN	492
Total	357		3,814
Intra-State	36		36
Imports	3,329		
Exports			65
Total Inbound	3,721		
Total Outbound			3,915

Source: USACE, Navigation Data Center, 2002

Exhibit 3-22
Origin Destination Analysis
Primary Iron Steel Product Movements
2002

To LA		From LA	
Origin	Tons (1,000)	Destination	Tons (1,000)
AL	33	AL	577
KY	18	AR	874
OT	33	FL	39
TN	15	IA	88
TX	52	IL	2,424
		IN	763
		KY	1,013
		MN	98
		MO	138
		MS	21
		OH	1,297
		OK	210
		Other Territories	103
		PA	918
		TN	767
		TX	324
		WI	101
		WV	199
Total	151		9,955
Intra-State	225		225
Imports	10,562		
Exports			183
Total Inbound	10,938		
Total Outbound			10,363

Source: USACE, Navigation Data Center, 2002
OT - Other territories

An import tariff is imposed to reduce imports. However, according to the U.S. International Trade Commission investigative studies, the overall imports for steel production in the country increased (U.S. International Trade Commission, *Steel: Monitoring Developments in the Domestic Industry,* Publication No. 3632, September, 2003). For example, imports of pig iron, coke, and scrap used for remelting to produce steel in mini-mills have increased as a result

of tariffs imposed on some imported steel products. According to Trade Commission study, the steel production imports through the New Orleans Customs District increased by 56% during the three-year period 2000 to 2003 (April 1- March 31). Similarly, the total imports to the U.S. increased by 45.8% during the period. The Port of New Orleans was the leader in all steel imports except for iron ore and steel scrap.

Although the tariff on certain steel imports caused domestic increases, other economic impacts may also have resulted. According to International Longshoreman's Association (ILA) sources, handling steel products traditionally generates more than 40% of the hours worked by stevedores on the Texas Gulf Coast. Therefore, lost revenues (underutilized equipment such as cranes, yards, and berths, etc.) and lost wages may have occurred. Overall, the waterway system in the state is ideally suited to handle large consignments of steel products either as direct transfers to barges, at mid-stream berths, and at along-side berths with adequate yard storage space.

3.4.5 Agricultural Grain Export

Louisiana's grain terminals handle 50% of the nation's grain exports and play an important role is providing international market access to farmers in more than half of America's heartland. The origin and destination network of domestic movements destined to foreign markets is shown in Exhibit 3-23. A competitive transportation system of inland barge and rail networks support the grain sector making it the largest single export commodity handled in the state. Taking into account both foreign and domestic movements, it is also the largest dry-bulk commodity handled in the state. The system supports grain movements and thus supports the agricultural sector in several states.

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Exhibit 3-23
Origin Destination Analysis
Food and Farm Product Movements
2002

To LA		From LA	
Origin	**Tons (1,000)**	**Destination**	**Tons (1,000)**
AL	496	AL	51
AR	3,203	AR	44
IA	9,473	FL	156
IL	34,081	IA	27
IN	3,700	IL	377
KY	3,097	IN	50
MN	8,037	KY	17
MO	6,183	MN	74
MS	2,051	MO	46
OH	1,238	MS	197
OK	1,176	OH	39
Other Territories	168	OK	80
TN	2,975	Other Territories	397
TX	194	PR	612
WI	717	TN	84
WV	10	TX	425
Total	76,798		2,676
Intra-State	2,104		2,104
Imports	1,649		
Exports			86,979
Inbound	80,551		
Outbound			91,759

Source: USACE, Navigation Data Center, 2002
OT - Other territories

3.4.5.1 Analysis of Grain Movement by Waterway System

The center for grain export operations in the state is the Lower Mississippi River which exported approximately 80 million tons of farm products in 2002, compared to less than 800,000 tons on the Calcasieu Ship Channel (Exhibit 3-24). The farm product exports from Lake Charles were mostly delivered by truck or rail to the port. Therefore, with all grain movements centered on the Lower Mississippi, the statewide grain movement results in a hub-and-spoke pattern. While the Upper Mississippi River, from the Ohio River to Baton Rouge carries supplies from America's heartland and functions as the main feed line linking America's heartland supplies, the in-state ports (Port of Lake Providence and shippers on the Ouachita and Black Rivers) carry only modest amounts of 334,000 tons and 274,000 tons. Similarly, the bulk of the movements on the GIWW moved eastward and then up-bound on the Morgan City-Port Allen Route accounting for 561,000 tons in 2002.

Exhibit 3-24
Food and Farm Product Movements
by Waterway Systems
2002 (1,000 Tons)

Waterway/Commodity	Domestic		Foreign	
	Internal	Coastwise	Tonnage	Percent
Mississippi River - Baton Rouge to Head of Passes				
Food and farm products total	80,201	887	87,393	100.0
Grains	47,420	90	51,505	58.9
Oilseeds	24,071	28	25,554	29.2
Processed grains & feed	6,671	653	7,273	8.3
Other	2,039	116	3,061	3.5
Mouth of Ohio River to Baton Rouge				
Food and farm products total	80,492			
Grains	48,601			
Oilseeds	23,927			
Processed grains & feed	6,610			
Other	1,354			
GIWW Louisiana Portion				
Food and farm products total	1,753	115		
Grains	440	3		
Oilseeds	170			
Processed grains & feed	102			
Other	1,036	112		
GIWW - Morgan City Port Allen Route				
Food and farm products total	561			
Grains	227			
Oilseeds	24			
Processed grains & feed	51			
Other	255			
Calcasieu River Lake Charles				
Food and farm products total	241	5	770	100.0
Grains	11	5	490	63.6
Oilseeds	--		2	0.3
Processed grains & feed	29		66	8.6
Other	201		262	34.0

Source: WCUS, 2002

Two reasons for the 6 million ton difference between domestic inbound movements and foreign export tonnage shown in Exhibit 3-23 are noteworthy. First, while the domestic movements report only cargo that moved by barge, the foreign trade moved by marine vessel includes total tonnage loaded including what may have been transported by surface modes. Second, surface mode or rail data were checked to verify this mode of transport. The rail data for 2002 indicate that 5.8 million tons of farm products terminated in the state thereby roughly accounting for that difference (See The Rail Transportation of Grain –Volume 1, 2003. Association of American Railroads, p.50). However, the rough accuracy of this approach, in this case, is not a short cut to estimate the modal shares as many other factors such as changing year-

end stock levels could affect this equation. Another important switch in foreign trade analysis will be the adoption of metric measures, mainly the switch from short tons to metric tons. For example, the 87.4 million tons exported from the Lower Mississippi will be about 79.3 million metric tons; and in many publications grain production is expressed in bushels, a volume measure with varying weights for different crops. According to the USDA Federal Grains Inspection Service the legal test weight per specific grains are as follows:

- Wheat and soybeans = 60 pounds per bushel
- Corn , sorghum, and rye = 56 lbs//bushel
- Barley = 48 lbs/bushel; oats = 32 lbs/bushel
- Sunflower seeds is 28 lbs

The total exported food and farm products from the Lower Mississippi are further desegregated into specific crops in Exhibit 3-25. The crop combination and the processed nature of products is important for planning purposes as the supply and demand structure for each crop is subject to wide variations. The type of crop handled is related to specific production areas, technological developments, various government policies, and the degree of political pressure that can be imposed by stakeholder groups. More pronounced differences may be observed on the demand side. For example, the demand response for wheat and rice that is used mainly for human consumption originates from developing countries, while the demand response for oilseeds and feed demand originates from more affluent countries that support livestock industries.

Exhibit 3-25
Analysis of Exports
by Specific Crops
2002 (1,000 Tons)

Waterway/ Commodity	Total Exports	Export Share (%)
Mississippi R.-Baton Rouge to Mouth of Passes		
Food and farm Products Total	***87,393***	100
Grains	**51,505**	**59**
Wheat	6,217	7
Corn	40,794	47
Rice	2,011	2
Sorghum Grains	2,139	2
Total Oil Seeds	**25,554**	**29**
Soybeans	20,667	24
Oilseeds nec	4,881	6
Vegetable Products	**2,132**	**2**
Vegetable Oils	2,026	2
Processed Grain and Animal Feed	**7,273**	**8**
Grain Mill Products	996	1
Animal Feed Preparations	6,213	7
Other Agricultural Products	**929**	**1**

Source: WCUS 2002

3.4.5.2 Grain Terminal Operations and Capacities

The economic importance of the grain sector in Louisiana lies not in crop production but in handling the nation's exports, a by-product of the inland waterway system. Thus, the

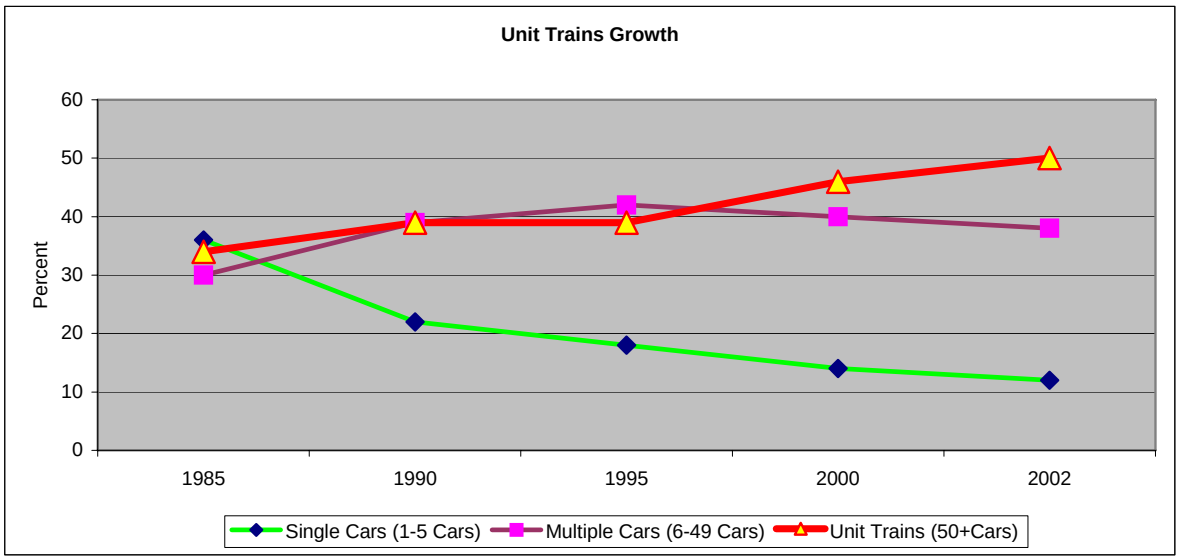
discussion concentrates on transportation issues in the domestic sector and foreign trade issues in the international markets. The analysis begins with an evaluation of the grain export terminal operations, a key element of the industry.

In general, grain-exporting firms are vertically integrated large-scale operations characterized by significant scale economies. Often, the vertical control extends through the marketing chain, into futures market contracts throughout the country, and to the level of river grain elevator operations. Also, modular systems of transport capable of carrying large quantities of product on inland barge tows and unit trains have resulted in minimized unit costs. The trend toward larger capacity systems is illustrated by the increase in unit trains between 1985 and 2002 (Exhibit 3-26). The tonnage carried by single cars decreased from 36% to 12% during this period while the share hauled by unit trains increased from 34% to 50%. Other efficiency measures are in force at the export terminals where grain receiving as well as vessel loadings are accomplished by using large conveyor systems. In general, large capital needs combined with significant scale economies characteristic to the industry have acted as barriers to entry, thereby promoting minimal competition among operators. In general terms, grain handling

Exhibit 3-26
Growth Trends in Grain Unit Trains Configurations 1985-2002

Movement Type	1985	1990	1995	2000	2002
			(percent)		
Single Cars (1-5 Cars)	36	22	18	14	12
Multiple Cars (6-49 Cars)	30	39	42	40	38
Unit Trains (50+Cars)	34	39	39	46	50

Source:The Rail Transportation of Grain, AARR, 2003.



and storage facilities can be classified into three major segments: (1) country elevators and river elevators functioning as collection points in production areas; (2) fixed land-based export elevators; and (3) floating crane terminals engaged in mid-stream barge-to-ship transfers.

3.4.5.3 Land-Based Fixed Elevators

On the Lower Mississippi, land-based export elevators are operated by six operators. One elevator on the Calcasieu Ship Channel is operated by the Port of Lake Charles (Exhibit 3-27).

Exhibit 3-27
The Location and Capacities of Fixed Export Grain Elevators

Elevator Location and City	Location Mile/Bank	*Estimated Annual Capacities (1,000 tons/Year)*				Constraint Component
		Ship Berthage	Barge Berthage	Storage	Limiting Capacity	
Zen-Noh Grain Corp, Convent	163.8 L	14,845	13,536	11,409	11,409	Storage
MFP, Paulina	150.5 L	7,489	8,520	5,896	5,896	Storage
Cargill, Reserve	139.6 L	22,545	13,319	20,047	13,319	Barge berthage
ADM/Growmark, Reserve	139.2 L	8,788	7,292	11,792	7,292	Barge berthage
ADM/Growmark, Destrehan	120.5 L	8,020	7,292	14,740	7,292	Barge berthage
Bunge Corp, Destrehan	120.0 L	8,848	5,948	19,201	5,948	Barge berthage
ADM/Growmark, Ama	117.7 R	8,848	10,246	15,477	8,848	Ship berthage
Continental, Westwego	103.1 R	22,055	10,021	9,988	9,988	Storage
MFP, Myrtle Grove	61.8 R	5,610	7,292	17,688	5,610	Ship berthage
Port of Baton Rouge Elevator, Baton Rouge	228.9 R				2,500	Estimate
Port of Lake Charles Elevator, Lake Charles	Calc River				3,000	Estimate
Total Annual Capacity					**81,102**	

Sources: Inland Waterway Grain Handling Facilities with Rail Connections, Navigation Data Center, USACE 1992
Louisiana Statewide Intermodal Plan, Working Paper on Water Rail, and Intermodal Freight Transportation, National Ports Waterways Institute, Louisiana State University, 1995

Each terminal consists of three basic components where the actual output is determined by at least one constraining component. A brief description of the three components and factors determining effective capacity is described below:

1. **Vessel Berthage (dock limitations and loading rates)**—A typical grain vessel may have the following specifications: 45k-50k dead weight tons (DWT); draft 30-40 feet; length overall (LOA) 650 feet; gross tonnage 25k-35k (Estimates based on The Bulk Carrier Register, Clarkson Research Studies, 1996). Ship loading rates vary between 1,000 tons to 1,200 tons per hour. *The effective loading rate* may range from 60-75% based on equipment adjustment delays and ship arrival schedules.

2. **Storage**—Typically, concrete or metal silo storage and capacities vary. *The effective transfer rate* is influenced by grain quality types stored, turnovers per year, average dwell time, etc.

3. **Barge and Rail Unloading**—The standard size grain barge is 35 feet by 195 feet and carries about 1,400 tons of grain. The effective capacity is relatively high (85%), and barge unloading may range from 1,000 to 1,500 tons per hour.

The total capacity of a terminal, as previously mentioned, is equal to the constraining component or the weakest link in the stock and flow system. Based on this criterion, the total annual capacity of land-based terminals is estimated to be about 81 million tons. Since the publication of this data (in Exhibit 3-27), several improvements have been made to the ADM/Growmark elevator in Reserve and to the Baton Rouge elevator. However, the terminal managers indicate that there are no problems of excess capacity because of two important reasons. First, the industry is in a mature stage where the demand and supply for services is stable, and second, with no new entrants looming in the horizon, there is no reason to maintain excess capacity as a defensive measure.

3.4.5.4 Midstream Terminals Operated with Floating Cranes

The exact number of midstream terminals varies. However, in late 2006, at least five midstream moorings engaged in direct transfer of cargo from barge to ship:

- Cargill's K2 at Convent
- ADM, Gemini at Destrehan
- Associated Terminals at Myrtle Grove
- Cooper T. Smith, Margaret "G" at LaPlace
- America, R.G.1 at Darrow

In general, grain loading direct from the barges to vessels could be an efficient, low-cost operation if the loaded barges fed the vessels in a continuously and uninterrupted manner. Although any type of dry-bulk cargo could be handled at these facilities, it is estimated that all floating cranes at mid-stream moorings have an annual capacity of about 16 million tons.

3.4.5.5 International Trade Flows

The international trade flow data presented in this report is extracted from the interactive database maintained by the U.S. International Trade commission (www.usitc.gov). The database reports exports from the Customs District of New Orleans, Louisiana, for the purpose of this report, and the data extracted follows the North American Industry Classification System (NAICS). When reported based on NAICS codes, the information on some exports is aggregated at a high level. For example, oilseeds are analyzed in two categories, as soybeans and as oilseeds

except soybeans. For coarse grains, minor varieties are also combined. Overall, the database provides valuable information for this analysis.

3.4.6 Foreign Trade: Grain Export Destinations

Since the analysis of export movements are for individual crops, individual crop profiles covering domestic and foreign trade characteristics are presented.

Wheat Profile

Wheat may be the most widespread crop and is grown in almost every country, except perhaps, a few countries in the Tropics. In 2002, the U.S. wheat production was 1.6 billion bushels. Since the bulk of the production was in states with no access to the waterway network, the wheat export share was less than 10% of all food and farm exports from Louisiana. The ports on the Pacific Northwest and Gulf ports in Texas competed for wheat exports.

A diverse set of countries imported wheat through Louisiana, with most destinations being developing countries (Exhibit 3-28). The top-five country import share was about 48%. Some of these exports were food aid, particularly those to Egypt and various African countries.

Exhibit 3-28
Top 30 Countries Importing Wheat from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	Egypt	964	1,075	737	925
2	Mexico	693	908	700	767
3	Venezuela	433	393	476	434
4	China	0	115	1,101	405
5	Colombia	269	286	410	322
6	Dominican Republic	266	228	312	269
7	Guatemala	294	261	203	253
8	El Salvador	168	214	271	218
9	Nigeria	246	172	211	210
10	Peru	166	94	301	187
11	Costa Rica	182	170	198	183
12	Jamaica	155	167	188	170
13	Honduras	183	153	157	164
14	Trinidad-Tobago	131	113	141	128
15	Chile	78	273	0	117
16	Bazil	215	86	25	109
17	Ecuador	145	53	122	107
18	Panama	95	111	97	101
19	Mozambique	38	112	142	97
20	Israel	80	54	133	89
21	Nacaragua	59	103	101	88
22	Italy	98	55	99	84
23	South Africa	6	71	124	67
24	Ethiopia	0	58	105	54
25	Cuba	0	50	106	52
26	Labanon	40	41	59	47
27	Ghana	45	49	42	45
28	Tunisia	26	85	24	45
29	Japan	22	80	30	44
30	Spain	50	74	0	41
	Total	**5,147**	**5,704**	**6,615**	**5,822**

Source: U.S. International Trade Commission Database- www.usitc.gov

Corn Profile

Corn exports from Louisiana rank first in terms of weight, comprising 41 million tons in 2002 or 47% of all food and farm products exported. While the total U.S. corn production in 2002 was 9 billion bushels, the top three states (Minnesota, Illinois, and Indiana) were responsible for producing more than half of this output (Crop Production 2002 Summary, January 2003. Agricultural Statistics Board, NASS, U.S. Department of Agriculture). These three states are connected to Louisiana through the inland waterway system and remain the top three states sending food and farm products to Louisiana (see Exhibit 3-23).

Exhibit 3-29
Top 30 Countries Importing Corn from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	Japan	14,296	13,029	10,978	12,768
2	Egypt	3,741	3,373	3,159	3,424
3	Mexico	3,015	2,291	2,255	2,520
4	Colombia	1,752	1,606	1,822	1,727
5	Taiwan	2,032	972	1,120	1,375
6	Algeria	1,114	865	1,011	997
7	Jamaica	2,521	211	201	978
8	Korea	449	101	2,189	913
9	Dominican Republic	1,037	916	750	901
10	Turkey	747	977	653	792
11	Israel	727	726	814	756
12	Syria	746	629	861	745
13	Venezuela	597	589	557	581
14	Guatemala	556	492	522	523
15	Costa Rica	492	486	576	518
16	Morocco	267	281	668	405
17	El Salvador	286	414	503	401
18	Saudi Arabia	584	185	396	388
19	Tunisia	353	258	503	371
20	Cuba	225	325	484	345
21	Ecuador	297	209	407	304
22	Panama	262	302	255	273
23	Honduras	213	247	235	232
24	Lebanon	194	144	289	209
25	Peru	170	36	245	150
26	United Arab Emirates	360	0	12	124
27	Jordan	53	50	224	109
28	Trinidad-Tobago	107	94	112	104
29	Mozambique	220	10	6	79
30	South Africa	221	0	6	76
	Total	**37,634**	**29,818**	**31,813**	**33,088**

Source: U.S. International Trade Commission Database- www.usitc.gov

More than 60% of corn exports were sent to the top-five export destinations: Japan, Egypt, Mexico, Colombia, and Taiwan (Exhibit 3-29). Corn is consumed as human food and also is used as feed stock for livestock industries. When used as human food, the demand conditions reflect that of a basic necessity: low price and high-income elasticity. Imports to Japan and Taiwan are for feed purposes with greater substitution possibilities.

Rice Profile

Rice in the U.S. is produced by segmented rice market that grows long, medium, and short grain varieties. This segmented market is evident in international markets as well, with countries in the Far East indicating a preference for short varieties that are sticky when cooked. The European and Latin American markets prefer long-grain varieties. In 2002, the top three states, Arkansas, California, and Louisiana, produced more than 80% of the total rice output with Mississippi, Missouri, and Texas producing the remaining 20%. The rice export destinations from Louisiana Gulf ports are mainly the Latin American markets (Exhibit 3-30). The list does not include several countries in the Far East which exclusively import short grain varieties produced in California. The top-five rice importers from Louisiana ports are all located in Latin America─Mexico, Brazil, Costa Rica, Honduras, and Nicaragua. While some of the rice produced in southwest Louisiana is channeled through the Port of Lake Charles, substantial quantities may be originating in Arkansas, which produces nearly half of U.S. rice output.

Exhibit 3-30
Major Countries Importing Rice from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	Mexico	408	475	315	399
2	Barazil	56	480	0	179
3	Costa Rica	122	133	190	148
4	Honduras	139	116	139	131
5	Nicaragua	107	99	135	114
6	El Salvador	87	73	69	76
7	Turkey	85	83	12	60
8	Guatemala	59	47	70	59
9	Cuba	38	56	0	31
10	Jamaica	19	38	25	27
11	Venezuela	0	64	0	21
12	Spain	34	13	11	19
13	Panama	29	8	8	15
14	Italy	19	0	0	6
15	Hungary	9	4	0	4
	Total	**1,211**	**1,689**	**974**	**1,291**

Source: U.S. International Trade Commission Database- www.usitc.gov

Other Grain Varieties

The 2002 exports included in this group are several minor categories of coarse grains─barley, rye, oats, and sorghum. Japan, Mexico, and Spain dominated the market, cornering more than 90% of the movements (Exhibit 3-31).

Exhibit 3-31
Major Importers of Other Grain Varieties from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	Japan	1,034	1,035	564	878
2	Mexico	731	336	346	471
3	Spain	8	206	99	104
4	Israel	25	113	17	52
5	Italy	0	121	31	51
6	South Africa	32	10	1	14
7	Netherlands	6	1	1	3
	Total	**1,836**	**1,822**	**1,059**	**1,572**

Source: U.S. International Trade Commission Database- www.usitc.gov

Soybean Profile

Three major types of exports, soybean grain, soybean meal, and soybean oil are handled at Louisiana port terminals. While the total production in the U.S. in 2002 was 2.73 billion bushels, the states of Illinois, Minnesota, and Iowa located on the inland waterway network were the leading producers. The list of the top-five importers, each importing more than a million tons and led by China (5 million tons), is testimony to the intense demand imposed by large populations with rising incomes (Exhibit 3-32).

Exhibit 3-32
Top 25 Soybeans Importing Countries from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	China	2,557	6,663	5,889	5,036
2	Japan	2,660	2,581	2,125	2,455
3	Mexico	1,622	1,836	1,158	1,539
4	Germany	1,112	964	1,426	1,167
5	Spain	1,188	1,220	752	1,053
6	South Korea	1,185	1,014	695	965
7	Taiwan	1,296	783	480	853
8	Indonesia	1,060	541	504	702
9	Netherlands	1,278	565	259	701
10	Portugal	592	405	196	398
11	Israel	567	237	181	328
12	Turkey	410	364	188	321
13	Belgium	357	363	201	307
14	Costa Rica	240	196	145	194
15	Colombia	194	121	119	145
16	Egypt	163	112	158	144
17	United Kingdom	181	127	118	142
18	Morocco	130	196	63	130
19	Malaysia	120	125	139	128
20	France	223	118	27	123
21	Italy	261	69	0	110
22	Cuba	110	100	57	89
23	Denmark	88	69	106	88
24	Trinida-Tobago	93	63	74	77
25	Iran	0	187	0	62
	Total	17,687	19,019	15,060	17,255

Source: U.S. International Trade Commission Database- www.usitc.gov

Other Oilseeds Profile (Except Soybean)

This category of exports includes peanut oil and small quantities of specialty oils (Exhibit 3-33).

Exhibit 3-33
Top 10 Countries Importing Oilseeds except Soybeans from Louisiana

Rank	Country	Year			3-Year Average
		2002	2003	2004	
		(1,000 metric tons)			
1	Colombia	0	14	399	138
2	Spain	173	59	0	77
3	New Zealand	0	43	0	14
4	Jordan	42	0	0	14
5	France	36	0	0	12
6	Syria	10	7	0	6
7	Germany	17	0	0	6
8	Guatemala	0	10	5	5
9	United Kingdom	0	15	0	5
10	Canada	0	10	0	3
	Total	**278**	**158**	**404**	**280**

Source: U.S. International Trade Commission Database- www.usitc.gov

3.4.7 Market Outlook and Long Term Trends

The inland waterway system and the food and farm sectors have developed a mutual relationship with barge operators providing a transportation system that is well adjusted to farm needs, and the farm sector provides much of the needed cargo to the inland barge industry. The U.S. Department of Agriculture projects steady growth in crop production as well as in agricultural exports (See USDA Agricultural Baseline Projections to 2013, January 2004). The data in Exhibit 3-34 indicates an average annual growth of about 2% for corn production and a higher rate of growth for corn exports at 6%. Although the trend for soybean exports is also positive, it is not as clear cut because a variety of processed products are exported.

Exhibit 3-34
Average Annual Growth Rates in Production and in Exports for Selected Crops 2002 to 2013

Crop/Production/Exports	Projections					Average Annual Growth
	2002	2005	2008	2011	2013	
Corn						
Production (million bushels)	9,008	10,490	11,035	11,510	11,695	2%
Exports (million bushels)	1,592	2,225	2,525	2,750	2,875	6%
Soybeans						
Production (million bushels)	2,749	2,910	2,955	3,065	3,110	1%
Exports (million bushels)	1,045	1,080	1,055	1,055	1,040	0%
Soybean Meal						
Exports (1,000 tons)	6,050	6,000	6,400	6,675	6,825	1%

Data Source: USDA Agricultural Baseline Projections to 2013, February 2004

The long-term growth projections for farm products made by the Institute of Water Resources of the U.S. Army Corps of Engineers indicate an annual growth rate of 0.8%, 1.5%, and 2.1% as low, medium, and high estimates for the Lower Mississippi River segment (U.S. Army Corps of Engineers, Institute of Water Resources, December 1999). This data includes both domestic and foreign movements. The above forecasts made at the national level based on macroeconomic variables such as population growth, rising income levels, etc., must be calibrated by examining specific factors affecting local activities.

3.4.7.1 Strategic Issues

The following items outline strategic issues facing grain export movements through Louisiana ports.

- **Regional Competition**—Several other port regions in the West and Atlantic coasts as well as the Gulf Coast states of Alabama and Texas challenge the traditional competitive advantage enjoyed by the Lower Mississippi terminals. Some of the primary reasons for these challenges are aggressive pricing policies adopted by railroad deregulation, vessel deployment patterns, and gradual development of port capacities in other regions.

- **Long-term Structural Shifts in U.S. Agriculture**—Indications are that major shifts from crop production and export to domestic use of grain as livestock feed and ethanol and export of high value dairy and meat products will continue to gather momentum. The current position of exporting agricultural products in primary forms will change similar to other developed economies. Currently, U.S. agricultural

products rank last among developed nations in terms of value per unit weight. The matrix of origin/destination movements will also change based on livestock industry developments.

- **Technological Developments**—New packaging such as containerization, biotechnology, and genetically engineered products has not developed sufficiently to make a clear determination as to how they will affect the barge industry. A brief analysis of this factor will appear later in this section.

- **Changing International Trading Partners**—The emergence of China as a major importer, competition from East European countries, and dwindling food assistance programs will affect waterborne grain movements.

- **Containerization in the Grain Sector**—As in many other commodity sectors, the containerization of products has made limited inroads in the grain industry. The need for containerization is primarily to ensure "identity preserved (IP)" grain shipments, which is preferred by farmers growing high quality cultivars that fetch high prices in the market and, more often, to identify the genetically altered grain products. However, the initial indications are that containerization of grain shipments may be better suited to rail than to barge transportation (Exhibit 3-35). For container-on-barge operations to be feasible, sufficient volumes and terminals that can handle containerized grains must be developed.

Exhibit 3-35
Shipping Time Comparison
for Bulk Handling and Containerization of Canadian Wheat

Bulk Handling System	Days	Container System	Days
Farm Storage	---	Farm Storage	
Local Delivery	1	Local Delivery	1
Primary Elevator	40	Intermodal Terminal	2
Rail Hopper Cars	11	Double-Stack train	2
Export Terminal	19	Intermodal Port	2
Bulk Shipment	15	Container Ship	11
Import Terminal	10	Intermodal Port	2
Local Delivery	1	Local Delivery	1
Final Customer		Final Customer	
Total	**97**		**21**

Source: Prentice, B., "Re-Engineering Grain Logistics: Bulk Handling versus Containerization, 1998.

3.5 Containerized Cargo Movements

A new development in cargo containerization, i.e., the shipment of general cargo in standardized boxes has revolutionized freight transportation. The use of standardized 20-foot

equivalent units (TEUs) has influenced the configuration of fully cellular vessels, the layout plans of ports with container berths, and the seamless intermodal transportation patterns between waterborne and surface transportation modes. The purpose of this section is to provide a brief evaluation of existing conditions and the potential future trends for containerized freight within the statewide waterway network.

The freight system in Louisiana which draws its cargo from the interior waterways is highly skewed to handling dry-bulk and liquid-bulk cargo. Vessel call patterns, in terms of all vessels and container vessels to New Orleans, are indicative of the freight structure within the state (Exhibit 3-36). In terms of total vessel capacity, New Orleans ranks third in the nation after Los Angeles and Houston. However, in terms of containership capacity, New Orleans had only 4.6% share compared to 51% for Los Angeles and 9.5% for Houston, indicating low levels of container vessel calls to New Orleans.

Exhibit 3-36
Port of Calls at Selected U.S. Ports by Vessel Type 2000

Port	Total Vessel Calls		Containerships		
	# Vessels	Capacity (1,000 dwt)	#Vessels	Capacity (1,000 dwt)	% of Total Capacity
Los Angeles/Long Beach, CA	5,326	242,951	2,955	124,281	51
New York, NY/NJ	4,605	186,631	2,172	87,463	47
Miami, FL	1,212	34,553	766	25,522	74
Houston, TX	5,129	207,831	614	19,799	10
Jacksonville, FL	1,291	35,532	211	7,989	23
New Orleans, LA	5,090	234,036	388	10,853	5

Data Source: USDA Agricultural Baseline Projections to 2013, February, 2004

Containerized cargo is handled at three locations in the state: the Port of New Orleans, the Port of South Louisiana, and the Port of Lake Charles. The Port of Baton Rouge ceased container operations in May 2006. Ninety-nine percent of the container volumes are handled at the Port of New Orleans (Exhibit 3-37). In this context, the Port of New Orleans may be the best and most likely location for container operations expansion among Louisiana ports.

Exhibit 3-37
Containerized Cargo Handling By Louisiana Ports
Calendar Year 2004

Port	Exports	Imports	Total	Exports	Imports	Total
	(in TEUs)			(in 1,000 metric tons)		
New Orleans	143,979	99,855	243,834	1,657	1,125	2,782
South Louisiana	289	10,662	1,351	3	13	16
Lake Charles	921	38	959	13	0	13

From 1999 to 2004, the national total increased by 42% while the total TEUs handled at New Orleans declined by 3.6%. It is assumed that market competition from other Gulf ports is the cause. Notwithstanding these conditions, the port made steady progress in increasing its general cargo tonnage reaching an all-time high of 14 million tons in 1998 and a minor increase of 12 million tons in 2000.

3.6 Waterborne Cargo Projections

The development of long-term cargo projections is an integral part of the waterway planning process in the public sector. The work scope for this report requires the development of statewide waterborne cargo projections for 10- and 25-year periods (or in some cases 30 years). The long-term cargo projections for the period 2005 to 2030 for individual waterway systems are presented in this section.

The projections developed assume statewide waterborne cargo consists of two basic categories, each responding to different supply and demand variables: domestic movements that are mainly driven by internal economic activities and foreign trade movements related to international trade requirements. Since the supply and demand conditions generating traffic for the two movement types are different, separate data sources are used in the projections. However, all movements are aggregated as one statewide system in the final analysis.

The presentation in this section evolves as follows:

- Estimations of domestic cargo movements on major and minor waterway systems in the state
- Estimations of cargo movements for foreign trade requirements
- Consolidation of the results and presentation of the total projections for the statewide system

Most of the detailed information is presented as a statistical appendix, and only the major results are presented in this section of the report. Frequent references are made in the text to guide the reader in estimating procedures and projection results.

3.6.1 Domestic Cargo Movements

3.6.1.1 Approach and Methodology

The main databases used for domestic cargo projections are waterborne cargo growth rates estimated by the Institute of Water Resources (IWR) of the U.S. Army Corps of Engineers in 1999 ("U.S. Inland Waterway Traffic Projections 1999". U.S. Army Corps of Engineers, Institute of Water Resources, <www.iwr.usace.army.mil>). Additionally, a summary of the

projections developed by commodity groups for the U.S. waterway system is shown in Exhibit 3-38 (refer to Table 1 in Appendix D). The growth rates are provided in terms of commodity groups. These estimates are then used to project waterway traffic in any system provided information on the traffic structure of the waterway is available. However, several implicit assumptions and adaptations to the estimates are required prior to applications to the statewide system.

Exhibit 3-38
U.S. Inland Waterway Traffic Projections by Commodity Groups
(million tons)

Commodity Group	Wtd. Average 1995-1998	2005			2010			2020			Average Annual Growth Rates		
		Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High
Farm Products	87.9	87.9	103.0	118.1	94.0	110.2	126.4	106.0	124.2	142.5	0.9	1.6	2.2
Metals	30.9	27.1	34.6	42.0	30.0	38.2	46.4	35.1	44.7	54.2	0.6	1.7	2.6
Coal	169.9	159.1	178.2	207.5	168.5	189.2	219.8	192.9	213.1	251.6	0.6	1.0	1.8
Crude Petroleum	43.4	41.7	46.3	50.9	43.9	48.7	53.5	48.5	53.8	59.1	0.5	1.0	1.4
Nonmetallic Minerals	99.9	102.6	116.8	131.0	110.3	125.6	140.8	123.0	139.9	156.9	0.9	1.5	2.1
Forest Products	17.9	16.2	18.5	20.8	17.3	19.7	22.1	19.2	21.9	24.5	0.3	0.9	1.5
Industrial Chemicals	41.7	39.7	46.3	52.9	44.9	52.3	59.8	55.8	65.0	74.2	1.3	2.0	2.7
Agricultural Chemicals	12.2	10.9	13.2	15.5	11.4	13.7	16.1	12.3	14.9	17.5	0.0	0.9	1.6
Petroleum Products	111.5	103.5	119.0	134.6	108.8	125.1	141.5	120.1	138.2	156.3	0.3	1.0	1.5
Other	11.2	8.3	10.4	12.5	8.4	10.6	12.8	8.8	11.1	13.4	-1.1	0.0	0.8
Total	626.5	597.0	686.3	785.8	637.5	733.3	839.2	721.7	826.8	950.2	0.6	1.3	1.9

Source: IWR, 1999

3.6.1.2 Assumptions and Adjustments to IWR Estimates

National Conditions

The use of IWR estimates implicitly assumes that the waterborne cargo projection trends in the state and the U.S. waterway system are similar.

Converting Commodity Traffic Data to Annual Growth Rates

The data provided in Exhibit 3-39 for commodity groups, Annual Rate of Growth in Waterborne Commerce, are converted into annualized compound growth rates in Exhibit 3-40. While these rates can be applied to any waterway where traffic structure is known, the IWR also developed projections specific to major segments of the U.S. inland waterway system. Three Louisiana waterway segments are included in this category, and their projections are based on

that data (Exhibit 3-41). Composite growth rates for other waterways are based on the weighted index developed for the commodity structure.[1]

Exhibit 3-39
Annual Rates of Growth in Waterborne Commerce on U.S. Inland Waterways 1998 - 2020 (Percent/Year)

Commodity Group	Wtd. Average 1995-1998	2005			2010			2020		
		Low %	Med %	High %	Low %	Med %	High %	Low %	Med %	High %
Farm Products	87.9	0.0	2.3	4.3	0.6	1.9	0.9	0.9	1.6	2.2
Metals	30.9	-1.8	1.6	4.5	-0.2	1.8	0.6	0.6	1.7	2.6
Coal	169.9	-0.1	0.7	2.9	-0.1	0.9	0.6	0.6	1.0	1.8
Crude Petroleum	43.4	-0.6	0.9	2.3	0.1	1.0	0.5	0.5	1.0	1.4
Nonmetallic Minerals	99.9	0.4	2.3	3.9	0.8	1.9	0.9	0.9	1.5	2.1
Forest Products	17.9	-1.4	0.5	2.2	-0.3	0.8	0.3	0.3	0.9	1.5
Industrial Chemicals	41.7	-0.7	1.5	3.5	0.6	1.9	1.3	1.3	2.0	2.7
Agricultural Chemicals	12.2	-1.6	1.1	3.5	-0.6	1.0	0.0	0.0	0.9	1.6
Petroleum Products	111.5	-1.1	0.9	2.7	-0.2	1.0	0.3	0.3	1.0	1.5
Other	11.2	-4.3	-1.1	1.6	-2.4	-0.5	-1.1	-1.1	0.0	0.8
Total	626.5	-0.7	1.3	3.3	0.1	1.3	0.6	0.6	1.3	1.9

Source: Exhibit 3-38

Exhibit 3-40
Traffic Projections Developed for Louisiana Waterways (Million Tons)

Waterway Segment	1995-1998	2004	Traffic Projections			Annual Growth Rates		
	Avg	Base	2005	2010	2020	2005	2010	2020
Lower Mississippi								
Low	197.0	196.6	189.7	203.5	231.0	-0.5%	0.3%	0.7%
Med.	197.0	196.6	222.2	238.6	270.8	1.6%	1.6%	1.4%
High	197.0	196.6	254.8	273.6	310.6	3.7%	0.0%	2.0%
GIWW-New Orleans-Texas								
Low	67.7	77.7	64.3	69.1	78.6	-0.7%	0.2%	0.6%
Med.	67.7	77.7	74.4	80.0	91.0	1.2%	1.4%	1.3%
High	67.7	77.7	84.5	90.8	103.3	3.1%	2.5%	1.9%
Morgan City/ Port Allen								
Low	25.6	22.9	25.0	27.2	31.4	-0.3%	0.5%	0.9%
Med.	25.6	22.9	29.1	31.6	36.6	1.8%	1.8%	1.6%
High	25.6	22.9	33.2	36.1	41.8	3.8%	2.9%	2.3%

*Source: IWR Traffic Projections database

1 The weighted index will be derived by multiplying the commodity shares (sum of shares =1) on a waterway by the growth rate estimated for that commodity group and adding them together. A waterway with two commodities with growth rates of 1% and 2% will have a composite growth index of ((0.5 x 0.01)+ (0.5 x 0.02) = 0.015 or 1.5%.

Exhibit 3-41
A Summary of IWR Projections and the Adjustments

	IWR Projections	Description	Adjustments
1	Projection Period	Low, Medium, and High scenarios developed for periods 1998-2005, 2006 to 2010, and 2011 to 2020	Follows the same growth rates to 2020 which are extended to 2030
2	Base Year	1997: The base year was estimated as the weighted average of actual data from 1994-1997	New base year is 2004 estimated as weighted average of actual date from 2002 to 2004
3	Three Forecast Levels	Low, Medium, and High	Same rates will continue with adjustments made to base year of 2004
4	Type of Projections	(a) Major commodity groups (b) Tonnage forecasts for selected waterways (c) Tonnage projections for the entire US. inland waterway System	Assumes national rates of growth are applicable to LA
5	Traffic in Terms of Million Tons	For the total U.S. inland waterway system	Traffic growth is converted to annual rates

Adjustment of Base Year Estimates to 2004

The 1997 base year used by the IWR in 1999 can now be updated to 2004 since the actual data for this period is available. Therefore, the base year for new projections is 2004 for this study, derived as the weighted average of actual data from 2002 to 2004. From this point in this report, projections under low, medium, and high scenarios will begin with the same base year. The growth projections estimated by IWR for the period 2010-2020 will be extrapolated to 2030 under the assumption that similar conditions will continue during this period. A summary of the IWR projections as applied are presented in Exhibit 3-42.

Exhibit 3-42
Comparison of Base Year Traffic
(Actual) and IWR Low, Medium, and High Projections for 2004

Waterway Segment	2004 Base Year Average	IWR Projection Estimates for 2004 (million tons)			Deviation from Actual** (percent)		
		Low	Med	High	Low	Med	High
Lower Mississippi	196.6	191.2	216.7	245.0	-2.7	10.2	24.6
Calcasieu Ship Channel	45.6	42.9	48.1	51.3	-5.9	5.5	12.5
Mississippi R., Mouth of Ohio R. to Baton Rouge	171.8	194.4	220.3	247.5	13.2	28.2	44.1
GIWW- Louisiana Portion	77.7	82.9	92.9	107.6	6.7	19.6	38.4
GIWW- Morgan City Port Allen Route	22.9	28.1	31.5	35.8	22.7	37.4	56.2
Atchafalaya R.- Old River Lock to Morgan City	9.8	10.4	11.7	12.9	6.1	19.8	31.6
Inner Harbor Navigation Canal	18.6	23.9	27.0	30.3	28.5	45.0	63.0

** Derived by dividing the estimate by base year values.

The IWR projections for the period 1998 to 2004 can now be compared to actual data. The projections are significantly higher compared to the observed waterway traffic data as shown by positive deviations in Exhibit 3-42. The new projections are based on actual data for the 2004 base year, derived as the average of actual data for the period 2002-2004. This adjustment will change certain projections. For example, the adjustment will lower the projections for Morgan City-Port Allen Route 22.7% for the low growth scenario and will increase the projections for the Lower Mississippi 2.7% for the low growth scenario. An illustration of the effect of base year adjustment is shown in Exhibit 3-43 for the Morgan City-Port Allen Route.

Exhibit 3-43
An Illustration of the Base Year Adjustment to 2004 Actual Data
Morgan City-Port Allen Route (low growth scenario)

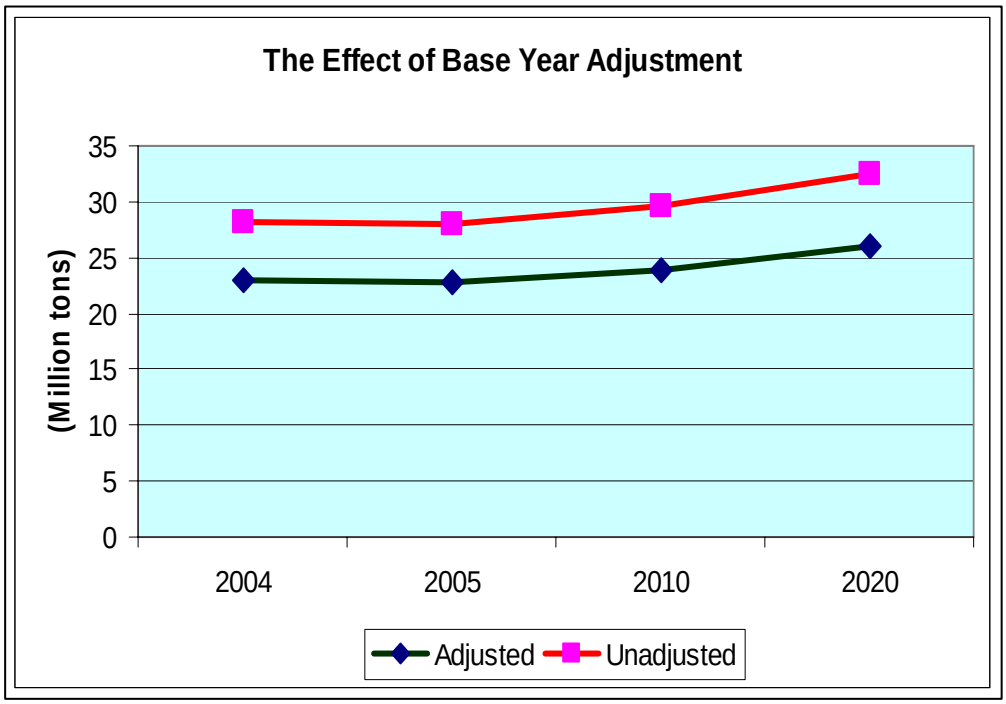


Exhibit 3-44
Estimating Domestic Cargo Projections
An Illustration Using Data for GIWW - Louisiana Portion

Commodity Group	2002 (Million Tons)	Weight (%)	2004 (Million Tons)	IWR Med. Growth Weights (%)			Cargo Projections (Medium Growth-%)			
				2005	2010	2020	2005	2010	2020	2030
	1	2	3	4	5	6	7	8	9	10
Farm Products	1.8	0.0254	2.0	2.3	1.9	1.6	2.0	2.2	2.5	3.0
Metals	3.4	0.0480	3.7	1.6	1.8	1.7	3.8	4.1	4.9	5.7
Coal	2.3	0.0324	2.5	0.7	0.9	1.0	2.5	2.7	3.0	3.2
Crude Petroleum	10.6	0.1495	11.6	0.9	1.0	1.0	11.7	12.3	13.6	15.0
Nonmetallic Minerals	14.4	0.2031	15.8	2.3	1.9	1.5	16.1	17.7	20.0	23.3
Forest Products	0.0	0.0000	0.0	0.5	0.8	0.9	0.0	0.0	0.0	0.0
Industrial Chemicals	12.9	0.1819	14.1	1.5	1.9	2.0	14.3	15.8	19.4	23.6
Agricultural Chemicals	1.3	0.0183	1.4	1.1	1.0	0.9	1.4	1.5	1.6	1.8
Petroleum Products	23.1	0.3258	25.3	0.9	1.0	1.0	25.5	26.9	29.7	32.8
Other	1.1	0.0155	1.2	-1.1	-0.5	0.0	1.2	1.2	1.2	1.2
Total	70.9	1.0000	77.7				78.7	84.4	96.0	109.6

Source: Calculated

3.6.1.3 Rates of Traffic Growth

The preceding section explained the procedure for establishing the base year tonnage for individual waterways. Conceptually, the baseline forms the intercept in a graphic presentation and the slope must be established by determining the annual growth rates for each waterway. The projected growth rates for GIWW-Louisiana Portion, the Lower Mississippi, and Morgan City-Port Allen Route are available directly from IWR estimates (see Exhibit 3-42).

The assumptions and methodology (Exhibit 3-41) for the development of traffic trend lines based on cargo structure are noted below:

- Derive a weighted index value for each commodity group based on its tonnage share with the sum of weights equal to 1.
- Develop the weighted index value based on actual traffic in 2002 (Exhibit 3-44, columns 1 & 2).
- Assign the base year (2004) total tonnage of 77.7 million tons to different commodity groups based on the weights derived in step 1 (Exhibit 3-44,column 3).

- Multiply the tonnage in each individual commodity group by the respective growth rates estimated by the IWR and then combine those amounts to estimate the tonnage of the waterway.

Estimates for medium level cargo projections for the GIWW–Louisiana Portion are shown in Exhibit 3-45a.

3.6.1.4 Domestic Cargo Projections for Major Waterways

A summary of domestic cargo projections derived from the IWR growth projections and from the adjustments described is included in Exhibit 3-45a and 45b, and a graphic presentation of the total trends to 2030 is included as Exhibit 3-46.

Exhibit 3-45a
Domestic Cargo Projections on Major Waterways to 2030

Waterway Segment	Growth	Growth Rates (%)				2004	Cargo Projections (million tons)				
	Levels	2005	2010	2020	2030	Base Yr	2005	2010	2020	2030	2035
Lower Mississippi	Low	-0.5%	0.3%	0.7%	0.7%	196.6	195.6	203.4	218.1	233.8	242.1
	Medium	1.6%	1.6%	1.4%	1.4%	196.6	199.7	216.2	248.5	285.6	306.1
	High	3.7%	2.7%	2.0%	2.0%	196.6	203.9	232.9	283.9	346.1	382.1
Calcasieu Ship Channel	Low	-0.9%	0.1%	0.6%	0.6%	45.6	45.2	45.4	48.2	51.2	52.7
	Medium	1.0%	1.2%	1.2%	1.2%	45.6	46.1	48.9	55.1	62.1	65.9
	High	2.1%	2.2%	1.8%	1.8%	45.6	46.6	51.9	62.0	74.2	81.1
Mississippi River Mouth of Ohio River to Baton Rouge	Low	-0.3%	0.4%	0.8%	0.8%	171.8	171.3	174.7	189.2	204.9	213.3
	Medium	1.8%	1.7%	1.2%	1.2%	171.8	174.9	190.3	214.4	241.5	256.4
	High	3.8%	2.8%	1.5%	1.5%	171.8	178.3	204.7	237.6	275.7	297.1
GIWW-Louisiana Portion	Low	-0.7%	0.2%	0.6%	0.6%	77.7	77.2	77.9	82.7	87.8	90.5
	Medium	1.2%	1.4%	1.3%	1.3%	77.7	78.6	84.3	95.9	109.1	116.4
	High	3.1%	2.5%	1.9%	1.9%	77.7	80.1	90.6	109.4	132.1	145.1
GIWW-Morgan City Port Allen Route	Low	-0.3%	0.9%	0.9%	0.9%	22.9	22.8	23.9	26.1	28.5	29.8
	Medium	1.6%	1.7%	1.3%	1.3%	22.9	23.2	25.3	29.6	34.7	37.6
	High	3.8%	2.5%	2.2%	2.2%	22.9	23.7	26.9	33.4	41.5	46.3
Atchafalaya River Old River Lock to Morgan City	Low	-0.5%	0.3%	0.7%	0.7%	9.8	9.7	9.9	10.6	11.4	11.8
	Medium	1.4%	1.3%	1.2%	1.2%	9.8	9.9	10.6	11.9	13.4	14.2
	High	3.0%	2.3%	1.6%	1.6%	9.8	10.1	11.3	13.2	15.5	16.8
Inner Harbor Navigation Canal	Low	-0.8%	0.1%	0.7%	0.7%	18.6	18.5	18.5	19.9	21.3	22.1
	Medium	1.2%	1.4%	1.3%	1.3%	18.6	18.8	20.2	23.0	26.1	27.9
	High	3.2%	2.5%	2.0%	2.0%	18.6	19.2	21.7	26.5	32.3	35.6
Total Domestic Tonnage on Major Waterways	Low					543.0	540.3	553.7	594.8	638.9	662.3
	Medium					543.0	551.2	595.8	678.4	772.5	824.5
	High					543.0	561.9	640.0	766.0	917.4	1004.1

Exhibit 3-45b
Total Domestic Cargo Projections-Major Waterways

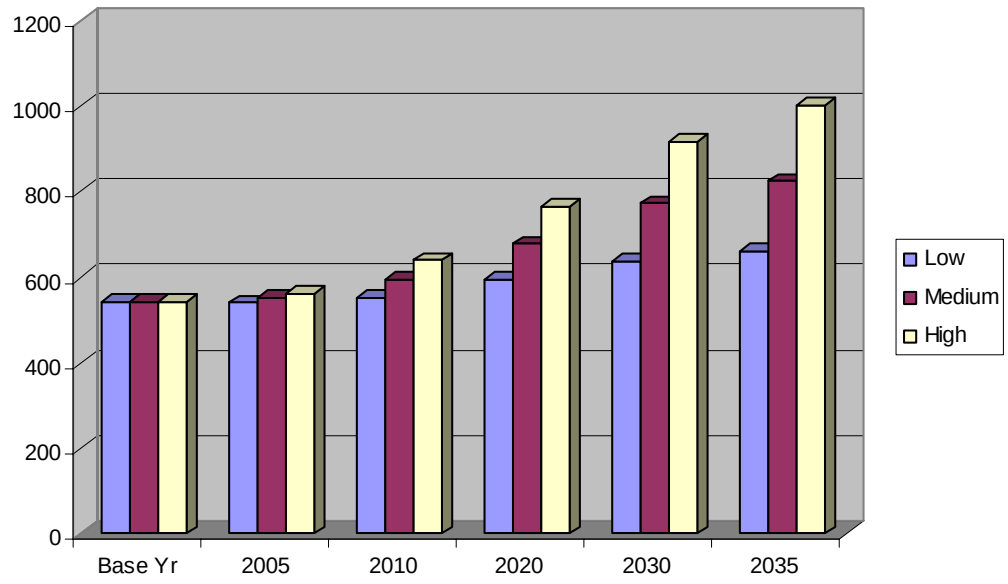
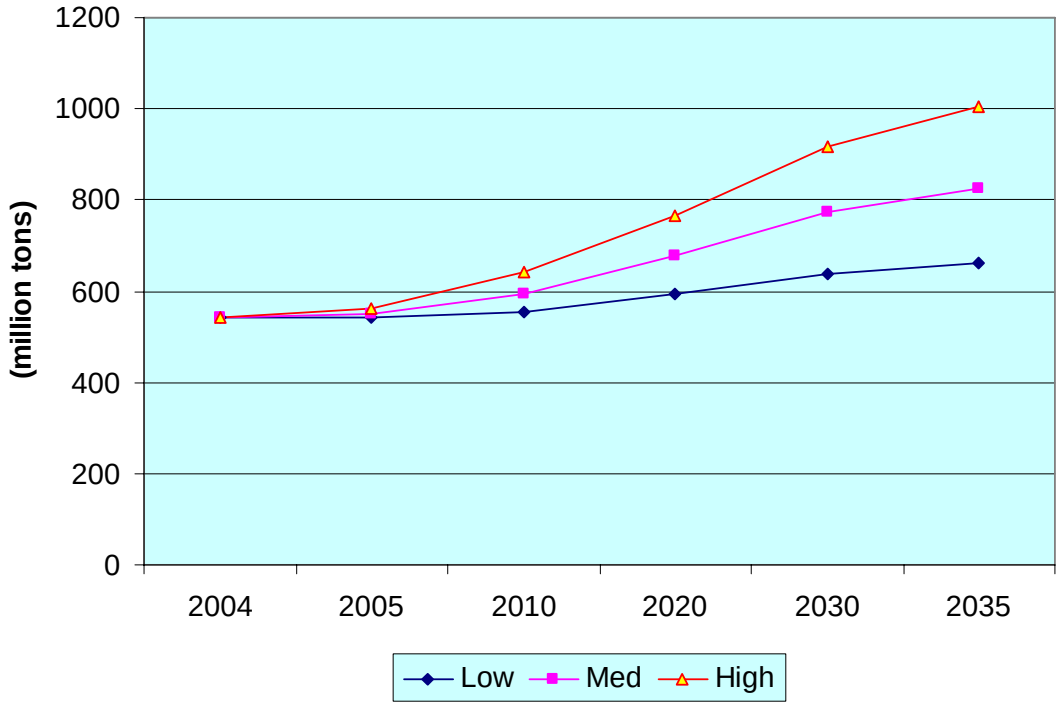


Exhibit 3-46
Domestic Cargo Projections on Major Waterways



The major trends can be summarized as follows:

- Under the low growth projections, the total tonnage is projected to increase by 22% from 543 million tons in 2004 to 638.9 million tons in 2030. This is equivalent to an average annual growth rate of about 0.7%.
- Under the medium growth projections, the total tonnage is projected to increase by 52% for the 25-year period, or an annual growth rate of 1.4%.
- Under the high growth projections, the total tonnage is projected to increase to 1 billion tons (1,004 million), or an increase of 85%, with an annual average growth rate of about 2.1%.

3.6.1.5 Domestic Cargo Projections for Medium Waterways

While the traffic volumes in these waterways are generally limited to local traffic, the traffic structure is also limited to a few commodity groups. The waterborne tonnage on these waterways is less than 5% of the statewide total (Exhibit 3-47). More than two-thirds of the cargo movements consist of non-metallic minerals (including sand and gravel and crushed rocks used as aggregates in concrete) and crude petroleum and petroleum products. The food and farm sector is also important especially for rice and other local produce transport and for the movement of fertilizer as agricultural chemicals.

Exhibit 3-47
Cargo Structure of Waterways with Medium Levels Of Traffic and the Application of IWR Projections (1,000 tons)

Waterway System	2002 Tonnage	Farm Prod.	Metals	Crude Pet.	Non-Met Min.	Agr. Chem.	Petr. Prod.	Other
Red River Waterway below Shreveport	3,708	276	0	211	2324	290	580	27
Ouachita and Black River	1,393	274	0	199	401	151	355	3
MRGO via Venice, Tiger Pass Gulf via Baptiste Collette	3,047	157	602	641	174	0	1463	10
Waterway from Empire to the Gulf	1,398	67	559	412	52	0	286	22
Atchafalaya R. Morgan City to the Gulf	2272	628	301	911	335	0	49	48
Bayou Lafourche	4,220	456	1354	453	1057	91	691	128
Petite Anse, Tigre and Caarlin Bayous, LA	2,210	0	0	218	1989	0	0	3
Bayou Teche and Vermilion River	1564	707	101	291	443	0	12	10
Barataria Bay Waterway	270	0	135	64	55	0	0	16
Houma Navigation Canal	408	0	0	295	91	0	0	21
Freshwater Bayou	961	0	893	69	0	0	0	0
Mermentau River, Bayous Nezpique and Des Cannes	736	152	0	107	358	51	68	0
Total	22,187	2,717	3,945	3,871	7,279	583	3,504	288
Aggregate Weighted Index for Other Waterways	**100.0%**	**12.2%**	**17.8%**	**17.4%**	**32.8%**	**2.6%**	**15.8%**	**1.3%**

Exhibit 3-47 (Continued)
Cargo Structure of Waterways with Medium Levels Of Traffic and the Application of IWR Projections (tons 1,000)

Waterway System	2002 Tonnage	Farm Prod.	Metals	Crude Pet.	Non-Met Min.	Agr. Chem.	Petr. Prod.	Other
Estimating Growth Rates:	Total							
Deriving Growth Rates for period 1998-2005	Growth	IWR Projections for Commodity Groups						
Low	-1.0%	0.0%	-1.8%	-0.6%	0.4%	-1.6%	1.1%	-4.3%
Medium	1.6%	2.3%	1.6%	0.9%	2.3%	1.1%	0.9%	-1.1%
High	3.6%	4.3%	4.5%	2.3%	3.9%	3.5%	2.7%	1.6%
Deriving Growth Rates for period 2006-2010								
Low	0.2%	0.6%	-0.2%	0.1%	0.8%	-0.6%	-0.2%	-2.4%
Medium	1.5%	1.9%	1.8%	1.0%	1.9%	1.0%	1.0%	-0.5%
High	2.6%	3.1%	3.4%	1.8%	2.9%	2.3%	2.0%	1.1%
Deriving Growth Rates for period 2011-2020								
Low	0.6%	0.9%	0.6%	0.5%	0.9%	0.0%	0.3%	-1.1%
Medium	1.4%	1.6%	1.7%	1.0%	1.5%	0.9%	1.0%	0.0%
High	2.0%	2.2%	2.6%	1.4%	2.1%	1.6%	1.5%	0.8%

Sources: WCUS 2002 and IWR 1999 projections

The procedure for estimating cargo projections on medium-traffic waterways is similar to the approach used in the preceding section (see Exhibit 3-41), with one exception. Because of the limited traffic in each waterway, an aggregate weighted index was developed for the whole system and applied to derive statewide cargo projections rather than for individual waterways. The procedure involves the following steps:

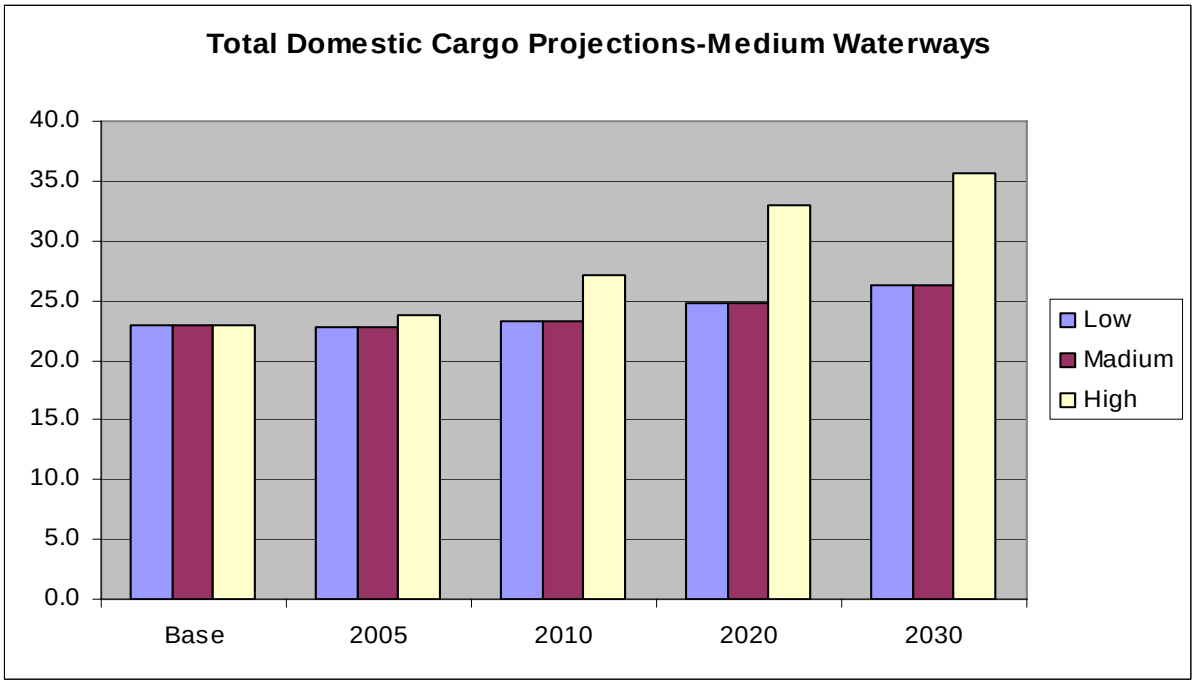
- **Estimating the Aggregate Commodity Index**—The traffic on all waterways was analyzed by individual commodity groups and then combined to develop a weighted index value.
- **Applying the Weighted Index to IWR Growth Rates**—The weighted index from above was multiplied by the IWR growth rates for each commodity and aggregated to derive growth rates for each period.
- **Cargo Projections to 2030**—The growth rate projections (Step 2) were applied to the 2004 base year estimates to develop projections to 2030.

A summary of cargo projections for medium-traffic waterways is presented in Exhibit 3-48a and 48b and is described below.

Exhibit 3-48
Cargo Projections to 2030: Waterways with Medium Levels of Traffic (million tons)

Growth Level	Growth Rates (%/year)			2004 Base	Traffic Projections			
	2005	2010	2020		2005	2010	2020	2030
Low	-1.0%	0.2%	0.6%	23.0	22.8	23.2	24.7	26.2
Medium	1.6%	1.5%	1.4%	23.0	23.4	25.2	28.9	33.2
High	3.6%	2.6%	2.0%	23.0	23.8	27.1	33.0	35.6

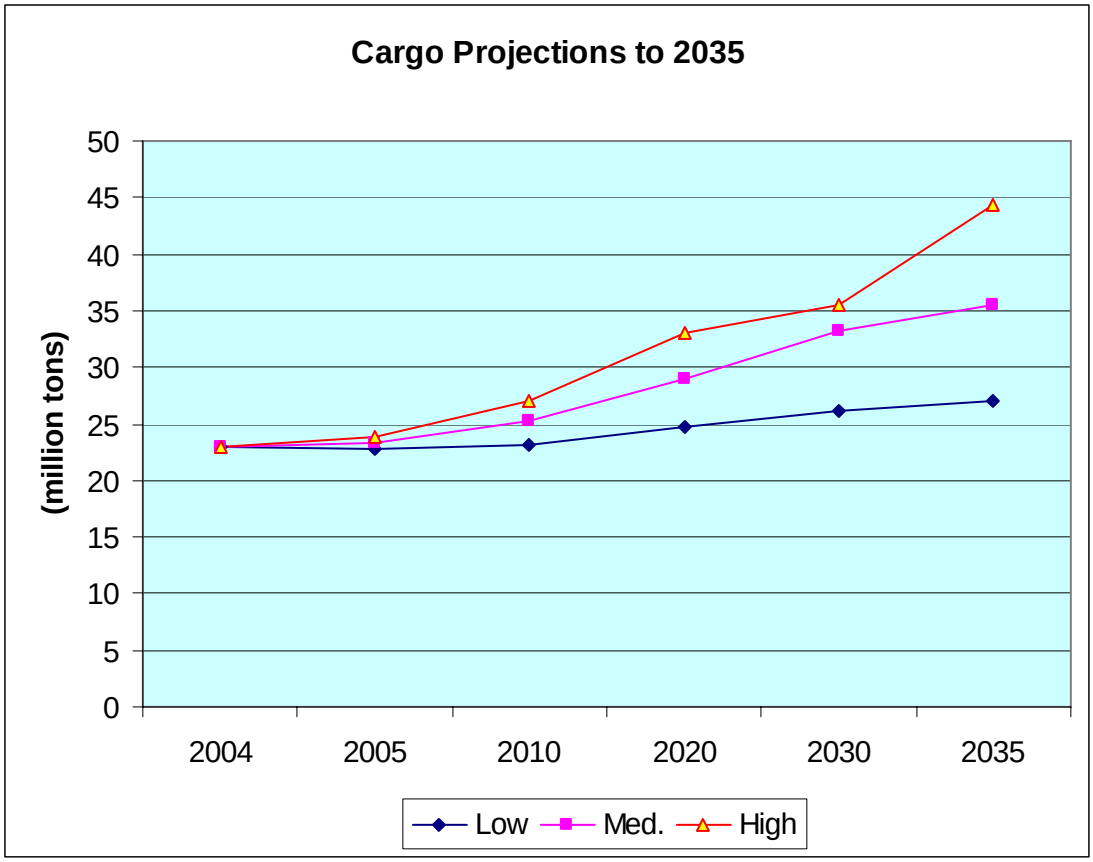
Source: Exhibit 3.4.10



- Under the low growth scenario, total traffic is projected to increase by 17%, equivalent to an average annual growth rate of 0.5% for the total period.
- Under the medium growth scenario, a 55% increase in traffic and average annual growth rate of 1.5% is projected for the total period.
- Under the high growth scenario, an annual growth rate of 2.2% and an overall growth in traffic by 93% is projected for the 30-year period.

The cargo growth trends under various levels of growth are illustrated in Exhibit 3-49. The annual estimates for the waterway system are included in Appendix D Tables.

Exhibit 3-49
Projections to 2035: Waterways with Medium Levels of Traffic



3.6.2 Foreign Trade Projections—An Overview

The variables affecting international shipping are quite different from the variables that influence domestic cargo flows. Unlike the domestic movements that are heavily dependent on the local resource base, the movements for imports and exports are determined by regional, national, and international economic conditions. International trade based on comparative advantage plays a substantial role in the structure and quantities of commodities that enter foreign trade channels. The cycles of economic expansion, the downturns in importing and exporting countries, the trade barriers and tariffs imposed at the borders, the foreign exchange conversion rates, and many other social and political factors determine foreign trade movements.

The Lower Mississippi River from Baton Rouge to the Gulf handled approximately 185 million tons in foreign trade; the Calcasieu Ship Channel, including the public port of Lake Charles, handled approximately 27 million tons in foreign trade.

Domestic versus Foreign Trade Data

Several database definitions and statistical relationships associated with the operational interface between waterborne cargo movements that define domestic and foreign trade are noteworthy and are presented below.

- **The definitions of foreign waterborne and domestic waterborne cargo are different.** The foreign waterborne trade data includes all shipments carried by ocean-going vessels for foreign trade purposes, and the main data source is the U.S. Customs records. The definition of foreign waterborne commerce includes all commodities carried by ocean-going vessels including domestic waterborne movements carried by barges as well as shipments by other modes such as rail, truck, and pipelines. Under this context, domestic waterborne commerce is a subset of foreign waterborne commerce.

- **All domestic waterborne commerce is not for foreign trade.** Domestic waterborne commerce consists of cargo movements for both foreign trade and domestic purposes. This relationship is explained in the 2004 waterborne commerce data reported for the Lower Mississippi River (LMR) (Exhibit 3-50). While the LMR accounted for 188.7 million tons in foreign trade, the domestic movements were 240.6 million tons. A substantial part of the domestic movements are for international trade purposes and this cargo appears twice in the database, first as domestic movements (in the case of exports) and then as foreign exports.

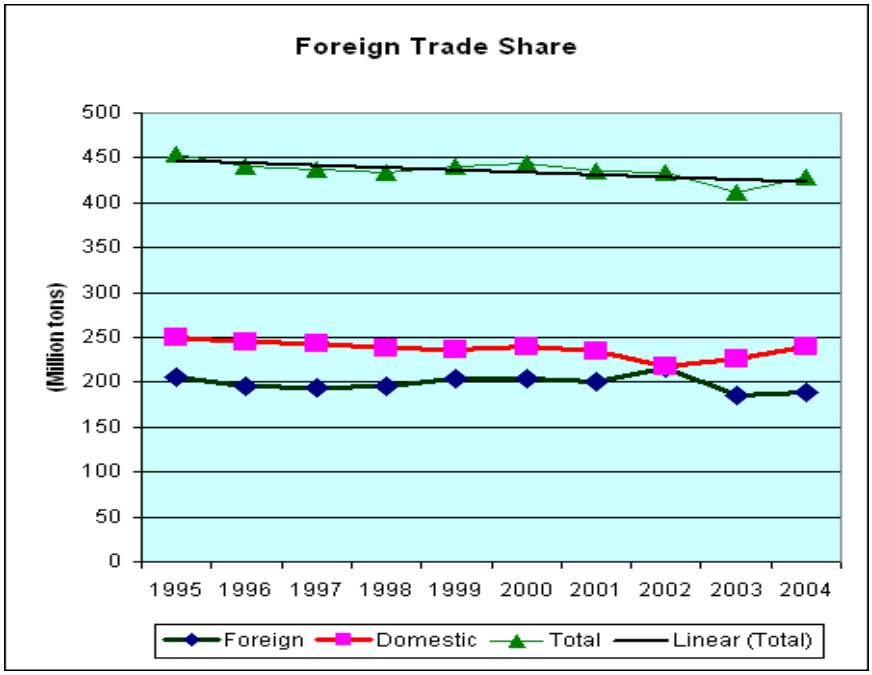
Exhibit 3-50
Lower Mississippi River-Total, Domestic, and Foreign, Trade Data,
1995 - 2004 (million tons)

Year	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Foreign	205	195	194	196	205	204	201	216	186	189
Domestic	250	245	243	238	236	240	235	218	226	241
Total	455	441	437	434	441	445	436	434	411	429
Foreign % of Total	45	44	44	45	46	46	46	50	45	44

- **Inland barge movements play a vital role in foreign trade.** The freight movement analysis (Section 3.0, Exhibit 3-2) indicated that rail and trucks play a very limited role in the state for foreign trade. On this basis, the inland barge movements play a critical role in fostering statewide international shipping.

- **Domestic and foreign trade trends.** In recent years, domestic and foreign trade trends were on the decline. The domestic cargo decline was more pronounced than the foreign trade trends (Exhibit 3-51).

Exhibit 3-51
Lower Mississippi River,
Total, Domestic, and Foreign Trade Trends
1995-2004



- **Few commodity categories dominate foreign trade.** Of the few sectors that dominate foreign trade, the foods and farm sector exports and crude petroleum and petroleum products imports account for 79% percent of the tonnage in foreign trade (Exhibit 3-52).

Exhibit 3-52
Foreign Trade Structure and the Specialized Commodity Groups, 2002 (million tons)

Commodity Group	Lower Mississippi		Calcasieu Ship Channel		Total		
	Tons(mil)	Share(%)	Tons(mil)	Share(%)	Tons(mil)	Share(%)	Cumulative
Food and Farm Products	87.4	47.1%	0.5	1.7%	88.2	41.5%	41.5%
Crude Petroleum and Petroleum Products	55.4	29.9%	24.2	89.1%	79.2	37.3%	78.9%
Chemicals and Related Products	13.0	7.0%	0.7	2.6%	13.7	6.5%	85.3%
Crude Materials Inedible		0.0%		0.0%			
Except Fuels	13.5	7.3%	1.5	5.5%	14.9	7.0%	92.3%
Primary Manufactured Goods	13.1	7.1%	0.0	0.0%	13.8	6.5%	98.8%
Coal	2.0	1.1%		0.0%			
Miscellaneous	1.0	0.5%	0.3	1.1%	2.5	1.2%	100.0%
2002 Foreign Trade Total	185.4	100.0%	27.2	100.0%	212.3	100.0%	

Source: WCUS, 2002

- **Different commodity sectors are affected by widely different conditions.** Different sectors respond to quite different variables. The U.S. food and farm sector plays the role of residual food supplier to food deficit countries, while oil imports depend on energy requirements of the nation. Therefore, the projections have to be sector-specific.

3.6.2.1 Approach and Methodology

Two main approaches are used in estimating long-term foreign trade projections. They include projections by federal agencies and extrapolation of past trends.

1. Projections developed by federal agencies for food and farm products, energy related crude petroleum, petroleum products, and coal, the projections developed by the U.S. Department of Agriculture and the Energy Information Administration of the U.S Department of Energy are used. While more than 80% of the foreign trade is covered under the above categories, the projections developed by these two agencies are also widely accepted by the research community. A summary of the methodologies and the sources used are described in Exhibit 3-53.

2. Extrapolations of past trends are for the remaining sectors that include approximately 20 percent of the total trade. Projections were developed based on past foreign trade trends for three specific sectors. Foreign trade tonnages handled through the New Orleans Customs District from 1996 to 2005 were used to estimate the trends. Although data for longer periods were available, they were not used because the pre-1996 conditions were substantially different compared to current conditions.

Exhibit 3-53
Summary of Databases Used in Estimating Foreign Trade Projections

Commodity Group	Total* Tonnage (millions)	Cumulative Share of Trade (%)	Data Sources for Projections
Food & Farm Products	88.2	41.5	Based on Agricultural Baseline Projections of Exports to 2016 and extrapolation of trends to 2035 U.S. Department of Agriculture
Crude Petroleum	56.4	68.1	Based on U.S. Energy Information Administration Projections to 2030. Separate Projections for Crude, Petroleum Products and Coal.
Petroleum Products	23.2	79.0	
Coal	2.2	80.0	
Crude Materials Inedible Except Fuels	13.5	86.4	Based on Import data of these commodities through New Orleans Customs District for the period 1996 to 2004. Trade data obtained U.S. International Trade Commission Dataweb. www.usitc.gov
Chemicals and Related Products	13.0	92.5	
Primary Manufactured Goods	13.1	98.6	
Miscellaneous	2.7	100.0	
2002 Foreign Trade Total	212.3	100.0	

Source : WCUS 2002, * Totals may not add-up due to rounding

3.6.2.2 Foreign Trade Projections to 2030

A summary of foreign trade projections utilizing medium growth rates for the next 25-year period is described below and is included in Exhibit 3-54a and 3-54b.

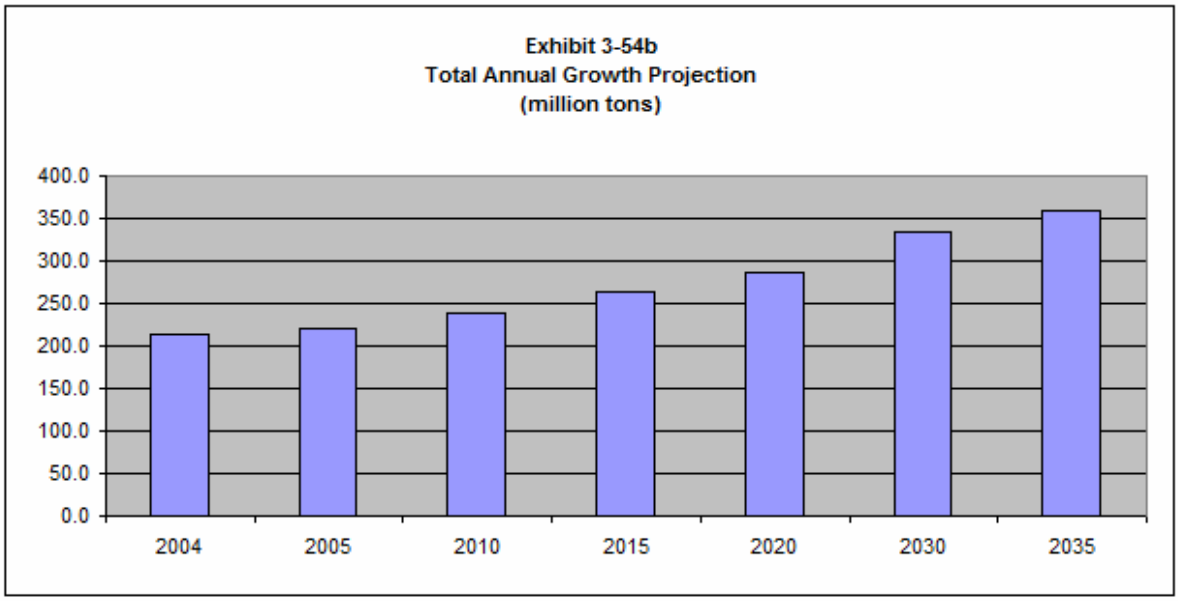
Exhibit 3-54a

Summary of Annual Growth Projections for Foreign Trade, Statewide System 2004 to 2035 (million tons)

Commodity Group	Annual Growth Rates					Cargo Projections						
	2005	2010	2015	2020	2035	2004 Base	2005	2010	2015	2020	2030	2035
Food and Farm Products	See note (1)					79.0	81.8	83.9	87.2	91.8	102.3	108.4
Crude Petroleum	3.7%	0.3%	0.8%	1.2%	1.2%	50.0	51.9	52.7	54.8	57.0	62.6	66.4
Petroleum Products	4.3%	2.4%	2.4%	2.8%	2.0%	32.2	33.6	37.8	43.0	48.7	62.2	68.7
Crude Materials	2.6%	2.6%	2.6%	2.6%	2.6%	16.7	17.1	19.0	21.1	22.5	24.3	25.0
Chemicals and Prod.	3.3%	3.3%	3.3%	3.3%	3.3%	16.3	17.5	23.4	32.1	38.3	48.5	53.1
Primary Manuf. Goods	4.6%	4.6%	4.6%	4.6%	4.6%	12.6	13.2	15.8	19.3	21.6	25.0	26.5
Coal	10.0%	-8.0%	-3.0%	9.0%	7.0%	3.8	4.2	2.9	2.5	3.8	5.9	6.7
Other	4.6%	4.6%	4.6%	4.6%	4.6%	2.2	2.2	2.7	3.2	3.6	4.3	4.6
Total						212.8	221.5	238.2	263.2	287.3	335.1	359.4

Notes:

1 Food and Farm product projections are derived by adding together individual crop estimates.



Food and Farm Products

The projections for this category were estimated using export projection estimates for individual crops and adding them together. The total growth in this sector for the 25-year period (from 79 million tons to 108.4 million tons) is approximately 27%, equivalent to an average annual growth rate of about 1.1%. Public policies controlling crop acreage and promoting forest conservation to control soil erosion, etc., are responsible for the slow growth.

Crude Petroleum and Petroleum Products

The overall projected increase in crude petroleum for the 25-year period is approximately 25% (from 50m tons to 66.4m tons, equivalent to an annual average growth rate of 1%. Petroleum products imports increase by 53% with an annual growth rate of 2% for the 25-year period.

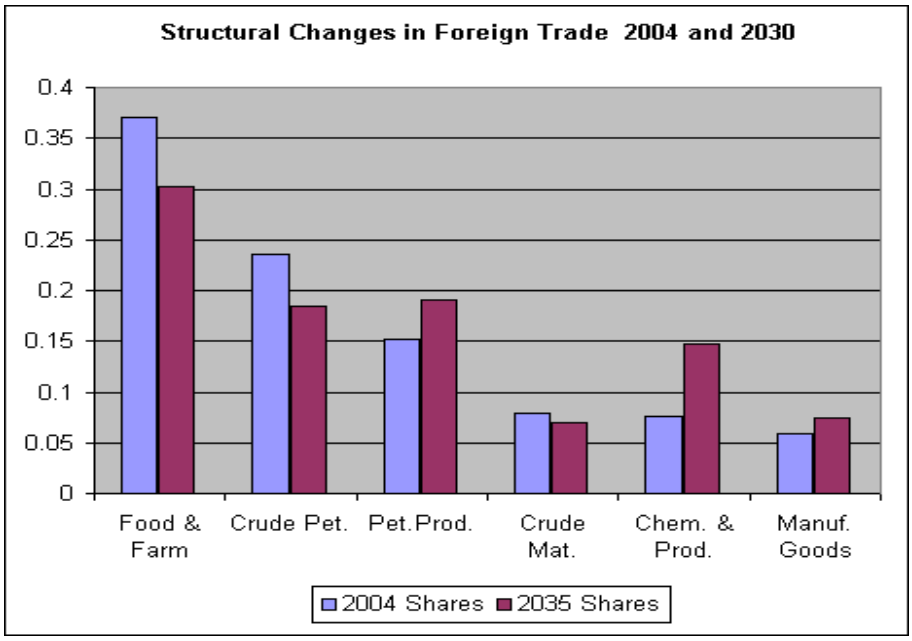
Overall, the total foreign trade volumes increase by 59% from 212.8 million tons in 2004 to 359.5 million tons in 2030. The structural changes in the commodity structure are shown in Exhibit 3-55 (% change by shares) and illustrated in Exhibit 3-56.

Exhibit 3-55
Structural Changes in Foreign Trade by Commodity Groups 2004 and 2030

Commodity Group	2004		2030		% Share Change
	Tons	Shares	Tons	Shares	
Food and Farm Products	79.0	37.1%	108.4	30.2%	-7.0%
Crude Petroleum	50.0	23.5%	66.4	18.5%	-5.0%
Petroleum Products	32.2	15.1%	68.7	19.1%	4.0%
Crude Materials	16.7	7.8%	25.0	7.0%	-0.9%
Chemicals and Prod.	16.3	7.7%	53.1	14.8%	7.1%
Primary Manuf. Goods	12.6	5.9%	26.5	7.4%	1.5%
Coal	3.8	1.8%	6.7	1.9%	0.1%
Other	2.2	1.0%	4.6	1.3%	0.2%
Total	212.8	100.0%	359.4	100.0%	0.0%

Source: Exhibit 3.4.17

Exhibit 3-56
Structural Changes in Statewide Foreign Trade 2004 and 2030



3.7 Total Cargo Projections

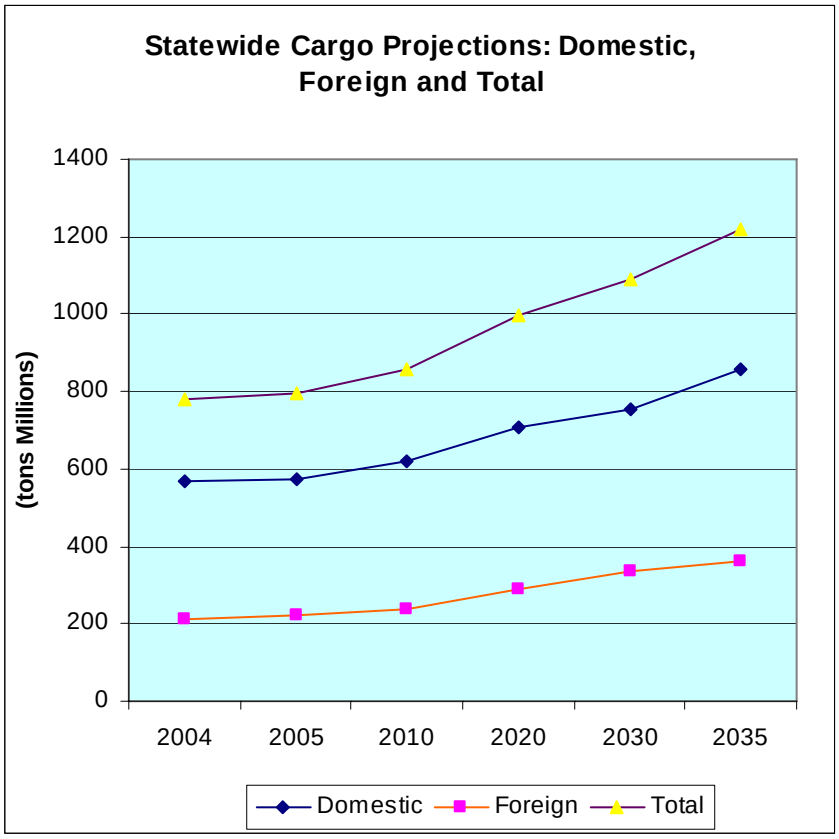
In summary, the domestic and foreign trade projections were developed for the 30-year period from 2004 to 2030, and the statistical tables presented in Appendix D are an integral part of understanding the procedural details and other information used to develop these projections.

The aggregate cargo projections including both domestic and foreign movements are presented in Exhibit 3-57 as a concluding summary. However, the data must be interpreted with caution since total tonnage data is repeated as movements pass through several waterway segments. Based on the assumption that these replications are constant over time, the projections indicate the magnitude of change in waterborne activities over the period. While the total waterborne cargo growth for the 25-year period is 40.2%, the domestic and foreign cargo sectors are projected to grow by 33.5% and 57.9% respectively. The trends of growth for different sectors, domestic and foreign, and the total growth trend are illustrated in Exhibit 3-58.

Exhibit 3-57
Summary of Statewide Cargo Projections: Total Domestic and Foreign (million tons)

Waterway Category	Base Year	Cargo Projections				2004-2030
and Data Source	2004	2005	2010	2020	2030	Change(%)
Domestic Trade						
Major Waterways (Exhibit 3-45a)	543.0	551.2	595.2	678.4	722.5	33.1%
Other Waterways (Exhibit 3-47)	23.0	23.4	25.2	28.9	33.2	44.3%
Total Domestic	**566.0**	**574.6**	**620.4**	**707.3**	**755.7**	33.5%
Foreign Trade						
Foreign trade (Exhibit 3-52)	212.3	221.5	238.1	287.3	335.3	57.9%
Total Domestic and Foreign	**778.3**	**796.1**	**858.5**	**994.6**	**1091.0**	40.2%

Exhibit 3-58
Domestic, Foreign, and Total Statewide Cargo Projections
2004-2035 (million tons)



4.0 ASSESSMENT OF ECONOMIC IMPACTS: AN OVERVIEW

The statewide waterway system yields multiple benefits as both an ecological resource and as a commercial navigation network. It provides a substantial contribution to the state's overall economic health as well as supports the nation's petroleum, farming, and fisheries products needs. Clearly, it has imposed a strong imprint on the state's economy.

The focus in this section is to provide an assessment of the economic impacts of the system mainly concentrating on the commercial and recreational navigation aspects. An accurate measurement of these benefits is beset with several challenges, primarily that of defining the economic components of the statewide network and segregating economic impacts to identify them as navigation benefits.

The basic framework for the economic impact assessment is as follows:

- Reviewing a full range of theoretical concepts of economic impact assessment
- Defining and describing the national and state maritime transportation systems (MTS) and its components
- Selecting a subset of maritime-related businesses from a published database of businesses in the state
- Estimating economic impacts of the industry using employment, payroll, and sales revenue data from that subset according to the accepted procedures developed by the U.S. Bureau of Economic Analysis (*Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS II).* Economics and Statistics Administration, Bureau of Economic Analysis, U.S. Department of Commerce, March 1997)

4.1 The National Network

4.1.1 Principal Components and Stakeholders

The statewide waterway network is a part of the national maritime transportation system (MTS) drawing strength from a combination of large-scale physical, institutional, and operational systems. It includes yet is not limited to the following (*An Assessment of the Marine Transportation System*, U.S. Department of Transportation. September 1999):

- The system of **waterways** includes locks and dams, bridges, navigational aids, and user regulations, as well as a tariff structure, which make the system commercially operational. The national network includes roughly 25,000 miles of waterways and

192 commercially active lock sites with 238 lock chambers. The Mississippi River, along with its main tributaries and the GIWW, connect inland ports to international shipping operations on the waterway segment from Baton Rouge to the Gulf. This inland waterway network carried more than 600 million tons in 2002. The combined operations of loading and unloading of inland barges, storage, and cargo transfers to ocean-going vessels have created one of the busiest and most productive waterway systems in the world, with one of the busiest segments of the system being the Baton Rouge to the Gulf segment.

- **Port terminals** are nodal points where freight and passenger transfers take place. The U.S. port system handles more than 2 billion metric tons of foreign and domestic cargo annually and can be classified into three categories. The inland and intracoastal ports, which are served by shallow-draft waterway segments, account for 1,800 terminals distributed across 21 states. The terminals for the U.S., the Mississippi River system (of which Louisiana is a part), and for Louisiana are classified by the types of cargo handled which are presented in Exhibit 4-1. While 59% of the U.S. terminals are dry-bulk facilities, mainly handling grain and coal, 27% are liquid-bulk terminals. Louisiana's share of the U.S. inland and Intracoastal port terminals is 3.6%. Other port categories are the sea ports with access channels of 25 feet of depth or more and the Great Lakes port system.

Exhibit 4-1

Inland and Intracoastal Port Terminals Classified by Use: U.S. Total and Louisiana Share

Terminal Location	Total	General	Dry-Bulk				Liquid-Bulk			Multi
		Cargo	Grain	Coal	Ore	Other	Petrol	LNG	Other	Use
U.S. Total	1812	70	271	238	8	551	265	4	215	190
Mississippi River System	1748	61	244	238	8	533	263	4	210	187
Louisiana	66	1	8	2	0	12	19	1	14	9
LA Share of U.S. Total	3.6%	1.4%	3.0%	0.8%	0.0%	2.2%	7.2%	25.0%	6.5%	4.7%

Source: An Assessment of the Marine Transportation System, U.S. Maritime Administration, 1999.

- A system of well-integrated **intermodal connections** is critical for efficient functioning of a maritime transportation system. The nation's maritime system is integrated with rail which consists of approximately 1.3 million freight rail cars and 20,000 locomotives operating on 152,000 miles of track. A 200,000 strong workforce is responsible for daily operations. A part of the nation's 5-million strong truck fleet also provides coordinated movements combining the highway and waterway networks.

- Different **specialized vessel configurations** equipped to handle international shipments such as fully cellular container ships, roll-on-roll-off vessels, bulk carriers, tankers, etc., and an inland barge fleet connecting interior land-locked locations with world markets are another asset of the system. In 1999, a fleet of 55 U.S. owned container ships, 104 tankers, 982 dry cargo barges, and 456 tank barges were available to support international shipping. In addition, 7,520 vessels, or 27% of the world merchant fleet, called on U.S. ports in 1999. In terms of capacity, the number of vessel calls accounts for 44% of the world shipping capacity. This trend has remained unchanged because the underlying industry conditions have remained unchanged.

- Comparison of **vessel calls** among the nation's top 25 ports (Exhibit 4-2) indicates that while 22% of all vessel calls to the U.S. were container vessels, the number of container vessels calling on Louisiana was only 5%, indicating that Louisiana ports handled mostly non-containerized cargo. The size of the container vessels was also examined in terms of dead weight tonnage (DWT). The results indicated that the national average weight of a container vessel was 33,000 DWT, while the container vessels calling on Louisiana averaged 25,000 DWT. For Houston, the corresponding value was 32,000 DWT. Only the Houston port and the ports at New Orleans and Lake Charles were used in this comparison because of their proximity to the Gulf and the similarity in vessel calls.

Exhibit 4-2

Vessel Calls Analysis: Port of Houston, Louisiana Ports and the U.S. Total

Port	Vessel Type and Number of Calls				
	Tankers	Dry-Bulk	Container	Other	Total
U.S. Total	20,584	14,481	16,930	25,858	77,853
Houston	3,450	807	515	2,031	6,803
Louisiana Ports	2,198	3,472	399	1,513	7,612
	Percentage Share				
U.S. Total	26%	19%	22%	33%	100%
Houston	51%	12%	8%	30%	100%
Louisiana Ports	29%	46%	5%	20%	100%

Louisiana ports include New Orleans and Lake Charles

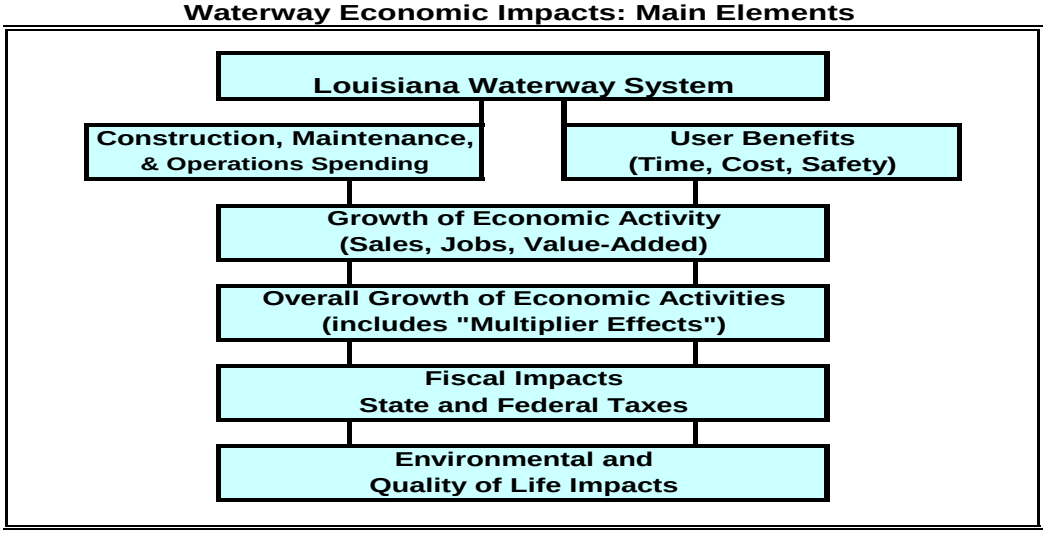
Source: Lloyd's Maritime Information Service, Vessel Movements, London

- Other important stakeholder groups are the shippers and the employees who make a living working in waterway-related industries. Additionally, stakeholders include recreational users of waterways, ferry passengers, and the commercial fisheries industry.

4.1.2 Identifying Economic Impacts

With the state's navigable waterway system defined, construction, maintenance, and operations spending along with user benefits were identified and combined. These factors were then incorporated as a function of jobs, sales, and value added components. Overall functions were then viewed relative to conservative multiplier effects wielding fiscal impacts which include state and federal taxes. A graphic representation of this approach highlighting the basic procedures followed in identifying and defining economic benefits of the waterway system in both qualitative and quantitative terms is shown in Exhibit 4-3.

Exhibit 4-3
Waterway Economic Impacts: Main Elements



Source: Adapted from *Transportation Research Circular Number 477* Assessing the Economic Impact of Transportation Projects, TRB, Washington, D.C. (www.TRB.org).

4.1.3 Identification of Construction, Maintenance, and Operations Spending

The elements included in this section are the physical facilities of the waterway system as described in the preceding section. The network of waterways, locks and dams, and related infrastructure is of special interest because they are external resource infusions into the state economy. The data for the estimates were collected from the budget allocations to the USACE New Orleans District. As the budget guidelines for each project specify the level of local participation (local share varying from 0-50%), it is possible to estimate both types of funds. According to a March 17, 2004, news release, the total spending by the USACE New Orleans District Office was estimated to be $400 million in 2004 which includes flood control, environmental restoration, and operation and maintenance of navigable waterways. Spending for operation and maintenance by the Vicksburg District Office for the parts of the Red and

Ouachita rivers was estimated to be $15 million in 2004. However, only 50% of the USACE spending, or $209 million, was related directly to navigation needs.

4.1.4 The Role of Economic and Social Benefits

The valuation of commercial navigation and the benefits of handling approximately 500 million tons of freight is an important task. Most of these benefits are included in the estimates of employment and other benefits. However, the waterway system yields the following social benefits to the state and the nation.

Barge transportation is the most energy efficient mode of transport with a gallon of fuel carrying one ton of cargo 514 ton/miles, compared to 59 ton/miles by truck and 202 ton/miles by rail (Inland Rivers Ports and Terminals Association, www.irpt.net). If the 215.4 million tons of waterborne cargo on the Lower Mississippi that logged in 18,383 million ton-miles in 2004 had been handled by rail, it would have cost the nation an additional 55 million gallons of fuel and substantial social costs by way of accidents and environmental damage. For example, the following is a comparison of the accident costs for barge and rail transport (*Paying Our Way: Estimating Marginal Social Costs of Freight Transportation.* Special Report, TRB, National Academy Press, Washington, D.C. 1996):

Fatal Accidents	
Cost of Fatal Accident	$2.3 million
Rail Accident rate /million ton miles	0.001
Barge Accident rate/million ton miles	0.00006
Cost difference for 18,383 million ton miles	(18383 × .001) - (18383 × .000006) × $2.3M
Cost Difference	$42.07 million
Non Fatal Accidents	
Cost per non-fatal accident	$46,000
Rail Accident rate /million ton miles	0.02
Barge Accident rate/million ton miles	0.000018
Cost difference for 18,383 million ton miles	(18383 × .02) - (18383 × .000018) × $46,000
Cost Difference	$16.75 million
Fuel Cost Savings	
Fuel Savings estimate	55 million Gallons
55 million gallons @ $2.00/gallon	$110 million
Total Cost Savings	
Fuel Savings	$110 million
Fatal Accidents	$42.07 million
Non –Fatal Accidents	$16.75 million
Total	**$168.82 million**

Although, the environmental costs of burning 55 million gallons of fossil fuels are substantial, these costs are not included because of the complexities involved in estimating economic costs of exposure of humans and property to these air pollutants. Therefore, this estimate is considered conservative.

4.2 Approach and Methodology

Because of the widespread spatial distribution of the waterway system in the state, a statewide database containing business establishments was used to estimate the **direct impact** of waterway-related industries in the state. These direct impacts form the basis for which the **indirect** and **induced** impacts are determined later in this section.

Several sources for business-related information were explored for this purpose. These sources include the Dunn & Bradstreet database administered by HarrisInfo, the U.S. Bureau of Labor Statistics (BLS), the U.S. Census Bureau (CB), the Louisiana Department of Labor (DOL), and the Louisiana Department of Revenue.

The HarrisInfo data is the primary source used for assessment of water-dependent businesses along each waterway. The limitation of this data set is that only businesses with 20 or more employees are considered. To determine the percentage of establishments and employees that account for businesses with less than 20 employees, multipliers were established and applied to the HarrisInfo. The multipliers were based on the distribution of employees within small businesses in the state (Department of Labor statistics) and are summarized in Exhibit 4-4.

Exhibit 4-4
Methodology Used to Determine Multipliers for Number of Employees and Number of Establishments for Businesses with Less than 20 Employees

Step #1		
Average No. Employees	No. of Establishments*	% of Total
1	13,985	0.12
3	48,385	0.42
7	22,255	0.19
15	14,391	0.12
>20	16,288	0.14
Total	115,304	1
Step #2		Ratio (Firms Multiplier)
For every 16,288 firms with greater than 20 employees:		1
	13,985 firms with 1 employee	1 to 1
	48,385 firms with 3 employees	3 to 1
	22,255 firms with 7 employees	1 to 1
	14,391 firms with 15 employees	1 to 1
Step #3		
Average No. Employees	No. Firms Multiplier	No. Employee Multiplier
1	1	1
3	3	3
7	1	7
15	1	15
>20	1	20
Total	7	52
Summary: 52 divided by 20 = 2.6; therefore, for every 1 firm with greater than 20 employees, there are 7 smaller firms with 2.6 x 20 employees (=52)		

2001 Bureau of Labor Statistics

For final analysis of waterway related business, the HarrisInfo data was evaluated with respect to other available data and statistics published by BLS, CB and DOL for scale comparisons.

The following steps were applied to the HarrisInfo data to determine waterway dependent businesses associated with each major waterway:

- The entire data set (statewide) was overlaid onto a state map depicting major waterways included in this study.
- All industries within one half-mile of each waterway shoreline were selected.

- Data tables were generated to include these industries by waterway.
- This data was then filtered to include only applicable industry types within two-digit NAICS codes (see "**NOTE**" below) relevant to waterway-related industries. The dataset includes the number of establishments, number of employees, and salaries within each NAICS code utilized.
- From this point, approximately 1,000 industries used are within 41 NAICS sectors, and within one half mile of each navigable waterway defined as navigable in Section 2.0.
- Business information extracted from the HarrisInfo database was validated by way of a 2% sample of the business population identified. Sample findings indicated a 100% verification factor signifying that all recognized businesses were water dependent within the designated location range.
- Overall economic analysis is based on the average usage and average corporate sales from the CB.

NOTE: Waterway related businesses were selected using the North American Industry Classification System (NAICS) of 3 to 5 digit codes. Of more than 4,000 NAICS codes available, 41 from within the eight major sectors (2-digit codes) were selected based on relevance to waterway dependent industries. Most of the NAICS selected (such as crop production, chemical manufacturing, etc.) involve the direct transfer of these goods and products via the waterway system. Other NAICS cases that were selected support the movement and handling of goods and products along the waterways such as warehousing, fish processing, and ship building. The NAICS sectors selected are listed and described in Table 4-1. A review of the descriptions for each of the codes is included to indicate their relevance to water-dependent businesses.

Based upon information generated, state sales taxes and revenues to the state were determined. The economic impacts of these establishments in terms of jobs, personal earnings, business revenue, and state and federal taxes are included as direct benefits of the statewide waterway system. The process used in the impact evaluation is presented below.

4.3 Valuation of Economic Activity

The total economic impacts of the waterway system on the state economy were estimated based on the direct impacts created by the noted subset of waterway-dependent industries. All employment, payroll, and tax revenues from the direct impact of these businesses are assumed as a function of the waterway system because, in the absence of the waterway system, the respective establishments would not be located where they are. Key variables used in estimating

Table 4-1: NAICS Codes Descriptions to Define Waterway Businesses Selected

Industry Group	Major NAICS Code	Industry Specific	Secondary NAICS Code	NAICS Sector Description	Relevance to Waterway
Agriculture, Fishing, Forestry, and Hunting	11	Oilseed and Grain Farming	1111	Includes crop production of soybeans, oilseeds (except soybeans), wheat, corn, and rice	Transfer of grain/farm products via waterways
		Other Crop Farming	1119	Includes crop production of tobacco, cotton, sugarcane, and hay; also other crop farming such as sugar beets, peanuts, other miscellaneous crop farming	Transfer of grain/farm products via waterways
		Timber Tract Operations	1131	Long-term timber farms	Transfer of raw timber via waterways
		Logging	1133	Logging	Transfer of raw timber via waterways
		Fishing	1141	Finfish, shellfish, miscellaneous marine products	Commercial fishing ondustry
Mining	21	Oil and Gas Extraction	2111	Crude petroleum and natural gas, natural gas liquids, industrial organic chemicals (recovering sulfur from natural gas)	Transfer of products via waterways
		Coal Mining	2121	Bituminous coal and lignite surface mining, bituminous coal underground mining, anthracite mining	Transfer of products via waterways
		Metal Ore Mining	2122	Iron ore, gold ore, silver ore, lead and zinc ore, copper ore, ferroalloy ores except vanadium, and uranium-vanadium-radium ores	Transfer of products via waterways
		Nonmetallic Mineral Mining and Quarrying	2123	Stone mining and quarrying, dimension stone and crushed and broken limestone mining and quarrying, crushed and broken granite mining and quarrying, sand, gravel, clay, and ceramic refractory minerals mining, construction sand and gravel mining, potash, soda, and borate minerals, phosphate rock, other miscellaneous nonmetallic minerals	Transfer of products via waterways
		Support Activities for Mining	2131	Drilling oil and gas wells, oil and gas field exploration services, oil and gas field services (except construction), coal mining services (except construction), metal and nonmetallic mining services (except site preparation)	Transfer of products via waterways
Manufacturing	31-33	Grain and Oilseed Milling	3112	Flour and rice milling, malt manufacturing, starch and vegetable Fats and oils manufacturing, corn milling, soybean processing, other oilseed processing, fats and oils refining and blending, breakfast cereal manufacturing	Transfer of products via waterways
		Sugar and Confections Product Manufacturing	3113	Sugar manufacturing, sugarcane mills, cane sugar refining, beet sugar refining, chocolate/nonchocolate and confectionary manufacturing	Transfer of products via waterways
		Fresh & Frozen Seafood Processing	3117	Seafood product preparation and packaging, seafood canning, fresh and frozen seafood processing.	Transfer of products via waterways
		Sawmills and Wood Preservation	32111	Sawmills and planing mills, hardwood dimension and flooring mills, special product sawmills, wood preserving	Transfer of products via waterways
		Other wood Product Manufacturing	3219	Manufactured home manufacturing, prefabricated buildings	Transfer of products via waterways
		Pulp Mills	3221	Pulp mills, paper mills, newsprint mills, paperboard mills	Transfer of products via waterways
		Petroleum and Coal Products Manufacturing	324	Petroleum refineries, asphalt paving, roofing, saturated materials manufacturing, lubricating oils and greases, other petroleum and coal products	Transfer of products via waterways
		Chemical Manufacturing	325	Basic chemical manufacturing, petrochemical and industrial gas manufacturing, synthetic dyes and pigments, alkalis and chlorine, carbon black, all other industrial organic chemicals. Gum and wood chemicals, cyclic crude and intermediate, ethyl alcohol, fertilizers, pesticides, agricultural chemicals, painting, coating and adhesives, soap and detergents, all other miscellaneous chemical product and preparation manufacturing.	Transfer of products via waterways
		Plastics and Rubber Mfg.	326	plastics, foils, plastic bags, plastic pipe and fittings, plastics profile shape manufacturing, polystyrene, urethane, and other foam product manufacturing, plastic bottles, floor coverings, tires rubber and plastic hoses and belting, all other rubber products manufacturing	Transfer of products via waterways
		Nonmetallic Mineral Products	327	Clay products, pottery, plumbing fixtures, porcelain electrical supply, brick and structural clay tiles, glass and glass products, cement manufacturing, lime manufacturing, gypsum products, abrasives products, cut stone and stone products, mineral wool	Transfer of products via waterways
		Primary Metal Manufacturing	331	Iron and steel mills, rolling and drawing of steel, alumina and aluminum production, smelting and refining (nonferrous, copper), steel, copper, and aluminum foundries	Transfer of products via waterways
		Pre-fab Metal Mfg.	3323	Prefabricated metal buildings, fabricated structural metal, metal door and window frames, sheet metal	Transfer of products via waterways
		Agricultural Construction, and Mining Machinery	3331	Farm machinery and equipment, cotton ginning machines, lawn and garden equipment, construction machinery, mining and oil and gas field machinery	Transfer of products via waterways
		Ship and Boat Building	3366	Ship and boat building and repairs (except repair in floating dry-docks)	Support to vessels and watercraft using waterways
Wholesale Trade	42	Grocery and Related Product	4244	General line groceries, packaged frozen food, dairy and poultry products, fish and seafood, meat, fresh fruit and vegetables	Fish and seafood, poultry industry are big users to transport product; wholesalers selling at market.
		Farm Product and Raw Material Merchandise	4245	Grain and field bean merchant, livestock merchant	Raw product from producer to markets.
		Chemical Merchants	4246	Chemical and allied products	Raw product from producer to markets.
		Petroleum Merchants	4247	Petroleum and petroleum products-bulk stations and terminals	Raw product from producer to markets.
Retail Trade	44	Specialty Food Stores	4452	Poultry, meat, fish, seafood (including freezer provisionary) markets, fruit and vegetable, and bake goods markets	Finished product sales-within 1/2 mile of waterway
		Direct Selling Establishments	4543	Fuel dealers, heating oil dealers, bulk station and terminals (sold to final customer), bottled gas	Finished product sales-within 1/2 mile of waterway
Transportation and Warehousing	48-49	Rail Transportation	4821	Railroads, line-haul operating, railroad switching and terminal establishments	Intramodal transfer, support to waterway transfers
		Water Transportation	483	Deep-sea, coastal, and Great Lakes transportation and freight, ferries	Directly related to waterways
		General Freight Trucking	4841	Local and long distance, general freight	Intramodal transfer, support to waterway transfers
		Pipeline Transportation Crude Oil	4861	Crude oil, natural gas	Intramodal transfer, support to waterway transfers
		Pipeline Transportation of Natural Gas	4862	Natural gas transmission and distributoin	Intramodal transfer, support to waterway transfers
		Other Pipeline Transportation	4869	Refined petroleum products.	Intramodal transfer, support to waterway transfers
		Support Activities for Water Transportation	4883	Port and harbor operations, marine cargo handling (all but dock and pier operations), navigational services to shipping, towing and tugboat services, piloting, marine salvage, floating dry-dock boat repairs, marine cargo checkers, ship scaling	Directly related to waterways
		Warehousing and Storage	4931	Refrigerated and special warehousing, farm products storage	Transfer/storage of products transported via waterways
Real Estate and Rental and Leasing	53	Machinery and Equipment Rental and Leasing	5324	Construction, transportation, mining, forestry machinery equipment rental and leasing, commercial boat and ship rental, office machinery and equipment rental, other commercial and industrial rentals	Various equipment rentals that support offshore oila nd gas activities, mining activites, also used rentals for agricultural indirectly related to farm products transferred on waterways.
Arts, Entertainment, and Recreation	71	Marinas	71393	Marinas, fitness and recreational sports centers	Marinas focused here.

the economic impacts are the employment data for individual industry sectors and worker productivity in terms of value-added to the state gross domestic product.

The economic linkage between waterways and business locations at the waterfront results from reduced transportation costs, enabling reliable schedules of input supplies, and strategic links to product markets. These advantages allow business expansion which leads to lower production costs, economies of scale, and contribution to the overall efficiency of the economic system. The magnitude of these economic impacts were estimated based on total employment and payroll as well as estimates of value-added attributes by industrial sector, all of which contribute to the state gross domestic product.

4.3.1 Employment, Payroll, and Value-added Activities

The procedure followed to estimate jobs created by waterway-dependent industries was noted in Section 4.2 and depicted in Exhibit 4.4. The payroll generated by the firms in each NAICS category is based on the average salaries per worker in each sector as reported by the Louisiana Department of Labor. The sales from waterway-dependent industries were estimated based on contributions made by each sector to the state gross domestic product. The estimate of worker productivity in each sector was multiplied by the number of workers employed to derive total sales. The use of this approach avoided double counting of intermediate inputs used in the industry.

4.3.2 The Multiplier Effects

In addition to the primary (direct) economic impacts, secondary (indirect and induced) impacts are generated in the local economy as employees spend a substantial portion of their disposable income to purchase goods and services. These may include food and other basic necessities, both durable and non durable consumer goods. At the same time, to support value-added business output in each industry, a variety of intermediate inputs have to be purchased. For example, the construction of a dock to increase capacity of a grain elevator may require cement, steel, professional engineering services, etc., creating rounds of inter-industry purchases. The effects of the income/spending cycle generated by added personal income and the inter-industry purchases by businesses reverberate throughout the statewide economy as secondary impacts.

For the purposes of this study, an aggregate economic impact multiplier for waterway-dependent industries is used based on Regional Economic Multipliers developed by the U.S. Bureau of Economic Analysis. After taking into consideration the wide diversity and spatial distribution of businesses, an average output multiplier of 1.8 and an income multiplier of 2.1 are used throughout the study. This estimate is comparable to similar studies conducted in the maritime sector.

4.3.3 Estimated Economic Impacts of Waterway Dependent Business

Private sector waterway-dependent industries (except fisheries and oil and gas) directly employed a labor force of 63,445, generating an annual payroll of $2.79 billion. Because of the widespread and mobile nature of the fisheries and oil and gas industries, these sectors are included as unique supplements to the summary of employment data relative to water-dependent industries.

Additionally, Louisiana consumers pay sales taxes averaging 6 to 8% of the value of goods at the retail level and selective sales taxes on motor fuel, alcoholic beverages, tobacco, and public utilities. In 2004, the total sales taxes collected were about 4.5% of the total value of goods and services produced in the state (*State and Local Government Finances by Level of Government and by State*. 2004.). Based on these estimates, the water dependent industries generated $645 million as sales taxes. Generally, these taxes were shared by the state and local authorities on a 60/40 basis. The sales taxes generated were about 15% of the total state sales tax revenues and 8% of the total tax base of local authorities. Corporate income tax paid to the state was about 1.5% of the state total gross domestic product of the state, and on this basis the water dependent industries paid $36 million to the state as corporate income taxes. Other miscellaneous taxes such as property tax, inventory tax, and franchise tax paid by corporations amounted to $477 million. The total contribution by water dependent industries as sales taxes, corporate income taxes and other property and income taxes is $1.2 billion or about 16% of the total tax base of the state.

With the addition of government sector jobs and expenditures, the jobs provided by the fisheries and oil and gas industries (discussed in detail in Sections 4.4 and 4.5), or indirect and induced impacts, the total number of jobs generated in the state as a result of waterway dependent industry is 230,344, which equates to 1 in 7 jobs as related to waterway industries.

4.4 An Assessment of Economic Impacts of the Fisheries Industry in Coastal Louisiana

Louisiana's coastline and its 3.5 million acres of coastal wetlands comprise about 40% of the coastal wetlands in the continental United Sates. In geologic terms, coastal Louisiana is divided into two major geologic units including the Deltaic Plain to the east of Vermilion Bay and the Chenier Plains to the west extending into Texas. The Deltaic Plain was deposited by sediments transported by the Mississippi River to form low fertile wetlands, with embedded estuaries, lakes, and bayous that in some places extend 60 miles inland from the coast. The Chenier Plain in western Louisiana was formed by westerly flowing sediments that interacted with periodic changes in sea-level, leading to a lowland topography interspersed by a series of beach ridges.

With large water bodies covering almost half the surface area, the communities in this region are heavily dependent on boats for transportation and pursuit of marine, riverine, and estuarine food resources. Fishing activities, both commercial and recreational, are characterized by unique economic and social conditions. For example, commercial fisheries consist of freshwater inland fishing in lakes, rivers and bayous, near-shore fishing in Louisiana Gulf waters and deep-sea fishing. Although other commercial activities such as crawfish and catfish farming, harvesting of wild crawfish, alligator farming, etc., were reviewed, they were not deemed as being dependent upon the navigable waterways. Several social factors such as recreational fishing for family consumption, family-operated fishing fleets, seasonal employment, and other activities make it difficult to measure the economic impacts of the industry with any accuracy. Although offshore fishing is significant, the operational focus of fishing crafts is the state's many canals, bayous, bays, and near shore waters of the Gulf. The distance from places of residence, the size and mechanical condition of the craft and equipment, and the unique life styles of the fishermen favor local operations.

4.4.1 Regional Analysis

The previous analysis of fishing activities by river basins (i.e., NAICS code related) excludes the essential characteristics of a highly mobile industry, where local fishermen move over a wide area and out of state fishing fleets also market their harvest at central Louisiana locations. Therefore, the approach used in this section groups several contiguous river basins as one regional unit and analyzes fishing activities by parishes within that region (Exhibit 4-5). This approach provides information about the spatial distribution of fishing activities in the coastal area in terms of river basins as well as by parish. The primary source of this data is a report prepared for the Department of Commerce, NOAA. The main focus of the report was primary data based on the weight of landings, value, and secondary businesses depending on the fishing industry (*Identifying Communities Associated with the Fishing Industry in Louisiana, Final Report – Volumes 1, 2, and 3*. December 2005). This reference provided quantitative economic data for 2003. It was selected after an extensive search and is considered to provide reliable information that meets the requirements for this report.

Exhibit 4-5
Analysis of Commercial Fisheries Activities in Coastal Louisiana

Regions	Major River Basins Included	Parishes Included
REGION 1	Sabine River, Calcasieu River, Mermentau River	Calcasieu, Cameron, Iberia, Jefferson Davis, Lafayette, Vermilion
REGION 2	Atchafalaya River, Vermilion River, Bayou Teche	Avoyelles, Iberville, St. Landry, St. Martin, St. Mary
REGION 3	Barataria and Terrebonne	Ascension, Assumption, Lafourche, Terrebonne
REGION 4	Mississippi River Basin	Jefferson, Livingston, St. Charles, St. James, St. John
REGION 5	Lake Pontchartrain and Breton Sound Basins	Tangipahoa, St. Bernard, Plaquemines, St. Tammany, and Orleans Parish

Source: U.S. Dept. of Commerce, NOAA Fisheries, December 2005

The Department of Commerce database analyzed covers 106 communities located in a 27-parish area. The classification of the area into five regions including several river basins in one region is purely for the purposes of analytical convenience. For purposes of this report, a "fishing community" is a social or economic group engaged in harvesting and processing of fish, typically consisting of the following two groups:

1. The primary group is directly engaged in fish harvesting.
2. The secondary businesses are engaged in processing and marketing as well as fishery vessel builders, brokers, equipment suppliers, and welders, fitters, etc. who maintain machinery and equipment.

The weight of fish landings, the value, and the secondary businesses fully or partially dependent on the fishing industry are listed in Exhibit 4-6 through Exhibit 4-10 which appears at the end of the regional analyses. The community level information outlines a detailed profile of the industry in terms of value per pound, seafood processors, boat building activities, etc.

4.4.1.1 Region 1 - Sabine, Calcasieu, and Mermentau River Basins

These three river basins located in the southwest corner of the state harvested about 37% of the total fish landings in the state (Exhibit 4-6). Six parishes in the region had 21 communities where fishing activity was important. The three parishes adjacent to the Gulf Coast (Cameron, Vermilion, and Iberia) dominated fisheries activity with approximately 86% of the output and 80% of the total earnings. The communities of Abbeville and Cameron produced more than 50 million pounds in 2003 with earnings of more than $5 million.

In addition to the fishermen who are directly engaged in fishing activities, 184 secondary businesses also were dependent on the fishing industry in the region. These establishments are identified in terms of infrastructure and equipment suppliers (boat-building yards, marinas, docks and piers, equipment suppliers, repairs and maintenance crews, etc.) and as businesses engaged in seafood marketing activities (processors, wholesalers, retailers, brokers, etc.). A summary of economic data on fishing activities for the region is provided in Exhibit 4-6, indicating that the region produced 138,000 tons of fishery products valued at $42 million, and 184 secondary businesses were dependent on the fishing industry. The degree of dependence of these businesses could be highly variable from a fishing processing plant which may be fully dependent to a seafood retailer where the dependence is limited to fresh fish sales.

4.4.1.2 Region 2 - Atchafalaya River Basin, Vermilion River and Bayou Teche Basins

This region, which consists of parishes along the Atchafalaya River, covers one of the largest freshwater wetlands which is the habitat for a unique ecosystem and home to a unique combination of freshwater fish species. The wetlands in the area support a thriving eco-tourism industry and an abundance of recreational fishing.

The database for the region covers 16 fishing communities located in five parishes (Exhibit 4-7). Simmesport in Avoyelles Parish, located far inland, has an active fresh water fishing fleet, and the catch includes various finfish and crawfish during the appropriate seasons. St. Mary Parish, bordering the Gulf, dominates the market, producing 71% of the output and about 48% of the earnings. The fishing community of Berwick located in this parish is the largest in terms of output. In summary, the region produced 28,000 tons of fish in 2003 valued at $27 million, and 155 secondary businesses were dependent on the fishing industry in various ways.

4.4.1.3 Region 3 - Barataria and Terrebonne River Basins

The region covers four parishes with 25 major fishing communities (Exhibit 4-8). The two inland parishes—Ascension and Assumption—are mainly engaged in freshwater fishing in rivers and bayous, raising crawfish and catfish in farms, and harvesting wild crawfish and catfish from water bodies distributed in the area. Assumption Parish has 12 active crawfish farms for a total of 300 acres (Louisiana State University Agricultural Center- Fisheries News).

The major area of fishing activity is in the coastal parishes of Lafourche and Terrebonne, which contribute more than 98% of the output and income. In terms of output, the communities of Houma, Chauvin, Montegut and Theriot in Terrebonne Parish stand out as communities producing more than 5 million pounds. Cut-off, Golden Meadow, and Galliano in Lafourche Parish also fall into the same category.

The region produced an output of 90,000 tons of fish with a total value of $49 million and a total of 248 secondary businesses related to the fishing industry.

4.4.1.4 Region 4 - Mississippi River Basin

The Mississippi River Basin has 19 fishing communities distributed over a five-parish area (Exhibit 4-9). All parishes are inland and away from the coast except for a narrow opening of Jefferson Parish at Lafitte. The output numbers are more modest compared to other regions with only two communities, Lafitte in Jefferson Parish and Des Allemands in St. Charles Parish, handling more than 5 million pounds. While commercial fisheries are dominated by freshwater fishing in large lakes (e.g., Lake Salvador, Lac Des Allemands), recreational fishing and boating are also major activities.

The data for region 4 includes 18,000 tons of fish production valued at $49 million and 198 secondary businesses dependent on the fishing industry.

4.4.1.5 Region 5 - Lake Ponchartrain and Breton Sound Basins

This region also covers a five-parish area including 23 fishing communities varying in size and in fishing activities (Exhibit 4-10). For example, Tangipahoa and St. Tammany Parishes are mainly engaged in freshwater fishing and recreation (Lake Ponchartrain and Lake Maurepas). Plaquemines Parish was the leading parish for fishery activities in the state, and Orleans Parish was a major marketing and processing center for the state pre-Hurricane Katrina.

The total fisheries output from this region in 2003 was 103,000 tons valued at $115 million, and 355 secondary businesses were dependent on the fishing industry.

The overall summary of the analysis presented in Exhibit 4-11 indicates that Louisiana produced 378,000 tons of fish in 2003 valued at $283 million. Some 1190 business units in the

state were influenced by the fishing sector activities. The parish rankings by output and by value indicate that these activities were widely distributed throughout the coastal zone (Exhibit 4-12).

Exhibit 4-6: Region 1
Total Fish Landings, Value, and Secondary Businesses

Region 1: Summary	
Fish Landings (tons)	**138,179.6**
Value ($1,000)	**42,278.0**
Secondary Businesses	**184.0**

Parish	Total Parish Earnings ($1,000)	Communities	2003 Landings (pounds)	2003 Value $	Secondary Businesses		
					Infrastructure & Equipment	Processing & Marketing	Total
Calcasieu	1,152,881	Lake Charles	34,733,558	2,663,850	30	12	42
		Sulphur	1,120,893	1,221,227	2	7	9
		Vinton	35,476	44,845	0	1	1
		Westlake	23,195	18,546	3	1	4
Parish Total			**35,913,122**	**3,948,468**	**35**	**21**	**56**
Cameron		Cameron	58,683,418	7,530,582	2	7	9
		Creole	41,072,255	2,753,773	1	0	1
		Grand Chenier	356,349	278,256	1	2	3
		Hackberry	972,650	918,219	1	3	4
		Jonesville	491,615	233,219	2	2	4
Parish Total			**101,576,287**	**11,714,049**	**7**	**14**	**21**
Iberia	1,038,127	Jeanerette	809,363	968,401	4	2	6
		Lydia	298,603	365,575	0	0	0
		New Iberia	5,772,204	5,191,266	37	13	50
Parish Total			**6,880,170**	**6,525,242**	**41**	**15**	**56**
Jefferson Davis		Lake Arthur	130,404	155,777	0	0	0
Parish Total			**130,404**	**155,777**	**0**	**0**	**0**
Lafayette		Youngsville	361,692	664,455	3	0	3
Parish Total			**361,692**	**664,455**	**3**	**0**	**3**
Vermilion	509,104	Abbeville	84,676,443	12,947,587	9	16	25
		Delcambre	396,332	638,683	3	7	10
		Erath	1,212,774	2,031,751	3	1	4
		Gueydan	122,044	42,299	0	1	1
		Intracoastal City	----	---			0
		Kaplan	45,089,974	3,609,974	3	5	8
		Pecan Island	----	---	0	0	0
Parish Total			**131,497,567**	**19,270,294**	**18**	**30**	**48**
Region 1 Total			**276,359,242**	**42,278,285**	**104**	**80**	**184**

Exhibit 4-7: Region 2
Total Fish Landings, Value, and Secondary Businesses

Region 2: Summary							
Fish Landings (tons)		**28,203.0**					
Value ($1,000)		**27,275.0**					
Secondary Businesses		**155.0**					
					Secondary Businesses		
Parish	**Total Parish Earnings** ($1,000)	**Communities**	**2003 Landings (pounds)**	**2003 Value $**	**Infrastructure & Equipment**	**Processing & Marketing**	**Total**
Avoyelles							
		Simmesport	7,884,782	641,902	0	4	4
Parish Total			**7,884,782**	**641,902**	**0**	**4**	**4**
Iberville	696,792						0
		Grosse Tete	304,618	291,552	0	1	1
		Maringouin	93,429	153,464	3	8	11
		Plaquemine	3,397,776	5,390,276	3	9	12
Parish Total			**3,795,823**	**5,835,292**	**6**	**18**	**24**
St. Landry		**Krotz Springs**	**1,000,204**	**705,245**	**0**	**1**	**1**
St. Martin	325,926						
		Arnaudville	156,111	268,591	0	1	1
		Breaux-Bridge	1,128,445	3,112,478	1	21	22
		St. Martinville	2,512,955	3,832,362	0	8	8
Parish Total			**3,797,511**	**7,213,431**	**1**	**30**	**31**
St. Mary	1,022,378		1,022,378				0
		Amelia	738,971	756,946	3	0	3
		Baldwin	288,071	224,974	1	2	3
		Berwick	32,303,937	3,518,672	6	1	7
		Charenton	547,946	550,834	0	0	0
		Cypremort Point	----	----			
		Franklin	1,665,797	1,818,824	7	12	19
		Morgan City	3,718,522	4,953,056	46	10	56
		Patterson	662,735	1,055,552	1	6	7
Parish Total			**39,925,979**	**12,878,858**	**64**	**31**	**95**
Region 2 Total			**56,404,299**	**27,274,728**	**71**	**84**	**155**

Exhibit 4-8: Region 3
Total Fish Landings, Value, and Secondary Businesses

Regions 3: Summary	
Fish Landings (tons)	90,497.0
Valve ($1,000)	55,903.0
Secondary Businesses	326.0

Parish	Total Parish Earnings ($1,000)	Communities	2003 Landings (pounds)	2003 Valve $	Secondary Businesses: Infrastructure & Equipment	Secondary Businesses: Processing & Marketing
Ascension	1,333,456	Donaldsonville	67,719	53,903	0	12
		Gonzales	150,032	225,664	8	4
		Prairieville	15,043	25,260	8	8
		Sorrento				
Parish Total			**232,794**	**304,827**	**16**	**24**
Assumption	181,881					
		Belle Rose	97,011	$167,172	0	2
		Napoleonville	57,483	$90,055	0	1
Parish Total			**154,494**	**$257,227**	**0**	**3**
Lafourche	1,064,417					
		Cut-Off	9,672,554	13752268	26	4
		Galliano	5,346,677	8025229	12	2
		Gheens	1,433,164	1299211		
		Golden Meadow	5,878,722	7686284	19	19
		Larose	2,034,677	2732114	2	2
		Leeville	---	---		
		Lockport	2,991,087	3395190	11	4
		Port Fourchon	---	---		
		Raceland	784,363	647181	3	6
		Thibodaux	586,204	859159	3	0
Parish Total			**28,727,448**	**38,396,636**	**76**	**37**
Terrebonne	1,597,270					
		Bourg	1,549,570	2,499,766	3	0
		Chauvin	11,756,170	16,311,671	10	10
		Cocodrie	---	---	5	0
		Dulac	4,039,036	5,910,843	10	16
		Gibson	270,703	376,438	1	1
		Gray	537,873	1,060,451	0	0
		Houma	51,101,963	24,903,713	62	43
		Montegut	7,717,971	11,870,126	0	1
		Theriot	5,718,938	7,416,559	1	7
Parish Total			**82,692,224**	**70,349,567**	**92**	**78**
Region 3: Total			**111,806,960**	**109,308,257**	**184**	**142**

Exhibit 4-9: Region 4
Total Fish Landings, Value, and Secondary Businesses

Region 4: Summary							
Fish Landings (tons)		**17,834.0**					
Value ($1,000)		**48,823.0**					
Secondary Businesses		**198.0**					
Parish	**Total Parish Earnings** ($1,000)	**Communities**	**2,003 Landings (pounds)**	**2003 Value $**	**Secondary Businesses**		
					Infrastructure & Equipment	**Processing & Marketing**	**Total**
Jefferson	8,345,279						
		Avondale	1,278,198	2,192,168	0	1	1
		Barataria	4,140,847	5,644,446	1	0	1
		Bridge City	112,638	203,666	2	2	4
		Grand Isle	3,589,630	4,949,755	4	1	5
		Gretna	2,455,635	4,162,182	8	11	19
		Harvey	4,065,690	6,830,167	44	8	52
		Lafitte	6,732,048	9,312,926	3	1	4
		Marrero	4,250,676	6,853,367	4	9	13
		Metairie	1,910,212	3,072,613	26	21	47
		TerryTown	201,862	338,329	0	1	1
		Westwego	23,195	18,546	15	4	19
Parish Total			**28,760,631**	**43,578,165**	**107**	**59**	**166**
Livingston	---						0
		Denham Springs	86,390	147,697	9	2	11
Parish Total			**86,390**	**147,697**	**9**	**2**	**11**
St. Charles	990,947						0
		Des Allemands	5,075,513	3,375,860	0	8	8
		Destrehan	251,393	329,813	0	2	2
		Luling	456,631	565,473	2	0	2
		Paradis	305,492	248,665	0	0	0
Parish Total			**6,089,029**	**4,519,811**	**2**	**10**	**12**
St. James	---						0
		Vacherie	543,711	338,652	2	5	7
Parish Total			**543,711**	**338,652**	**2**	**5**	**7**
St, John the Baptiste	489,248						0
		La Place	127,108	146,031	1	0	1
		Reserve	60,916	92,730	1	0	1
Parish Total			**188,024**	**238,761**	**2**	**0**	**2**
Region 4 Total			**35,667,785**	**48,823,086**	**122**	**76**	**198**

Exhibit 4-10
Total Fish Landings, Value, and Secondary Businesses

Region 5: Summary							
Fish Landings (tons)		**103,013.0**					
Value ($1,000)		**114,936.0**					
Secondary Businesses		**355.0**					
Parish	**Total Parish Earnings ($1,000)**	**Communities**	**2003 Landings (pounds)**	**2,003 value $**	**Secondary Businesses Equipment & Infrastructure**	**Processing & Marketing**	**Total**
Orleans	12,159,302						0
		New Orleans	11,441,768	21,972,988	74	82	156
Parish Total			**11,441,768**	**21,972,988**	**74**	**82**	**156**
Plaquemines	792,639						0
		Belle Chasse	1,875,240	3,644,871	11	5	16
		Boothville	3,642,685	4,725,663			0
		Braithwaite	1,049,926	1,056,373	2	1	3
		Buras	10,345,614	16,180,239	0	2	2
		Empire	145,115,304	18,444,404	0	2	2
		Point A la Hache	425,731	868,514	3	0	3
		Port Sulphur	2,442,341	4,076,552	0	0	0
		Venice	4,734,324	5,635,142	6	3	9
Parish Total			**169,631,165**	**54,631,758**	**22**	**13**	**35**
St. Bernard	563,216						0
		Arabi	203,608	389,431	3	4	7
		Chalmette	1,713,037	3,918,693	5	12	17
		De la Croix	--	---			0
		Meraux	4,250,676	6,853,367	2	2	4
		St. Bernard	12,377,023	18,223,678	2	9	11
		Violet	3,199,279	5,125,445	0	0	0
		Ysclosky	,---	---			0
Parish Total			**21,743,623**	**34,510,614**	**12**	**27**	**39**
St.Tammany	1,877,788						0
		Lacomb	53,475	39,828	2	2	4
		Madisonville	43,933	31,339	10	3	13
		Mandeville	134,672	123,298	26	11	37
		Pearl River	276,701	478,146	1	1	2
		Slidell	1,909,090	2,550,871	17	46	63
Parish Total			**2,417,871**	**3,223,482**	**56**	**63**	**119**
Tangipahoa	----						0
		Akers	100,861	65,155	1	2	3
		Ponchatoula	691,286	531,597	1	2	3
Parish Total			**792,147**	**596,752**	**2**	**4**	**6**
Region 5 Total			**206,026,574**	**114,935,594**	**166**	**189**	**355**

Exhibit 4-11
Summary of Commercial Fishing Activites, Fish Landings, Value, and Secondary Business in Coastal Louisiana

Regions	Major River Basins Included	Parishes Included	2003 Landings (short tons)	2003 Value ($1,000)	Secondary Businesses		
					Equipment & Infrastructure	Processing & Marketing	Total
REGION 1	Sabine River, Calcasieu River, Mermentau	Calcasieu, Cameron, Iberia, Jefferson Davis, Lafayette, Vermilion	138,180	42,278	104	80	184
REGION 2	Atchafalaya River, Vermilion River, Bayou Teche	Avoyelles, Iberville, Rapids, St. Landry, St, Martin, St Mary	28,203	27,275	71	84	155
REGION 3	Barataria, Terrebonne	Ascension, Assumption, Lafourche, Terrebonne	90,497	49,251	166	132	604
REGION 4	Mississippi River Basin	Jefferson, Livingston, St. Charles, St. James, St. John	17,834	48,823	122	76	198
REGION 5	Lake Ponchartrain, and Breton Sound Basins	Tangipahoa, St. Bernard. Plaquemines, St. Tammany Orleans	103,013	114,936	166	189	355
Grand Total			**377,727**	**282,563**	**629**	**561**	**1,190**

Exhibit 4-12
Louisiana Parishes Ranked by Fishery Output and by Value, 2003

Parish	Rank	Fishery Output		Parish	Rank	Export Vessel Value
		(1,000 pounds)				($1,000)
Plaquemines	1	169,631		Plaquemines	1	54,632
Vermilion	2	131,948		Terrebonne	2	51,538
Cameron	3	101,576		Jefferson	3	45,578
Terrebonne	4	69,386		Lafourche	4	38,397
St. Mary	5	39,926		St. Bernard	5	34,510
Calcasieu	6	35,913		Orleans	6	21,973
Jefferson	7	28,761		Vermilion	7	19,270
Lafourche	8	28,721		St. Mary	8	12,879
St. Bernard	9	21,744		Cameron	9	11,714
Orleans	10	11,442		St. Martin	10	7,213

In addition to the above analysis, several other secondary sources confirm the economic significance of the fisheries sector to the state's economy. Four of the top five fishery ports by landings in the continental U.S. are located within Louisiana. Louisiana ranked second only to Alaska in total pounds of commercial fish and shellfish landed. In 2006, the state accounted for 37% of annual fisheries landings in the country, 41% of the national landings by value, and 75%

of the national landings by weight. Recreational fishing also plays a major role in the state's economy. In 1991, approximately 900,000 people spent more than $600 million fishing in Louisiana's waterways, generating almost $25 million in state sales tax and resulting in $330 million in earnings while supporting more than 18,000 jobs. An update to the report of findings for Louisiana's fishing industry has not been conducted since the 2005 comprehensive evaluation by the U.S. Department of Commerce and NOAA (*Identifying Communities with the Fishing Industry in Louisiana Final Report Volumes I-III,* 2005)

As an aside, it is important to note that the loss of wetlands and marsh along the coast has the potential to severely impact the fisheries industry if that loss is not kept in check through coastal restoration and maintenance projects. The marshes and estuaries along the Gulf coast serve as nurseries or spawning grounds for 98% of the fishes caught in the Gulf. The 21 major estuaries along the Gulf Coast account for 24% of all estuarine area in the 48 contiguous states and 55% of the marshes.

4.4.2 Economic Impact Assessment of the Fisheries Industry

According to the analysis presented in Exhibit 4-11, the total value of output in the industry in 2003 was $282 million. Assuming that $0.3903 of every dollar of output in the fishing industry is paid to households, the average earnings are estimated as $110.3 million (Regional Multipliers, RIMS Model II, U.S. Bureau of Economic Analysis) in wages. Using the average statewide weekly wage of $646/week (*Louisiana Works.* 2005) (adjusted by 5.3% for 2006 inflation = $680), the 52 week salary equals $35,360. Adding a fringe of 20% as insurance, healthcare, office space, etc. results in $42,432 per worker a year. On this basis, earnings in the industry create 2,600 jobs. Using the multiplier of 2.1 to determine total employment and induced impacts and a total indirect multiplier of 1.8, the following economic impacts of Louisiana's fisheries industry are estimated:

Direct Impact of Fisheries

Total Value of Output	$282 Million
Household Earnings	$98 Million
Number of Jobs Generated	2,600

Total Induced and Indirect Impact of Fisheries

Total Induced Impacts	$206 Million
Total Indirect Impacts	$507 Million
Total	$713 Million
Total Employment generated	5,460

4.5 Evaluation of Economic Impacts of the Offshore Oil and Gas Industry

Deepwater oil and gas exploration activities in the Gulf of Mexico expanded unabated from 1995 to 2006 and that trend is expected to continue for the next several years. The decision to lease the Gulf of Mexico outer continental shelf (OCS) region to private sector prospectors at fair market value has tremendously expanded the resource base available for economic development in coastal Louisiana. As a result, dwindling oil and gas activity in shallow waters has been being replaced by reserves in deep water. According to U.S. Minerals Management Service (MMS) data, oil production from deepwater reserves increased 535% from 1995 to 2002 (*Deepwater Gulf of Mexico 2004: America's Expanding Frontier*).

Louisiana's coastal waterways are essential to offshore oil and gas activities. Landside operations along the coast, including the coastal ports, function as supply stations to provide logistical support to offshore operations. Landside support to the oil and gas industry includes intermodal and pipeline transport, storage and handling facilities, shipbuilding, and equipment fabrication among many others.

As one of the largest industry sectors influencing the state's economy, the industry is heavily dependent upon coastal waterways and therefore is widespread, particularly along the Gulf of Mexico. Because of the expanse of the industry along the coastal front, a conservative approach to determine economic impacts was established as noted below.

- From west to east, oil and gas activity south of the Louisiana Highway 14 and U.S. Highway 90 corridor was selected as an east-west reference for focusing on coastal oil and gas impact analysis.
- Oil and gas establishments were selected based on the NAICS sector codes that included oil and gas extraction, mining support activities, petroleum manufacturing, ship building and repair, and water transportation. However, adjustments were made to this data set so as not to double-count prior economic evaluation numbers presented in this study.
- All businesses (100%) below the reference line and within the selected NAICS sectors were identified and included in the economic assessment data base.

The following economic impacts from the oil and gas industry were identified:

Direct Impact of Oil and Gas

Total Value of Output	$8,151 Million
Household Earnings	$1,106 Million
Number of Jobs Generated	31,803

Total Induced and Indirect Impacts of Oil and Gas

Total Induced Impacts	$2,383 Million
Total Indirect Impacts	$14,672 Million
Total	$22,078 Million
Total Employment generated	66,786

Now that the past and present economic impacts of the state's navigable waterways have been defined, it is clear that the future economy of the state will also be heavily dependent on waterborne resources.

A summary of the combined economic effects from waterway-dependent businesses, fisheries, and the oil and gas industry is shown in Exhibit 4-13. Based upon federal expenditures previously cited ($515 M), the state and local government contribute 36% to overall waterway expenditures. Louisiana's dependency on waterborne resources requires that the state take notice of waterway system deficiencies that limit potential economic growth.

Exhibit 4-13a

SUMMARY OF ECONOMIC IMPACT ANALYSIS OF WATERWAY DEPENDENT BUSINESS IN LOUISIANA

		Direct	Indirect	Total
GOVERNMENT	**Federal, State, and Local**			
	Expenditures	$ 663,000,000	$ 530,000,000	$ 1,193,000,000
	Earnings	$ 477,000,000	$ 525,000,000	$ 1,002,000,000
	Jobs	11,840	13,024	24,864
PRIVATE SECTOR	**Waterway Dependent Business (Other than Fisheries, Oil & Gas)**			
	Output	$13,274,000,000	$10,621,000,000	$23,895,000,000
	Earnings	$ 2,120,000,000	$ 2,451,000,000	$ 4,571,000,000
	Jobs	63,445	69,789	133,234
	Fisheries			
	Output	$ 282,000,000	$ 225,000,000	$ 507,000,000
	Earnings	$ 98,000,000	$ 107,000,000	$ 205,000,000
	Jobs	2,600	2,860	5,460
	Oil and Gas			
	Output	$ 8,151,000,000	$ 6,521,000,000	$14,672,000,000
	Earnings	$ 1,106,000,000	$ 1,277,000,000	$ 2,383,000,000
	Jobs	31,803	34,983	66,786
SOCIAL	**Social Benefits**			
	Fuel Savings	$ 110,000,000	NA	$ 110,000,000
	Safety	$ 69,000,000	NA	$ 69,000,000
TOTAL ECONOMIC IMPACT	**Totals (Does Not Include Social)**			
	Output	$22,370,000,000	$17,718,000,000	$40,088,000,000
	Earnings	$ 3,801,000,000	$ 3,153,000,000	$ 6,954,000,000
	Jobs	109,688	120,656	230,344

Exhibit 4-13b
SUMMARY OF ECONOMIC IMPACT ANALYSIS OF WATERWAY DEPENDENT BUSINESS IN LOUISIANA
Tax Revenue

TAXES	State-Individual Income Tax	$ 103,000,000
	State-Corporate Income Tax	$ 59,000,000
	State-Sales Tax	$ 1,054,000,000
	State Misc Tax	$ 780,000,000
	Local Sales Tax	$ 703,000,000
	Total Tax Revenue to State & Local Gov't	$ 2,699,000,000

4.6 Future Projects to Optimize Economic Benefits

The purpose of this section is to examine several economic development options available to fully utilize statewide waterway resources. In general terms, the main thrust of economic development in a market oriented economy comes from the private sector enterprises; and public sector organizations provide public infrastructure, encourage market studies, and develop public-private partnerships, wherever possible.

With the responsibility for capital improvements and maintenance, the federal government is the largest investor in the navigable waterway system. Private sector investment in port terminals, tugs, barges and other floating craft ranks second followed by public port investments and multi-faceted small projects sponsored by local bodies and parishes for flood control and surface drainage, etc. The participation by state agencies such as DOTD, DNR, and DED is mainly as local sponsors of federal projects.

The planning and maintenance of the waterway system in the state by the federal government for the multiple purposes of flood control, navigation and environmental protection, etc., is a tremendous asset to the state. Similarly, the private sector economic development decisions that are guided by market opportunities are the time-tested approach to developing a productive and efficient maritime transportation system. Therefore, the role of the state public sector is that of serving as a facilitator for private sector development that coordinates actions of various regulatory functions, develops market research studies, and assists in forming private-public partnerships. The U.S. Army Corps of Engineers, the U.S. Department of Commerce Economic Development Administration, DOTD, and the Department of Economic Development are among the agencies that fill this role.

For the purposes of this report, potential future economic benefit is addressed in accordance with issues brought forth in previous sections of the study. Recommendations fall into one of the following categories:

- Value-added activities based on existing waterborne cargo flows
- More efficient and cost-effective vessel services

4.6.1 Local Resource Based Industries

One basic approach to water resource development is to examine the nature of waterborne cargo flows and design plans for expansion of these activities depending on future projections. Several commodity categories, such as grains and oilseeds, for example, are mainly for export while crude petroleum and petroleum products are the basis for use in large scale petrochemical industry operations. A detailed examination of the various activities in these industries provides an indication of what other value-added activities could be performed in the state. Some typical examples are noted below.

1. Transfer product shipments currently sent as bulk shipments to retail markets and packaged outside the state to in-state processors. An in-depth analysis of the industry shipments could be readily tailored from existing resource data.

2. Containerization of grain shipments is an ever increasing reality worldwide. Louisiana currently has no facilities for such an operation. Locating said operations near existing grain elevators appears logical.

3. Organization of industry associations (such as grain handlers, chemical associations, etc.) that will champion economic interests beneficial to each industry sector is needed. An industry-specific initiative organized to focus on economic components related to waterborne commerce should be initiated. EDA, DED, and DOTD sponsorship on a project focused on other parts of the world and leading edge industries would be valuable to the state in expanding its market share of waterborne commerce.

4.6.2 Iron Ore and Scrap

Recycled iron and steel scrap is the main raw material used for the production of new steel and cast-iron products in a widely scattered network of mini-mills in the U.S. The Lower Mississippi is a major trading region for steel scrap with 304,000 metric tons of exports and 95,000 tons in imports in 2005 (*2005 Minerals Yearbook: Iron and Steel Scrap.* October 2006).

The collection of scrap material from dispersed supply sources by brokers, collectors, and dealers and the transportation of the commodity to steel mills and foundries is a cost intensive

activity. Several redundant technological developments in the type of shears, presses, shredders, and fragmentizers used to reduce scrap could be utilized in the state to enhance industry participation. Again, specific industry focused research would be required. In this instance, joint participation by DED and DEQ is advisable as the industry is environmentally beneficial.

4.6.3 Ethanol Industry: Existing Conditions and Outlook

The ethanol industry emerged as a result of the energy crisis in the 1980's and was supported by a series of tax incentives oriented toward ethanol producers and blenders in producing reformulated gasoline. The tightening of environmental regulations by the EPA and the requirement in 1995 of the use of reformulated gasoline year-round spurred growth in the industry. An additional breakthrough was realized in 2000 with the EPA recommendation to phase out the use of Methyl Tertiary Butyl Ether (MTBE), the main substitute for ethanol throughout the United States. The provisions to create Renewable Fuels Standards set high baseline conditions for the use of oxygenates in the Energy Policy Act of 2005 and set the long-term direction for the ethanol industry.

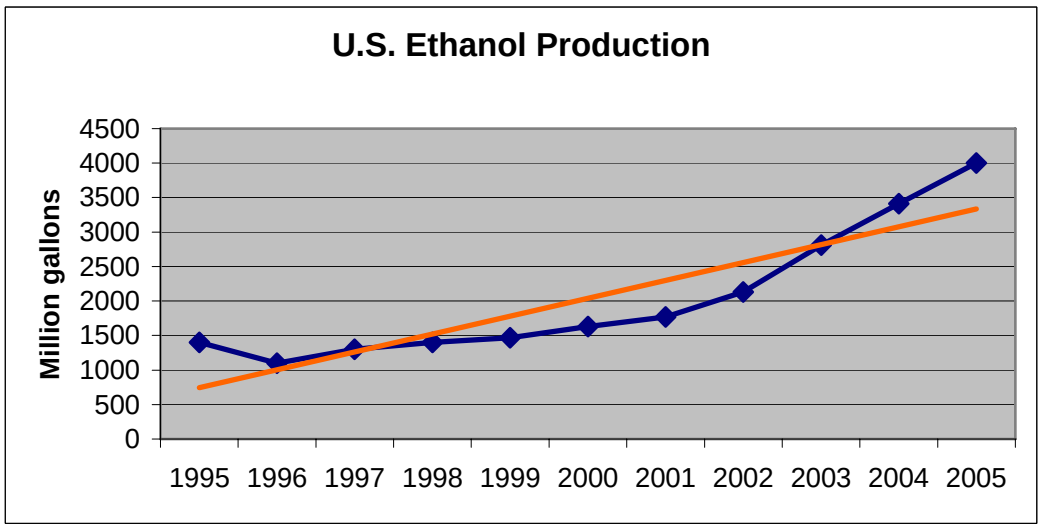
The primary purposes of ethanol use are to serve as an octane extender for gasoline, an oxygenate fuel additive facilitating combustion, and an added source for the nation's energy supply reducing the dependence on oil imports. Since ethanol and MTBE are both gasoline additives that extend the blended product by approximately 10 percent in volume, the three product prices are positively correlated.

Currently, the U.S. ethanol industry is in the midst of a growth spiral spurred by a combination of economic, technological, regulatory, and environmental concerns. Sustained high gasoline prices have kept ethanol prices high, and currently more than 30% of the nation's gasoline is blended with ethanol. Information in Exhibit 4-14 shows U.S. ethanol production data from 1995 through 2005.

Exhibit 4-14
U.S. Fuel Ethanol Production and Growth

Year	Production (million gallons)	Annual growth (%)
1995	1400	
1996	1100	-21%
1997	1300	18%
1998	1400	8%
1999	1470	5%
2000	1630	11%
2001	1770	9%
2002	2130	20%
2003	2810	32%
2004	3410	21%
2005	4000	17%
Average Annual Growth 2000 to 2005		20%

Source: Ethanol Industry Outlook 2006, Renewable Fuels Association Annual Report 2005.



In addition, by 2003 a total of 18 states had passed legislation that will ban MTBE, an alternative to ethanol, creating significant demand for ethanol particularly in the large markets in California and New York.

During the last decade the number of ethanol producing refineries in the U.S. increased from 54 to 105 (94% increase) and the refining capacity from 1.7 billion gallons a year to 5 billion gallons (194% increase). The higher rate of increase in capacity than the number of plants indicates the industry trend to shift to higher capacity plants (Exhibit 4-15).

Exhibit 4-15
Long Term Forecasts of Gasoline and Ethanol Use and Prices

Type of Use/Prices	Year						Annual
	2005	2010	2015	2010	2025	2030	Change (%)
Automobile Gasoline Use (mil.barrels/day)	1.64	1.88	2.06	2.19	2.23	2.31	1.4
Gasoline Price (cents/gallon)	2.31	2.03	2.00	2.08	2.13	2.18	0.6
Ethanol (E-85) Price (cents/gallon)	2.10	1.98	1.92	1.97	2.03	2.10	0.4
Ethanol wholesale Price (cent/gallon)	1.84	1.98	1.46	1.64	1.69	1.67	-0.1

*Source: Annual Energy Outlook 2006 with Projections to 2030, US Energy Information Administration

The long-term projections for the U.S. ethanol industry are that the production will increase from 1.64 million barrels a day in 2005 to 2.31 million barrels a day in 2030. While this is approximately 1.4% annual increase in output, the prices are expected to decline after 2015.

More than 90 percent of the feedstock used for ethanol production comes from corn at present, and the U.S. Department of Agriculture (USDA) estimates indicate this figure will remain more or less stable for the coming 10-year period. By processing a bushel of corn, it is possible to produce 2.75 gallons of ethanol under current technology and about 18 pounds of distiller dry grain soluble. Therefore, along with industry growth, the supply of distiller's grains, the main co-product from ethanol production, will also increase. In Louisiana, the construction of an ethanol plant is under way at the Port of Lake Providence, as well as at other locations in the state and a biodiesel plant is under construction at the Port of West St. Mary.

Louisiana has the potential to capitalize on the ethanol industry growth because of its waterways, import and export of grain, and other supporting industry base.

4.6.4 Container-on-Barge Operations

An analysis of the feasibility of container-on-barge (COB) operations must focus on challenges and opportunities to the state in developing such a system. From a transportation planning perspective, COB operations are appealing because they combine a dynamic transportation sector and the inland barge system with minimal social costs in energy use, air and noise pollution, and land-use and social impacts.

The diversification of the inland-barge cargo base through containerization (especially adding more valuable products) will facilitate market expansion for barge services and the marine sector of Louisiana that operates the most extensive barge-to-ship operations in the nation. Several developments in the freight sector indicate that current conditions are more appropriate for COB services than ever before. The major trends that make COB services more feasible are as follows:

- Infrastructure congestion in other modes

- Experience gained in operating several COB operations
- Proliferation of container transport to new products such as grains, steel, woodchips, etc.
- Increasing awareness of social costs from environmental pollution associated with transportation activities

International marine container volumes handled in the U.S. reached 42 million in 2005 with the total sector growing at more than 8% annually for the last decade. While 60% of these boxes come from China, more than 70% come from all of Asia, over-extending the U.S. west coast maritime and rail infrastructure. The limited availability of land for rail yard expansion in the eastern U.S. and the community resistance to allocate residential urban areas for this purpose have slowed down expansion. According to USACE, domestic waterborne container traffic increased from 5.16 million in 2003 to 7.3 million TEUs in 2004, a 41% increase (Carmony, 2006). Therefore, the critical volumes necessary for initial operations to be feasible in Louisiana have been achieved.

In that regard, Osprey Lines, a Texas based logistics operator established a COB service connecting Houston, Lake Charles, Baton Rouge, New Orleans, and Pascagoula on the GIWW. In March 2000, service extended to the inland ports of Memphis and Chicago, both of which are located on the Mississippi River system (www.ospreyline.com). Osprey operated a weekly fixed schedule between Houston and New Orleans as well as between New Orleans and Memphis. The services were extended to other ports on an inducement basis (based on available cargo volume). Osprey Lines operations from Baton Rouge to New Orleans started on a weekly schedule in January 2004 from the Inland Marine River Terminal, a terminal built by the Port of Greater Baton Rouge, to the Napoleon Avenue terminal at the Port of New Orleans. In 2003, Osprey Lines COB services included handling 22,000 inland containers and 14,000 marine containers.

In 2006, Kirby Corporation exercised its existing option to increase its ownership to two-thirds interest in Osprey Lines with the remaining third being owned by Cooper/T. Smith (Marine Log, February 17, 2006). The take over of Osprey by one of the largest liquid cargo barge operators and a large stevedoring services company is testimony that the industry considers significant future potential for COB services. Under the new management, however, the Baton Rouge terminal ceased operations in April 2006 because of the limited market. COB services in Louisiana did not have the opportunity to reach full potential.

4.6.5 An Assessment of Grain Containerization: Trends and Opportunities

The containerization trends in the grain and oilseeds sector are of great interest to Louisiana for several reasons, two of which are noted. First, containerization accounts for 47% of total exports, and any change can have significant economic impacts. Second, if the concept of containerization takes hold in the grain sector, it will restore some balance in the maritime commodity sector that is currently skewed to dry-bulk and liquid-bulk cargo.

The grain transportation network for containerized grains (CG) is quite different compared to the bulk grain movement patterns. The current CG patterns follow the heavy container traffic network with no significant parallels to bulk grain flow patterns. The total CG exported in 2000 was estimated to be 91,328 TEUs weighing approximately 1,826,000 tons. The total tonnage of all grain exported in 2000 was 97 million tons (*Waterborne Commerce of the United States: Part 5- National Summaries*. 2001), and the containerized share was about 1.9%.

The major inland container centers are shown by BEA areas[2] in Exhibit 4-16. The largest center is located in Memphis, Tennessee, which is an intermodal rail site as well as a location directly connected with the main stem of the Mississippi River. Many containers on barge operations on the Colombia-Snake River at Portland, Oregon, are noted. The facility handles rail shipments from wheat producing states. Containerized cotton and hay which are non-grain commodities are included in Exhibit 4-16 since they can also easily be handled with grains. The third section includes only grain products.

Although 2 to 3% of total grain exports are currently sent as containerized exports, Louisiana will have to exert significant energy to tap into this market. The advantages of using back-haul containers from west coast ports combined with the well-established railroad network leave little room for competition. If the CG market grows rapidly, saturating the system, or if COB operations succeed as an alternative to rail, opportunities for Louisiana ports may arise.

2 BEA areas are economic units created by the US Bureau of Economic Analysis. The country is divided into 183 BEAs.

Exhibit 4-16
A Profile of the Containerized Grain Sector, 2000

Item			
1	**Top 5 Originating Centers**		
	BEA**	# TEUs	U.S. Share
			(%)
	Memphis, TN	4,595	37
	Lubbock, TX	2,627	21
	Dallas, TX	2,002	16
	Portland, OR	1,821	15
	Los Angeles, CA	1,483	12
2	**Major Commodities Containerized**		
	Commodity	# TEUs	U.S. Share
			(%)
	Cotton	26,485	29
	Corn	10,046	11
	Hay	10,035	11
	Potatoes	8,219	9
3	**Major Grain Types**		
		U.S. Share (%)	
	Corn		33
	Sorghum		22
	Wheat		20
	Barley		13
	Rice		5
	Soybean		5
	Oats		1

BEA Bureau of Economic Analysis areas Major Grain Types is a subset of Food and Farm Commodities

4.6.6 Establish Leadership for a Collaborative Marine Transportation Center

Although transportation service is one of the major economic sectors contributing to economic growth and a significant part of the state budget is spent on capital improvement and maintenance projects to support transportation infrastructure, the state has not developed a strong program specifically in support of marine transportation economics and logistics. The Louisiana Transportation Research Center (LTRC) is presently engaged in engineering research for all transportation modes, and its functions essentially as a section of DOTD to gather and provide information. The LTRC could be used strategically in cooperation with a marine transportation system program in place.

Louisiana is ranked among the top five states, handling more than 1 billion tons of inbound and outbound cargo each year (*Freight in America: A New National Picture.* January 2006). The four states handling more freight than Louisiana are Texas, California, Illinois, and Ohio, an elite group of states with economies several times larger than Louisiana. The "freight intensity," derived by dividing total tonnage by total population, is three-times higher for Louisiana with 235 tons per capita compared to the U.S. per capita average of 78 tons.

The basic economic activities of more than half-a-dozen mid-western states are directly dependent on our ports and the waterway system. If the ton-miles handled by our waterway system in 2004 were to be handled by rail, the next best alternative, the effort would have burned 55 million gallons of additional fuel, costing the nation more than $100 million a year, and added significantly to air pollution.

These and other transportation issues faced by the state require analysis by specialists with the experience and knowledge of local factors. Developing a leadership role to promote issues that benefit the entire maritime transportation industry can and should be a collaborative effort—one that combines the public sector, state and federal, as well as the private sector. Leadership will provide the mechanism and basis upon which to collaborate with federal and state maritime agencies, EDA, the Louisiana ports (PAL), DED, and DNR and will be pivotal in arriving at objective decisions and facilitating open discussion on many unresolved issues confronting the industry. The establishment of a leadership position under DOTD should be directed by a steering committee representing different stakeholders within the industry. Some of the issues that could be addressed and the major functions of this effort are as follows:

1. Promote dialogue and take a leadership role on multi-modal transportation issues confronting the state. Examples from the maritime sector include promoting dialogue on restoring and expanding the container market growth and developing a transportation benefit-cost methodology that incorporates social costs. Additionally, promote an integrated maritime sector by organizing seminars for various sectors of the industry such as private terminal operators, the tug and barge industry, ship-building and inland barge industry issues, etc. to offer long-term strategic benefits.

2. Organize a "political compact" of states that depend on inland barge transportation, short sea shipping, and long haul shipping that could be used for influencing the political decision-making process at the federal level.

4.6.7 Develop Traffic Volumes on the Red River Waterway

The opening of the Red River Waterway to barge traffic from the Old River Lock on the Mississippi River to Shreveport in 1994 was one of the major events for the statewide maritime transportation system. The project cost was $1.9 billion in federal funds. With the completion of the project, many of the intended benefits such as bank stabilization, straightening of the river

course, flood control, and year-long navigation, etc. were accomplished. The economic benefits realized were nearly $20 in spending for every $1 invested by the local taxing authority. On the average, over 2,000 jobs per year were created by the project (including construction jobs).

Cargo flow on the Red River increased by 8% from 2002 to 2004. Because of efforts by the Red River Waterway Commission, additional federal, state, corporate, and private monies were attracted to the area for further development. Opening of the Red River has established an important link in the state's inland navigable waterway system. Also, deepening the entire channel to a 12-foot depth would significantly increase cargo capacity and economic impacts to the area. Marketing efforts for a 12-foot channel would attract more of the private sector activities to the waterway

5.0 SUMMARY AND RECOMMENDATIONS

A broad profile of the Louisiana maritime transportation system including its physical infrastructure, operational framework, and significance for economic development has been presented. The basic approach was first to conduct a detailed inventory of the resource base, to analyze existing conditions and constraints, and then to examine alternatives available for improving the state's waterway system. The results of that planning process are summarized below. Matters that restrain and/or minimize optimal operational efficiency and hinder maximum economic impact potential of the state's navigable waterways are targeted. Potential solutions to those problems as well as economic opportunities are offered.

5.1 Waterway System Conditions and Cargo Flow Summary

Louisiana's marine transportation system is generally considered by end users as a successfully operated and integrated transportation system that connects domestic markets of the American heartland with the international marketplace through a cost-efficient inland barge transportation system linked directly to ocean-going vessels and corresponding terminals. The state's inland maritime marketplace is linked to America's heartland via the Mississippi River. A major beneficiary is the vast agricultural marketplace within the system boundaries defining the Mississippi River Basin, approximately 40% of the continental United States.

Agricultural enterprises based in the American heartland, i.e., domestic production, are linked to world markets through lower Mississippi River based grain export operations from Baton Rouge south to the mouth of the river. Similarly, oil and gas operations and services also use coastal waterways for both domestic and international markets continuously working to satisfy the nation's energy demand. The domestic transfer of coal and coal related bulk products also flows through Louisiana because the state is strategically located between coal producing and coal using states.

Overall, the navigable waterway system provides a safe, environmentally sound transportation network to the nation. It also serves as a sustainable economic resource base for Louisiana, one that can be continuously harnessed for the benefit of economic growth and diversification, even more so today than in the past.

The navigable waterway system in Louisiana consists of over 2,800 miles of rivers, bayous, lakes, and estuaries and is second only to Alaska in terms of navigable miles. As the U.S. highway and rail networks continue to reach and, in many instances, exceed capacity, water-based transport continues to offer long-term excess capacity for the movement of goods.

In Louisiana, the top four commodity sectors for both domestic and foreign movements include food and farm products, crude materials and petroleum products, chemicals and related

products, and crude materials. Petroleum and petroleum products handled on Louisiana waterways are more than 50% of the U.S. total with refinery-related industries (generally petroleum products) producing the largest volume of waterborne commerce. Grain is the largest dry-bulk commodity, and Louisiana grain terminals handle 50% of the nation's grain exports. The states along the Upper Mississippi River that produce more than half the nation's output of grain, particularly corn, move the bulk of their crops through the Lower Mississippi River in Louisiana.

In the processing of this study, domestic and foreign trade projections for Louisiana waterways were developed for a 25-year period—2005 to 2030. The total waterborne cargo growth for this period is projected to be 40.1%. The domestic and foreign cargo sectors are projected to grow by 33.5% and 57.6% respectively. With growth projections such as these, Louisiana should work toward alleviating current waterway system constraints as quickly and efficiently as practical to enhance marketability in domestic and international commerce. To do so, an investment is required to accommodate future infrastructure needs.

Because multinational shippers schedule according to reliability and consistency, they select waterway systems and port complexes that meet these criteria. For Louisiana to remain competitive on a global scale in cargo operations, which are expected to increase 33% in 10 years, the Louisiana waterway system must be prepared to increase cargo movement velocity and to evolve with the introduction of larger, more efficient vessels. Ocean container trade volume has outpaced gross domestic product growth by greater than 300% in the past 5 years and is expected to increase 186% in the next 20 years (Vickerman, 2006). Container trade is expected to grow faster than the world economy with 60% of all North American container trade originating in Asia (Vickerman, 2006). Currently, Houston is the only Gulf Coast location that is a top 10 maritime container gateway. While Pacific Coast port systems are already congested. Louisiana's readiness to respond to these changes in a fast and efficient manner will determine its ability to retain and expand an existing market share for its extensive system of ports and waterways.

Numerous constraints within the system—physical and institutional in nature—are hindering needed improvements. These constraints must be addressed if optimal efficiency demanded by the marketplace is to be provided and if Louisiana is to maintain a competitive edge among other states also seeking to expand cargo handling and associated economic benefits.

Major physical constraints along many of the state's waterways include but are not limited to channel depth limitations, dredge disposal issues, and outdated locks, all of which are typically addressed at the federal level through congressional mandates and implemented by the U.S. Army Corps of Engineers (USACE). These physical constraints limit the ability of the

state's waterways to provide smooth passage and efficient cargo movement, thereby reducing competitiveness with neighboring Gulf States, some Southeastern ports, and emerging Gulf Coast ports in Mexico.

Projects identified to alleviate physical constrictions and associated safety concerns are often constrained by institutional issues. By way of example, one major institutional constraint, actually a series of constraints focuses on federal procedures and processes. Specifically, an impediment is the USACE and its organizational structure, project selection procedures, funding approach and methodology, and implementation process as it relates to public sector projects. Correspondingly, the lack of funding at the federal level exacerbates the procedural concerns. At the state level, the primary institutional constraint limiting infrastructure improvements is the lack of adequate public funding mechanisms.

Findings presented in previous sections indicate that waterborne commerce within Louisiana accounts for 20% of the nation's total. The vast majority of this activity, 83%, occurs along the Lower Mississippi River and the Calcasieu Ship Channel, both of which are deep-draft waterways. Other coastal and inland waterway cargo movements account for the remainder.

In addition, cargo movements along the state's shallow-draft waterways are more significant than reported. The primary reasons for this under reporting are the standard reporting procedures used by federal agencies, another clearly defined institutional constraint, and the lack of reporting along the state's inland waterways. These challenges are institutional rather than physical.

A classic example of how this issue affects Louisiana relates to waterborne commerce in support of offshore oil and gas activities. Much of the data collected by federal authorities used in setting funding priorities are tonnage based. Oil and gas service industries are frequency-based operations as much as or more than they are weight-based. The result is under-reporting of statistics needed as support for many projects at the federal level. One proposed solution is for the state to accept that data gathering responsibility for a sufficient period to create a correlation between trip frequency and weight bearing cargo. In the meantime, the matter should be brought to light at the federal level. Additionally, other frequency based factors such as safety, personnel transfer, equipment mobility, and sustenance supply should be taken into account in waterway needs assessment and funding formulation. It is noteworthy that tonnage is not the only factor used in project justification; in-depth economic analysis also plays a significant role. Nonetheless, frequency of operations should be a weighted factor in project determination.

5.2 Waterborne Transportation and the State Economy Summary

The link between the state's marine transportation system and the state economy is vividly evident as presented in Section 4. More than half of the parishes in the state are adjacent to navigable waterways, and one in seven jobs in the state are waterway dependent. This geographic advantage has facilitated the development of local resources using water-based transportation facilities and services.

The corresponding port system, 39 separate public entities and countless private docks and terminals, operate as a public/private partnership. As a unit, this network handles approximately 485 million tons of cargo a year which includes 200 million tons as foreign trade. In addition, more than 65 shipyards—ranging in size from those building ocean-going naval and commercial ships and others specializing in fabricated metal rigs and structures for offshore oil exploration to those that repair smaller boats and barges along the bayous—are vitally linked to the economic framework of the state.

Information presented in the following sections parallels the economic impact analysis conducted in the previous chapter. A summary of industry contribution by major North American Industry Classification System sectors (NAICS codes) follows. Each sector was considered as water-dependent in the economic analysis section presented previously.

5.2.1 NAICS 11: Agriculture, Fishing, Forestry, and Hunting

Food and farm production in America's heartland contributes immensely to the entire nation and the world marketplace. With 50% of the nation's grain movements passing through Louisiana's waterways as dry-bulk cargo, private sector terminal managers are often experts in the field. With the ongoing growth in grain containerization, Louisiana has an opportunity to re-evaluate container-on-barge operations in the grain and food and farm products sectors. Private/public coordination in this arena may prove beneficial in regaining a more competitive position in container handling. Coordination among the Louisiana Departments of Agriculture and Forestry (DAF), Transportation and Development, and Economic Development in combination with both public and private grain terminals is required. While recent DED and DOTD cooperation in state waterway system improvements has been noted, the additional involvement of the DAF is critical to this initiative.

An additional avenue relative to the state's transportation system and the DAF as a function of waterways involves the ethanol industry and recent strides in the development of several sites across the state. Logistical benefits may be accrued via the waterways even though preferred modes of transport of feedstock and final products have historically been by truck and rail. Coordination and communication between DOTD and DAF on this matter is required, and the subject is worthy of future analysis from an industry-wide perspective.

DAF also plays a leading role in promoting the state's fisheries industry, one of the state's oldest and best known industries. The industry's workforce is mobile, and consistent production is indicative of a resilient work force and culture that has survived fluctuating environmental and economic conditions. The industry provides 37% of the nation's commercial fish harvest, and recreational fishing also plays an important role in the state's economy.

Because Louisiana's commercial and recreational fishing is keenly dependent upon clean and navigable waterways, the Louisiana Department of Environmental Quality must also become an active participant in the state's public/private ports and waterways partnership. Also, because Louisiana and the nation are so dependent on the state's waterways and coastal wetlands, DEQ and DNR, as lead public sector environmental stewards, should consistently upgrade environmental policy in guiding Louisiana toward becoming a leading edge environmentally conscious state.

A recent example of successful multi-agency collaboration at the state level affects the coastal region and the waterways inherent to that area. DNR and DOTD recently combined resources and, with the help of other state and federal agencies such as Louisiana Wildlife and Fisheries, NOAA, NRCS, the USACE, and several universities, completed the state's first combined coastal protection and restoration plan in April 2007. It was approved by the state legislature one month later. The framework is now in place for decades of efforts to stabilize and reduce coastal land loss while also maintaining and improving navigable waterways.

Another example of combined agency efforts is the proposed deepening of the GIWW as the Acadia to the Gulf of Mexico Access Channel (AGMAC) and the proposed deposition of dredged material to stabilize the shoreline and simultaneously enhance surge protection along the coast. Louisiana must embrace this and similar overlapping efforts as part of its marine transportation plan to achieve environmental as well as economic sustainability. While presenting the AGMAC as a successful collaborative approach among state and federal authorities, its true benefit is to the oil and gas industry addressed below.

5.2.2 NAICS 21: Mining

Oil and Gas, Coal, Mining Support Activities—With the anticipated expansion of offshore deepwater oil exploration and production in the Gulf of Mexico, growth in this industry will provide broadening economic benefit to the state. The Walker Ridge find announced in 2006 and the anticipated eastern expansion of the industry between the Mississippi River and Florida validate this assessment for oil and gas exploration, production, supply, maintenance, and services. As a result, expanded port-related development can be expected along and south of the GIWW for the length of Louisiana's coast. Deep-water oil and gas service opportunities as well as the increase in liquefied natural gas facilities offer economic development opportunity for the

Cameron Parish area and the Calcasieu Ship Channel. One LNG facility currently operates in Cameron Parish and three others are under construction or planned.

Continued expansion in petroleum mining and transport, along with domestic and foreign market demands, have the potential to influence the petroleum products and chemical manufacturing industries along the Mississippi River and the Calcasieu Ship Channel. (This statement does not include international commodity cost issues related to these industries and the international marketplace.) These expansions continue to offer potential value-added industry sectors based upon raw materials mined in and transported to and through the state. The creation of similar value-added industries that take advantage of the cargo flowing through this state on a daily basis should become a focal point of regional and state economic development strategy.

Coal, another petroleum based commodity within this NAICS code, is the single largest commodity handled by rail and the second largest by water in the state. Louisiana is now challenged to compete with neighboring states for movement of coal on waterways because of the expansion of coal handling facilities in Mobile and shifting supply and demand scenarios (barges for coal to Florida). More in-depth logistical analysis relative to the coal industry beyond the scope of this report is required to weigh the pros and cons of investing in the industry. However, the amount of lignite based coal operations in northwest Louisiana and the need for that coal at facilities along the Mississippi River offer significant opportunities along the Red River. In that regard, the Red River Waterway Commission and the Red River Valley Association petition to deepen the Red River from nine to twelve feet is worthy of in-depth feasibility analysis in accordance with federal procedures, which are in need of streamlining in terms of both complexity and length of time.

5.2.3 NAICS 31-33: Manufacturing

Grain, Sugar, Seafood, Petroleum Products, Chemicals—As noted waterborne cargo offers opportunity for spin-off industries. Other than value-added services provided by the oil industry (manufacturing), chemical manufacturing, and seafood industries, the state's economic profile portrays minimal value-added industry. The opportunity for keenly focused value-added industries that take advantage of the extensive cargo mix that passes within and through the state and the logistical advantages inherent in that offering should be a dedicated DED focus.

Ship and Boat Building—Ship-building, barge construction, and fabrication of structures for deepwater oil and gas exploration constitute a major industrial sector in the state. Like the petrochemical industry, it offers a value-added industry based upon proximity to the state's waterways. Currently, industry experts and numerous periodicals note that the supply of inland barges, critical in the determination of waterborne transportation costs, is dwindling. Inland barge retirements exceeded barge construction during the last seven consecutive years. In 2004, barge retirements exceeded construction by more than 5,000. As such, the tight barge

supply conditions have led to higher contract rates. According to available data, at least sixty-six barge and ship-building establishments are located in the state, and local industry expansions can and should be encouraged. In addition, continuous debate at the industry and legislative levels regarding the Jones Act generates disharmony in the industry thereby hindering functional efficiency. However, further detail relative to issues created by the Jones Act is beyond the scope of this report.

5.2.4 NAICS 48-49: Transportation and Warehousing

Rail, Water, Pipeline Transportation (NAICS 48)–The dominant role of the state's waterways as the main mode for freight transportation is clearly established in the Commodity Flow Survey (CFS 2002) data which indicates that 48% of total freight tonnage in the state is handled by waterways as compared to 23% for trucks and 5.9% for rail. The remainder is divided among pipelines, air, and miscellaneous classifications. Were oil and gas service industry tonnages included, waterborne freight would easily exceed half of the total.

Similarly, average shipment distances also favor inland barge transportation with an average distance of 712 miles compared to 683 miles for rail and 343 miles for trucks for hire. The Louisiana waterway system exerts a strong imprint on the state's economy, handling a major share of freight, facilitating foreign trade, and providing optimal sites for key waterway-dependent industries. While intermodal activity (truck, rail, and pipeline) as it relates to waterway transportation was recognized within this study, detailed analysis of this industrial sector was not part of the scope or this study.

Support Activity for Water Transportation (Ports, Harbors, Longshoremen, etc.) (NAICS 48) and Warehousing and Storage (NAICS 49)–These industry sectors are discussed together as industry use of the waterways often is influenced by the type of cargo transfers and warehousing requirements that must be in place for the efficient movement of cargo. Ports, harbors, and terminals along the waterways develop specialized handling and storage facilities to accommodate the variety of cargo types such as containerized, dry-bulk, or liquid-bulk cargo that move along the waterways. For example, the Calcasieu Ship Channel is the center for LNG, while the Port of New Orleans deals with major steel and metals and Port Fourchon is an intermodal support base for over half of the domestic oil and gas activity in the U.S.

The following sections outline some of the issues regarding these types of cargo transfer.

- **Containerized Cargo–**The advantages enjoyed by the Louisiana maritime transportation system because of its strategic location may be over-shadowed by several far-reaching technological and institutional changes that recently transformed

the freight transportation industry in other regions but not in Louisiana. By way of example, two interrelated and relatively recent industry developments can be summarized as (1) the use of containerized cargo and (2) the evolution of intermodal transportation systems.

Containerization revolutionized much of the transportation chain, from vessel configurations to port terminal designs and cargo handling equipment. Intermodal transportation systems simultaneously developed efficient and seamless cargo transfer between modes. The essential differences in the new system are (a) the speed of freight movement, which is mainly supported by technology, and (b) the emphasis on service to the customer, which is based on institutional or human factors.

The maintenance and development of container freight market shares are important for several reasons. First, the economic impacts of handling containers is several times higher than the impacts of handling any other cargo; second, the highly competitive market share of containers is often regarded as a port performance measure. More than 70% of general cargo is currently containerized, and the use of containers continues to grow and evolve.

Several public and privately based studies on this subject focused on restoring and/or enhancing the state's competitiveness in this sector and concluded with proposals for large capital investments. From the state's perspective, little in the way of comprehensive port productivity and cost-analysis studies have been conducted to examine container based performance enhancing opportunities, site opportunities at existing facilities, and interrelated cost-benefit functions to enhance the region's competitiveness. Additional information to suggest possible studies that should be conducted are specified in section 3.4.7.1 and 4.6.4 of this report.

As noted, Texas now handles more cargo than Louisiana. That change in rank is the result of several factors, one of which is the increased handling of containerized cargo. This fact, functions of market place density, and other issues noted below indicate that the state's competitiveness along the Gulf Coast is waning. An organized approach to reversing these trends will require coordination and strategy in unified fashion between and among ports and applicable state agencies. Denying this fact and/or delaying the initiation of this endeavor only makes the chore more challenging and more costly to the state.

- **Dry-Bulk Cargo**–Mississippi and Alabama public ports have created keen competition for Louisiana in the handling of dry-bulk cargo. The port of Mobile has developed a large coal terminal, and increasing coal volumes are moving from the Appalachian region to Florida using the Tennessee-Tombigbee River. Grain exports from the Pacific Northwest are also expanding their respective market shares by utilizing favorable tariff rates provided by railroads. Louisiana does not have a

planned, unified, or strong integrated intermodal system as such, but rather an aggregate of multiple private and public modes, each of which tends to be inwardly focused on its own individual area of interest with little or no cross communication and collaboration. Little if any federal or state incentives exist to encourage rail participation, therefore further compounding the weak integration between rail and water. This issue has become a major concern of the Louisiana chemical industry and directly affects operational efficiency.

- **Liquid-Bulk Cargo–**Most of the liquid-bulk freight on Louisiana waterways consists of intermediate products moving between refineries for further processing. In recent years, the consolidation of several refineries into larger units producing a wider range of products have resulted in transportation savings to major oil producers. The rapid growth in traffic of chemicals and related products continues to benefit the Louisiana marketplace with refinery-based cargo products.

5.2.5 Other NAICS

Other NAICS codes include Wholesale Trade (42), Retail Trade (44) Machinery and Equipment Rental Leasing (53), and Arts, Entertainment, and Recreation (71). These sector contributions to the maritime industry are noteworthy but less significant than those discussed previously. All of these sectors are influenced by and benefit from growth in the other maritime dependent sectors and are presented below.

- **NAICS 42–Wholesale Trade (Farm/agriculture, Chemical, Petroleum) and NAICS 44–Retail Trade (Direct Selling Establishments, Fish Distributors)—** These industries, individually, have been discussed elsewhere in this section. As a function of the wholesale and retail trade of these commodities, though, a different set of economic activities exists. Generally, operations are dependent upon either or both manufacturing facilities and distribution networks. As such, value added opportunities are plentiful in this arena also. With continued growth anticipated in the farm and agricultural products sector, petroleum and related products, and the fisheries in Louisiana, growth in the wholesale and retail trade sector is inevitable. Additional manufacturing opportunities in these sectors abound, and appropriate marketing efforts that focus on Louisiana manufacturing and trade can and will encourage additional growth.

- **NAICS 53–-Machinery and Equipment Rental and Leasing (Farm/agriculture and mining)—**Along some waterways, rental companies exist to provide leased or rented large-scale equipment to either the farm sector or the oil and gas sector. As farming and mining/extraction sectors grow, this activity can be expected to increase as well.

- **NAICS 71–Arts, Entertainment, and Recreation (Marinas)—**In support of more recreational waterway activities, the contribution of this sector to the economy is more culturally based and influenced by local use and as a function of tourism.

In summary, economic analysis by waterway dependent industry sectors clearly identifies trends and opportunities that exist for Louisiana's maritime system and related industries. Along with the summary of waterway conditions and waterborne commerce, a list of physical project needs was developed as outlined in the following section.

5.3 Recommended Projects to Reduce or Eliminate Physical Constraints and to Provide Economic Development

Specific physical projects and institutional issues identified as constraints to Louisiana's waterway transportation system and hence its economy have been identified throughout this report. These projects and procedures, according to the scope of services, are intended to achieve the following:

- improve the efficiency of waterway operations by alleviating physical constraints
- expedite project planning, authorization, and identification of funding mechanisms by streamlining current USACE and state procedures
- benefit the state and national economies via waterborne cargo flow and international trade

Selected projects are presented to address physical constraints, institutional constraints, cargo flow projections, and economic considerations. The proposed projects and concepts directly impact waterways now or are needed to keep pace and remain competitive with growing demands and economic changes in waterborne commerce on a local, state, national, and international level. Proposals for construction projects are based on previously referenced U.S. based cargo data. Project selection and presentation do not reflect long-term cargo shifts specific to international economies such as those related to China and other Asian markets; such analysis is not within the scope of this report. Non-construction concepts are based on institutional constraints and economic trends that were identified.

5.3.1 Group I—Construction Projects for Immediate Physical and Infrastructure Improvements

The projects listed below are imperative for efficient operation of the state's waterborne commerce system. Except for the MRGO, all of the projects identified within this group address critical physical constraints that pose safety hazards or cause traffic congestion.

- **Simmesport Railroad Bridge Alteration**—The bridge has been determined a hazard to navigation by the U.S. Coast Guard. The bridge is located on a complex bend in the river and the moveable mid span, which is not in the middle, does not allow room for proper alignment of barges to pass under the bridge. Tug operators use the fixed span during low water, however, during high water, vessels cannot pass under the fixed span and must use the mid span requiring dangerous navigation maneuvers. The alternative, during high water, is for mariners to use the GIWW Alternate Route which increases the trip length to 1 ½ days or use the Mississippi River which increases the trip length by 2 ½ days. Additionally, traffic congestion at the Bayou Sorrel Lock which allows vessels using the GIWW Alternate Route to cross the East Atchafalaya Basin Protection Levee also causes delay issues. Because of bridge height, rapid currents, and the placement of support columns, hazards to navigation exist.

  The bridge has been hit several times, and concerns and complaints have been filed with the Coast Guard indicating that numerous near-collisions occurred. Communications with mariners indicate the route is often avoided because of these hazards. DOTD requested funds on behalf of the USCG under the Truman-Hobbs Act in the amount of $47 million for replacement of the bridge. No resulting action at the federal level has been noted.

- **Bayou Sorrel Lock Replacement**—This lock, which was completed in 1951, allows waterborne traffic to move on the GIWW Port Allen to Morgan City Alternate Route through the East Atchafalaya Basin Protection Levee. It is the narrowest lock in the state at 56-feet wide and allows single width barge tows only. A multiple barge tow must be separated to allow passage. The result is congestion, delay, and increased hazard potential. Vessel traffic and cargo tonnages continue to increase on this waterway as noted in Section 3, and replacement of the lock is imperative to meet increased vessel traffic needs and to mitigate hazard potential. The lock is listed for authorization in the WRDA bill which was under congressional consideration at this writing. To date, no less than 10 years have been invested in federal procedure wrangling in pursuit of this improvement.

- **Inner Harbor Navigation Canal Lock Replacement**—The IHNC lock became operational in 1921 and is one of the oldest locks in the nation. It is a vital link to the nation's inland waterway system connecting the GIWW, the Mississippi River, the MRGO, and Lake Pontchartrain. For decades it has not functioned in accordance with its intended operational and design criteria. Delays to maritime traffic lasting 24 to 36 hours are not unusual, and users indicate that a much longer than normal delay

occurs with every use. In succinct terms, the lock's capacity is inadequate to accommodate the volume of existing and future traffic.

When the IHNC Lock is inoperable as a result of malfunctioning equipment or structural failure, vessel operators rely on the MRGO as the alternate route. With Congress considering closure of the MRGO, the IHNC Lock must be fully operational. Demolition on the proposed lock construction site and required environmental restoration was completed in June 2005. However, construction of the lock has been stalled because of continued environmental and legal matters. Replacement is estimated to take 12 years once legal proceedings are complete. Even after the replacement of the IHNC Lock, a shallow-draft alternate route will remain a primary concern to navigation interests. Ideally, the IHNC Lock replacement must be expedited and MRGO should be limited to shallow-draft vessels only.

5.3.2 Group II—Construction Projects for Future Physical and Infrastructure Improvements

The projects in this group are needed to maintain and improve waterway infrastructure, influence traffic capacity, and allow continued growth in waterborne commerce. These projects should begin as soon as practical. Channel deepening recommendations, in particular, require environmental impact and feasibility studies and approval of required study by USACE prior to implementation.

- **Atchafalaya River (Morgan City to the Gulf)—Channel deepening to 35 feet and alignment stability**. Feasibility studies continue. With increasing waterborne traffic and commerce along the coastal waterways and at coastal ports, local proponents feel that deepening this channel will allow greater usage of the waterway. Existing evidence indicates that the channel is currently underutilized because of depth restrictions and a constantly moving thalweg alignment. Regardless of the need for deepening, stabilizing the channel alignment to its mandated 20-foot depth is critical to the sustainability of the river and its related economic activity in the lower Atchafalaya Region.

- **American Pass—Channel deepening and sediment traps**. American Pass is located in the southern section of Lower St. Martin Parish just north of the main channel of the Atchafalaya River. At the mouth of American Pass, just north of the weir emplaced by USACE, a subsurface flat has formed. The sandbar has created a serious hazard to navigation. The channel is used by commercial as well as recreational. Reports of stranded boaters hundreds of feet into the sandbar were noted by fishermen and tour guides. Reports indicate that fishermen traveling at high rates

of speed have been ejected by the sudden impact with the sandbar. The St. Mary Parish Government accepted responsibility to apply for a permit requesting approval to dredge a portion of American Pass to alleviate the situation. The permit was approved in 2007. The project will involve hydraulic dredging of the old channel to recreate the forty (40) bottom width and will include sediment traps to catch any new sediment from the river

- **GIWW/Commercial Canal/Port of Iberia Channel Deepening (AGMAC)—Channel deepening to -16 feet.** In 2006, the USACE approved the Port of Iberia study to deepen the GIWW from the Port of Iberia Commercial Canal to the Freshwater Bayou Channel into the Gulf of Mexico. The increased depth will facilitate growth in the off-shore fabrication businesses that reside at the port. The Freshwater Bayou By-Pass Canal was built by the Abbeville Harbor and Terminal District in 1986 to allow oversized vessels to by-pass the lock. It should be noted that even though there is a by-pass canal to the Freshwater Bayou Lock, the lock is still vital for small barge traffic in the area.

- **GIWW/Port of West St. Mary**—Channel deepening to -16 feet (port access channel and 7 miles along the GIWW) includes an ongoing feasibility study for deepening of the port channel. This project is an eastward extension of the AGMAC project.

- **Calcasieu Ship Channel—Widening to an optimally efficient dimension.** Because of limited maintenance funding, the USACE has been unable to maintain 40 feet by 400 feet channel dimensions at all times. Currently, channel dimensions allow one-way traffic only and prevent the passage of some large vessels. Congestion is concentrated along a 15-mile reach of the channel generally between the GIWW and Lake Charles. Vessels of 32 feet draft or greater cannot pass side by side on the inland reach of the ship channel requiring the inbound vessel to wait in the Gulf or outbound vessels to wait upstream until the channel is cleared. The exception is LNG vessels for which the U.S. Coast Guard mandates a leading safety zone of two miles ahead and one mile behind. With new LNG facilities planned for development or under construction, traffic congestion is expected to worsen. With existing and planned LNG facilities along this waterway to provide 20% of the nation's daily use, the ship channel is an energy lifeline to both southwest Louisiana and the nation. Channel maintenance and provisions for anchorage areas are needed to alleviate congestion. The Calcasieu River is a major deep-draft coastal waterway with vast potential to provide more value to the coastal waterborne commerce system. Additionally, opportunities abound to combine major dredging operations with beneficial use of dredged materials to create environmental enhancements and a wealth of opportunity in the region.

- **Red River (Old River Lock to Shreveport)—Channel deepening to -12 feet**. Authorized for a 9 foot deep channel, the Red River provides an important link to the state's inland navigable waterway system. Currently, 90% of the waterway is 12 feet; however, approaches to the locks and dams and around bends are only 9 to 10 feet which limits certain vessel movements. Other significant waterway systems south of Cairo, Illinois, except for the Red, are currently authorized for a 12 foot channel including the Mississippi River, Arkansas River, Atchafalaya River, and the GIWW.

  Barges traveling northbound on the Atchafalaya and Mississippi Rivers destined for the Red must be light loaded to 9-foot draft causing traffic delays and inefficient operations for shippers. In the southbound direction, only barges loaded to 9-foot capacity can travel down the Red to the Old River Lock. The river then connects to the Atchafalaya and Mississippi Rivers which in turn connect to Baton Rouge, New Orleans, Morgan City, the GIWW, and ultimately to the Gulf. The opportunity to expand shipping to and from the Red River is thus severely limited as 12-foot draft barges cannot travel continuously to or from the Red River and major southern port destinations.

  Deepening of the channel would allow larger capacity tows to utilize the waterway and thereby improve operational efficiency and cost effectiveness. Increased barge loading also increases cargo capacity and efficiency of the waterway system on a broader scale, lowering overall transportation costs in the region by generating the tendency to reduce rail rates in the region. In addition, with the potential for developing business along the Mississippi River in Ascension Parish that would utilize lignite from mines in northwest Louisiana, navigability of the Red River becomes a key factor in the economics of this business venture.

- **Houma Navigation Canal (HNC)—Channel deepening to -20 feet from Houma to the Gulf of Mexico.** The potential to increase waterborne commerce from the Gulf to inland ports and waterways as well as to support the growing deepwater oil and gas fabrication facilities exists for this waterway. The USACE is conducting a re-evaluation study to identify an economically feasible and environmentally acceptable depth of the canal. This study began in response to congressional authorization for design of a lock on the HNC (part of the Morganza to the Gulf Hurricane Protection Plan). Dimensions of the lock are dependent on the HNC dimensions, and navigation interests have expressed concern that lock design should consider future traffic and growth. A request was made by the Terrebonne Port Commission to USACE to evaluate deepening of the HNC prior to finalization of any lock design.

- **Baptiste Collette—Channel deepening to accommodate oil and gas industry traffic**. From the Mississippi River, this waterway provides an opportunity for access to the eastern Gulf. If new oil and gas fields open east of the Mississippi River as anticipated, this project will offer Louisiana based operations improved access and lessen demand for similar service industries in Mississippi and Alabama.

- **GIWW Locks—Lock replacement.** With the anticipated increase in waterborne commerce along the GIWW and the fact that many of the GIWW locks currently cause vessel delays and traffic congestion 100% of the time, replacement of three GIWW locks is warranted.

  The Calcasieu Lock was completed in 1950. Delays to navigation occur on a regular basis because of increasing vessel traffic. Since 2000, studies to increase lock capacity have been recommended. A feasibility study and associated environmental impact study are underway to identify potential alignments for a replacement lock.

  The Algiers and Harvey Locks in the New Orleans vicinity were completed in 1956 and 1935 respectively. The GIWW, a system in itself, connects coastal and inland waterways and requires that these locks conform to the traffic increases along the entire GIWW. As part of the GIWW system, these locks are among the smallest with restrictive dimensions that cause traffic delays and congestion. Increased lock capacity and operational efficiency is needed to satisfy present demand and anticipated increases in waterborne commerce along the GIWW. Both locks were considered for improvements previously by USACE; however, no action has been taken to date to reconsider these locks for replacement.

Additional construction projects and one non construction project include those listed below. Justification for deepening Bayou Lafourche and extending navigability of the Red River north of Shreveport are still needed. Although the project warranted the dredging of the Calcasieu Ship Channel and beneficial use of dredged material is not a traditional construction project.

- **Bayou Lafourche—Channel deepening to 50 feet (local request) from Port Fourchon to Belle Pass.** This channel and the port support offshore oil and gas and fisheries industries. The current depth restricts full utilization of the channel by oil and gas support vessels and limits port use for future cargo based operations.

- **Red River—Extension of the navigable channel north of Shreveport into Arkansas.** North of Shreveport, the waterway is unsuitable for commercial navigation. To bring the waterway up to navigable standard, it will be necessary to construct features similar to those on the lower Red, i.e. locks and dams. The

USACE currently is authorized and funded to perform a feasibility study for the extension. The study is scheduled for release for public comment in 2008. In addition to the benefits of navigation, barge transport, and recreation, economic development benefits would accrue to the region as a result of an expanded industrial base and inducements for the location of new industries.

- **Beneficial Use of Dredged Material (Calcasieu Ship Channel)**—While dredging in the Calcasieu Ship Channel will continue to increase, limited sites remain to dispose of its dredged material. However, the potential exists to utilize the dredged material to rebuild nearby wetlands and lands slated for development (particularly on Monkey Island and in the vicinity of Cameron). A dredge disposal management plan is under development.

5.3.3 Group II— Non-Construction Concepts to Improve Louisiana's Waterway System

Economic development for Louisiana's maritime industry will depend on strong commitments from state agencies, ports, and maritime interests. As noted throughout this report, commitment to growing and strengthening the maritime industry will increase the state's competitiveness locally, regionally, nationally, and internationally. During the 2005 hurricane season, the nation's dependence on Louisiana for maritime trade cargo in New Orleans and Lake Charles and in the oil and gas industry along the coast became very apparent. The importance of our waterway system should continue to be emphasized and promoted with commitment from state and local entities.

Substantial economic improvement will begin to occur when the physical constraints and infrastructure improvements previously identified are in place. However, major institutional constraints are also preventing infrastructure improvement. Examples include lack of current funding for projects, the backlog of design and construction that continues to impair the system, and the lack of a statewide strategic initiative for the waterway system as a whole.

In addition to funding and strategy based issues, analysis of cargo based trends, projected cargo growth, and world economy and marketplace issues identified several concepts for economic improvement and development in the maritime system. Strategy, funding, and other projects for economic growth are described below.

- **Develop a fully representative maritime transportation coalition** to work with federal, state, and maritime-related agencies to guide waterway improvements and economic based projects. The state's Maritime Advisory Task Force exists for this purpose but has not involved the DOTD marine and rail section. A coalition that involves state and federal officials, Department of Transportation and Development, MARAD, the Ports Association of Louisiana, the Department of Economic

Development, Department of Natural Resources, the Department of Agriculture and Forestry, and the U. S. Department of Commerce, among others, is needed to market the Louisiana waterway system, promote private sector financing, elicit increased state and federal spending on the waterways, and participate in redefining and streamlining federal procedures. The fragmentation of maritime-related agencies is a nationwide issue, and Louisiana has the ability to step up and set precedents that benefit the state and the nation's waterway system.

- **Develop a maritime marketing strategy** as a result of the maritime coalition that represents all stakeholders as described above. Louisiana does not have a long-term marketing strategy that considers the state waterways as a system. Promotion of the Louisiana waterway system should expound upon its importance to the nation as a gateway among international markets and a gateway into America's heartland, both via the Gulf of Mexico.

- **Streamline federal authorization and funding processes and restructure USACE procedures to minimize time constraints** (currently under legislative consideration). Currently the USACE budget process focuses narrowly on individual projects which are proposed by individual cost-shared sponsors. Funding of projects to completion often is uncertain for many large, multi-year projects, and more projects have been authorized than have been funded. System performance should be the primary measure of project value and funding priority within a fiscally constrained process, and funded projects should be fully funded in useful increments to avoid inefficient delays in construction activities. In addition to new projects, USACE is also responsible for O&M of the waterways and infrastructure. Similar constraints are applicable.

  Federal funding to the USACE as an annual congressional appropriation constitutes the major source for O&M and capital expenditures. However, while initial investments in the national network of waterways were made several decades ago, expansion of the system has been kept to a minimum. Because of the rehabilitation needs of aging infrastructure, USACE operations and maintenance funding needs have dramatically increased in recent years. The median age of all lock chambers in the state system is 50 years, and all but five chambers on the Upper Mississippi River were built before 1940. Because a major portion of waterway congestion is caused by breakdowns at old locks and dams, the USACE is under increasing pressure from barge operators, shippers, and local and state governments to construct larger, modern locks that can accommodate expanded and more efficient tows.

  The USACE O&M funding gives priority to maintaining high-use segments of the waterways based on ton mile. However, it is often the non-federally maintained

tributaries as part of the waterway system that provide and supply the tonnages to the major waterways. Coastal waterways also do not meet the ton mile criteria and yet provide access to Gulf operations for offshore oil and gas industry as well as commercial and recreational fishing.

Based upon the present backlog, the current level of available O&M funding is inadequate. The Inland Waterways Trust Fund does not have an adequate budget to address the backlog of construction and O&M projects that are needed to maintain and improve the nation's waterway system. The Harbor Maintenance Trust Fund has a $6 billion surplus that Congress is not directing for its intended use to maintain and improve the nation's waterway system.

As a general trend, the national investment in water resources projects has not kept pace with the level of economic and social expansion. Capital investment in public water resources infrastructure has decreased by 70%. For example, in the 1970's, the USACE civil works construction appropriations were in the $4 billion range. In the 1990's, the funding for construction dropped to an average of $1.6 billion a year and has remained relatively unchanged. Only a portion of these reported dollar amounts are dedicated to navigation projects.

- **Develop additional state funding sources.** In light of the federal funding failure to maintain and improve the waterway system, the state should prepare to accept partial responsibility for these tasks and establish funding sources accordingly. Competition for funding sources that already exist in the state dictate that new funding sources should be identified. Louisiana is not alone when it comes to identifying potential funding sources for infrastructure improvements that provide economic benefits to the state and the nation. Similar efforts to create funding sources have been applied across the nation with varying results. A few examples for funding maritime related development in Louisiana are noted below.

  a. The opportunity exists for trust fund development to be directed for maritime transportation use that does not interfere with legal issues relative to interstate commerce yet utilizes fees generated from maritime operations. While billions of federal dollars are spent on waterway maintenance and improvement, state dollars provide a mere fraction of expenditures on the state waterway system. Louisiana must take serious measures to invest in the waterway system and should explore several options for building a trust fund. Senate Bill No. 311 (approved in 2005) created the Louisiana Waterways Infrastructure and Development Fund in the state treasury. To date, this mechanism has not been funded. The proposed fund was to direct monies specifically to waterside infrastructure and development

projects whose sole purpose is for the transportation of goods, people, and cargo for intrastate, interstate, and international commerce. A modification of this bill is needed to ensure monies are directed to waterway improvement in addition to ports.

b. Modify laws so that taxes associated with maritime operations that currently go into general fund accounts could and should be measured and a portion redirected to a maritime transportation fund such as that described above.

c. A reduction in the marine fuel tax exemption should be considered for use in seeding the fund described above in a similar capacity.

Success in developing new funding sources will come only as a result of concerted efforts among maritime related agencies in the state, convening with state and federal legislators, garnering industry buy-in and support, and promoting the needs of Louisiana's maritime system. An agenda that clearly focuses on state maritime funding needs is required, and all previously listed private and public entities must be involved. With funding mechanisms directed to the maritime system, the following economic-based concepts can commence.

- **Increase value-added manufacturing** industry along the waterways (iron ore and scrap metal, chemical manufacturing, goods manufacturing, ethanol industry, grain containerization, etc.). The limited consumer base within the state limits the type market expansion that areas such as Houston have already achieved. Louisiana must create a strategy that offers incentive to value-added service and manufacturing

- **Develop and/or work with additional industry-specific coalitions** such as the Louisiana Chemical Association to capitalize on interstate and intrastate interests, transportation efficiency, and economic trends.

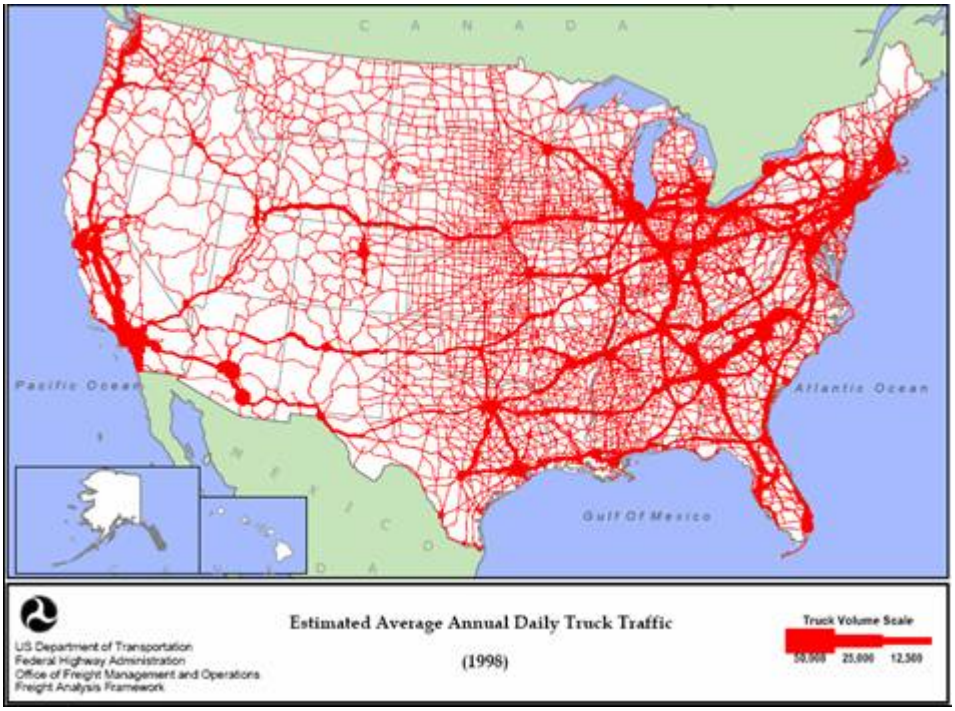
- **Increase private sector investment** through marketing, tax incentives, and state grants. Increasing private sector investments encourages a larger, stronger consumer base.

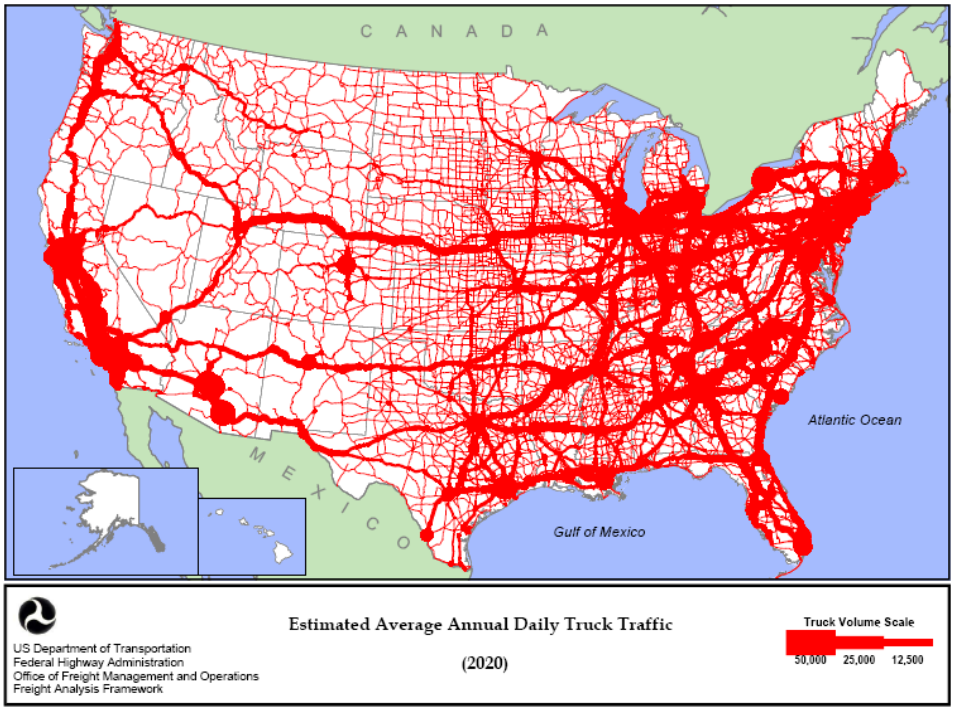
- **Develop comprehensive tracking systems for smaller waterways** that support the oil and gas and fisheries industries. A tracking system must be defined, created, and implemented to truly establish Louisiana's role in the state and international marketplace and to aid in justifying state and local projects. Frequency of use should be included as a performance measure as well as, and on accession in lieu of, ton/miles as are used for larger waterways.

- **Accelerate Compliance with Homeland Security Mandates—**While the Transportation Security Administration will require other transportation modes to

obtain security credentials, the maritime industry is required to implement the security requirements first. Louisiana has the largest combined U.S. port complex along the Mississippi River, employing several thousand workers, as well as other coastal and inland ports that employ thousands more workers. The state should set the pace for security compliance and lead the nation in achieving top security ratings in the maritime industry.

- **Assess and Develop Short-Sea Shipping System**—The one solution to congested truck and rail traffic may be an investment in the marine transportation system that fully integrates waterborne transportation into our nation's transportation system. Short-sea shipping functions as an alternative form of commercial transportation that utilizes inland and coastal waterways to move commercial freight from major domestic ports to destination sites. Similar to the hub-spoke system used in aviation, short-sea shipping utilizes economies of scale by using very large, high volume main line vessels to deliver large quantities of cargo to a few hub ports. From the hub port, the cargo is then distributed on smaller short-sea (feeder) vessels to other smaller destination ports. Without short-sea shipping, the level of congestion on our already overburdened transportation infrastructure will only increase as shown in the following diagrams.





By utilizing short-sea shipping, the U.S. may expand economic growth and trade; relieve road congestion and improve mobility; create jobs in ports, terminals, and the merchant marine; enhance national security; and mitigate pollution. A Short-Sea Shipping Memorandum of Cooperation is already in place with Canada and Mexico. (MARAD, Flyer on Short-Sea Shipping). More recently a Short-Sea Shipping Act was introduced to exempt certain coastal and Great Lakes cargos from the harbor maintenance tax imposed on domestic movements. The elimination of this tax would encourage those contemplating coastal start up services for port-to-port domestic movements, thereby promoting increased maritime commerce and short-sea shipping (AAPA Alert, March 26, 2007).

One main issue with short-sea shipping is the lack of U.S. flagged vessels capable of moving this domestic cargo in accordance with the Jones Act. To make short-sea shipping successful, it may be necessary to explore creative methods of re-flagging small vessels or the possibility of amending the Jones Act.

- **Expand Container-on-Barge Operations**—Containerized shipping is not only the fastest growing technique for transporting all types of cargo, but it is also considered one of the most efficient and cost effective methods. The surge in containerized cargo is driven mostly by international trade. With the increasing role played by the foreign component of U. S. waterborne commerce, it is imperative that the Louisiana marine transportation system take advantage of this trend. Less than 2% of the

nation's containerized cargo is handled in Louisiana, and it will be difficult for Louisiana to gain a competitive advantage over modern high-volume facilities such as those in Houston and Miami. However, the handling of niche container cargos such as perishables or steel, for example, may provide an effective means for Louisiana to become competitive. With the addition of value-added manufacturing industries along waterways, as mentioned above, increased containerized cargo can be expected and is encouraged.

- **Continue to Expand Red River Traffic Volume**—Completion of the Red River "opening" in 1994 allowed for several small-scale private sector operations to develop. Additional efforts to increase private sector industry at the waterfront should be explored. The fact that studies are being conducted to open the Red north of Shreveport into Arkansas adds momentum to future growth and will add to the value of the Red below Shreveport as an avenue to other regional industries in the near future.

- **Improve Rail-Water Interface**—The maritime system is highly dependent on unobstructed transfer of cargos to and from rail. While evaluating the rail-water interface is outside the scope of this study, surveys conducted as part of this study cited rail-water connections as an operational constraint. Deregulation of the rail industry in the early 1980s resulted in mergers between larger rail carriers that focused on high-density lines and prevented the shorter lines from full participation in the network. Carrier rates and market competition as they interface with transfer of waterborne cargos were affected. Federal incentives to improve rail to water transfers are needed.

- **Continue to Improve In-State Intermodal Transportation Centers and Interfaces—**An increase in value-added manufacturing requires an increase in distribution centers which then requires an increase in intermodal connectivity for delivery to the consumer base. A strategy to expand the maritime industry sectors should be coordinated with improvement and expansion of infrastructure and intermodal connectivity centers.

5.4 Costs and Benefits of Construction Projects and Non-Construction Concepts

5.4.1 Cost / Benefit Assessment of Construction Projects

Cost/benefit analysis identifies all positive factors which are benefits. The analysis then identifies all negatives which typically are costs but can also be intangibles such as loss of jobs. As an economic tool, the cost/benefit analysis evaluates the desirability of an action in a

marketplace, such as the Louisiana waterway system, and gauges the positive and/or negative effects of that action.

All of the construction and non-construction projects previously discussed have associated costs and benefits. For the purpose of this study, costs and benefits are discussed in terms of dollar or social value. Social value includes the overall qualitative value of improving the economic contribution of the waterway system or project to the state, the region, and/or the nation.

The construction projects identified to improve Louisiana's waterway system are listed in Table 5-1a along with the benefits that result from implementation of the projects. Estimated costs for studies, engineering/design, construction, and maintenance also are listed where available. Cost estimates for reconnaissance and feasibility studies and engineering and design were based on known or standard annual federal expenditures. Construction costs estimates were either known or estimated based on similar project types. Feasibility studies generally provide detailed estimates of construction cost and cost/benefit ratios measured in dollar amounts.

All of the construction projects identified address waterway system constraints or deficiencies. If no action is taken or dollars spent to implement these projects, no benefits would be realized. However, safety issues along the waterways would escalate; operational efficiency would decline further; cargo flow capacity would stall at current levels limiting use of the waterways to smaller vessels and tows; and no economic expansion would occur. The Louisiana waterway system will not be able to maintain its position as a leader in the maritime industry if no action is taken.

Completion of construction projects needed immediately such as the Bayou Sorrel Lock replacement, the IHNC Lock replacement, and the Simmesport Bridge Alteration will provide immediate benefits by alleviating safety hazards and traffic congestion. Completion of construction projects for future improvements to coastal and inland waterways and locks will provide benefits such as enhancing operational efficiency, allowing larger vessel and tow capacity, expanding economic impact, and restoring or improving the state's competitive edge with neighboring Gulf States. The benefits that could result from implementation of these projects extend beyond the state line, positively affecting interstate and international maritime economies.

As noted, Louisiana's maritime system is key to both the interstate and international markets for petroleum and petroleum products, food and farm products, crude materials, and chemical products. Louisiana must strategize to expedite the federal process for funding and implementation to get these projects in place or step up state interest and support in the overall

maritime industry. A lack of interest or monetary input from the state leaves the state at the mercy of federal practices. In contrast, increased interest and monetary input from the state puts the state in control of a strategy for the waterway system.

The projects and project status (recon, feasibility, construction, etc.) are shown in Table 5-1a associated values do not include all costs for the projects listed. With projected growth in domestic and foreign markets that affect the maritime industry in Louisiana, it is not unrealistic to expect a highly significant economic impact from future state investment in the state's maritime industry—if Louisiana is prepared.

The Red River Water Commission recently completed an economic impact assessment to measure the regional benefit of its five locks and dams, ensuing port development, and other impacts directly associated with the project. Benefits in spending attracted to the area (mostly federal construction) $19 for every $1 spent. In new sales, the economic benefit reached $35 per $1 spent. In household earnings, i.e., jobs, the impact was $11 per dollar invested. It is noteworthy that gaming impact in the Shreveport-Bossier area is not included in the noted impact results.

Timeliness of project implementation is a factor in the return the state will realize—the longer it takes to get projects implemented, the more costly the projects will become. In the meantime, Louisiana will lose its edge to neighboring states, and it will be decades for the state to recover and establish a new status quo within certain markets. Louisiana can only benefit from implementation of waterway construction projects.

5.4.2 Qualitative Benefits of Non-Construction Concepts

Non-construction concepts were identified in this study to address institutional constraints and economic development opportunities based on cargo flow and other economic impact parameters. The concepts identified are listed in Table 5-1b along with the benefits that would result. Non-construction concepts, for example, include consistent federal and state funding sources; a fully representative maritime coalition, statewide maritime marketing strategies; and various industry expansions such as short sea shipping, container on barge operations, private sector investment, and improved intermodal centers. No costs were assigned to these concepts as they are presented as functional concepts only. Nonetheless, the resulting benefits are described in a qualitative manner.

If no action is taken to develop these concepts, maritime related projects will continue to develop in piece-meal fashion i.e., waiting on federal dollars and without a statewide strategy. The coastal restoration master plan set a precedent in this state for combining hurricane protection and coastal restoration for the entire coast into one plan and with stakeholder approval. In the same manner, a unified strategy among stakeholders in the state's maritime

Table 5-1a
CONSTRUCTION PROJECTS IDENTIFIED TO IMPROVE LOUISIANA'S WATERWAY SYSTEM

No.	PROJECT	BENEFITS										BENEFIT RANGE			* COST (When Available)				
		Removes Safety Hazard	Alleviates Congestion	Enhances Operational Efficiency	Allows for Larger Vessel/Tow Capacity	Accomodates Deeper Draft Vessels/Tows	Shortens Travel Distance/Time	Provides Alternate Route	Provides Flood Control	Expands Economic Impact	Improves State's Competitiveness	Intrastate	Interstate (Domestic/National)	International	RECON	Feasibility	Preconstruction Engineering & Design	Construction	Average Annual O&M
	GROUP I--PROJECTS FOR IMMEDIATE PHYSICAL AND INFRASTRUCTURE IMPROVEMENTS																		
1	Simmesport Railroad Bridge Alteration (Atchafalaya River)	X		X			X			X	X	X			---	---	---	$47,000,000	---
2	Bayou Sorrel Lock Replacement (GIWW)	X	X	X	X		X		X	X	X	X			---	---	$5,100,000	$9,680,000	---
3	Inner Harbor Navigation Canal (IHNC) Lock Replacement (New Orleans) in Conjunction with Maintaining and Alternate Route	X	X	X	X		X			X	X	X	X	X	---	---	---	$804,000,000	---
	GROUP II--PROJECTS FOR FUTURE PHYSICAL AND INFRASTRUCTURE IMPROVEMENTS																		
4	Atchafalaya River (Morgan City to the Gulf) Channel Alignment to 20 feet			X	X	X		X		X	X	X	X	X	---	---	---	---	$3,780,864
5	Atchafalaya River (Morgan City to the Gulf) Channel Deepening			X	X	X				X	X	X	X	X	$197,000	$3,610,000	$1,500,000	---	---
6	American Pass	X		X		X				X		X			---	---	---	---	---
7	Bayou Lafourche Channel Deepening at Port Fourchon			X	X	X				X	X	X	X	X	---	$210,674	---	$1,800,000	---
8	GIWW/Commercial Canal/Port of Iberia Channel Deepening (AGMAC) Channel Deepening to 16 feet			X	X	X	X	X		X	X	X	X	X	---	---	$6,000,000	$163,312,000	$1,843,000
9	GIWW/From Port of West St. Mary Channel to AGMAC Deepening to 16 feet			X	X	X				X	X	X	X	X	---	---	---	$25,373,882	---
10	Calcasieu Ship Channel Operations and Maintenance	X	X	X	X	X	X			X	X		X	X	---	$1,861,000	---	---	---
11	Calcasieu Ship Channel Dredge Disposal Issues									X	X	X	X	X	---	---	---	---	---
12	Red River Channel Deepening to 12 feet			X	X	X		X		X	X	X	X	X	$100,000	---	---	---	---
13	Red River Extension North of Shreveport									X	X	X	X		$400,000	$3,673,000	$1,000,000	$700,284,000	$2,520,000
14	Houma Navigation Canal Channel Deepening to 20 feet			X	X	X				X	X	X	X		---	$5,000,000	$5,000,000	---	---
15	Houma Navigation Canal Lock **				X				X			X			---	---	---	---	---
16	Baptiste Collette Channel Deepening (Mississippi River at Venice)			X	X	X	X	X		X	X	X	X		$250,000	---	---	---	---
17	Calcasieu Lock Replacement (GIWW)	X	X	X	X	X			X	X	X	X	X		$100,000	$4,391,000	---	---	---
18	Algiers Lock and Harvey Lock Replacement (GIWW) ***	X	X	X	X	X	X			X	X	X			---	---	---	---	---

*Note: All costs provided are FY 2007 when available (USACE New Orleans and Vicksburg Districts).

** Being developed under Morganza to the Gulf project

*** Costs provided by others

industry is needed to provide a strong authority that will support and drive legislative issues to obtain funding for waterway projects and concepts.

One third of the concepts listed in Table 5-1b are funding issues that require a federal action and/or response. The remaining concepts include state funding issues, strategy issues, and economic considerations that require state action and/or response. The state must be convinced of the economic impact potential of the waterway system and its need for state investment. As mentioned above, a unified strategy with stakeholder involvement will gain considerably more momentum than individual stakeholders seeking funds for individual projects. This effort should be an effort among all stakeholders to develop a statewide strategy and implement projects to benefit the maritime industry as a whole within this state. If this strategy is accomplished, both construction projects and non-construction concepts can more assuredly be attained. Texas, Florida, and Alabama have utilized increased state funding for port and waterway improvements, and their waterway systems are 30 to 50% smaller than Louisiana's waterway system.

Table 5-1b
NON-CONSTRUCTION CONCEPTS IDENTIFIED TO IMPROVE LOUISIANA'S WATERWAY SYSTEM

No.	State (S) or Federal (F)	PURPOSE/INTENT	OBJECTIVES							
			Unify Maritime System Goals	Assist in Alleviating Physical Constraints	Provide Funding to the Waterway System	Increase Industry-Specific Establishments	Expand Intermodal Centers	Create Jobs	Increase State & Local Area Revenue	Improve State's Competitiveness
		GROUP III--APPROACH TO ALLEVIATE INSTITUTIONAL CONSTRAINTS								
1	S	Develop Maritime Transportation Coalition with All Applicable Stakeholders	X	X	X	X	X	X	X	X
2	S	Develop Maritime Marketing Strategy	X	X		X	X	X	X	X
3	F	Streamline Federal Authorization and Funding Processes	X	X	X					X
4	F	Restructure USACE Procedures for Project Selection and Implementation	X	X	X					X
5	F	Restructure the Inland Waterways Trust Fund that is Running Out of Funds	X	X	X			X	X	X
6	F	Utilize the Harbor Maintenance Trust Fund for its Intended Purpose	X	X	X			X	X	X
7	F	Provide Funds to the Transportation Trust Fund for Waterways	X	X	X			X	X	X
8	S	Develop Additional State Funding Sources	X	X	X	X	X	X	X	X
8a	S	Establish Maritime Transportation Trust Fund Built on Operational Fees	X	X	X			X	X	X
8b	S	Redirect Portions of the General Fund into a Maritime Transportation Trust Fund	X	X	X		X	X	X	X
8c	F	Reduce the Marine Fuel Tax Exemption	X	X	X			X	X	X
8d	S	Develop Infrastructure Banks through Direct Loans, Lines of Credit, and Other Credit Enhancements to Fund Waterway Projects	X	X	X			X	X	X
9	S	Increase In-state Value-added Industry and Manufacturing	X			X		X	X	X
10	S	Develop Additional Industry-Specific Coalitions	X	X		X				X
11	S	Increase Private Sector Investment	X		X	X	X	X	X	X
12	S	Develop Tracking Systems to Document Frequency-of-Use for Smaller Waterways and Vessel Activity	X	X	X					X
13	S	Accelerate Compliance with Homeland Security Mandates relative to Maritime Uses	X							X
14	S	Expand Container on Barge Operations and Industry Sectors to Support Other Operations	X			X	X	X	X	X
15	S	Continue to Expand Red River Traffic Volume and Other Inland Waterways by Networking with Shallow and Deep Draft Operations	X	X	X	X	X	X	X	X
16	S	Assess and Evaluate Short Sea Shipping Systems	X			X	X	X	X	X
17	S	Improve Rail-Water Interface	X			X	X	X	X	X
18	S	Continue to Improve In-State Intermodal Transportation Centers and Interfaces				X	X	X	X	X

REFERENCES

1992 Census of Transportation, Communications, and Utilities: 1993 Commodity Flow Survey (Louisiana). United States Department of Commerce. 1996.

2005 Minerals Yearbook: Iron and Steel Scrap. October 2006. U.S. Department of Interior, U.S. Geology Survey

A User Handbook for the Regional Input-Output Modeling System (RIMS II). March 1997. United States Department of Commerce, Bureau of Economic Analysis, Economics and Statistics Administration. Regional Multipliers:

An Assessment of the Marine Transportation System. September 1999. United States Maritime Administration, Report to Congress.

Bureau of Transportation Statistics Home Page. Retrieved June 27, 2007. www.bts.gov

Carmony, Brad. "Container-On-Barge Service Continues to Gain Momentum on Inland Waterway System" 2006. Fullen Dock and Warehouse Home Page. Retrieved June 27, 2007. < <www.fullendock.com/news-09-01-06.html>

Comprehensive Assessment of the Ports of Mississippi Final Report. 2000. Parsons, Brickerhoff Quade & Douglas, Inc.

Deepwater Gulf of Mexico 2004: America's Expanding Frontier. 2004. U.S. Department of Interior, Mineral Management Services <http://www.gomr.mms.gov/homepg/whatsnew/techann/2004/2004-021.html>

Energy Information Administration Home Page. Retrieved June 27, 2007. www.eia.doe.gov

Energy Information Administration, Coal Industry, 2003. Retrieved June 27, 2007. < www.eia.doe.gov/fuelcoal.html>

Ethanol Industry Outlook 2005. 2005. Renewable Fuels Association.

Final Report Maritime Advisory Task Force Summary of Proceedings and Recommendations. 2006. University of New Orleans, College of Urban and Public Affairs, National Ports and Waterways Institute and Mississippi River Corridor Initiative.

Freight in America: A New National Picture. January 2006. U.S. Department of Transportation, Research and Innovative Technology Administration, Bureau of Transportation Statistics. P. 38

Grain Inspection, Packers and Stockyard Administration Home Page. Retrieved June 27, 2007. <www.gipsa.usda.gov/GIPSA/webapp?area+home&subject=landing&topic>

Identifying Communities with the Fishing Industry in Louisiana Final Report Volumes I-III. 2005. United States Department of Commerce, NOAA Fisheries.

Inland Rivers Ports and Terminals Association. Retrieved June 2007. www.irpt.net

Institute of Water Resources Home Page. Retrieved June 27, 2007. www.iwr.usace.army.mil

LA DOTD Annual Report, July 2002- June 2003. Louisiana Department of Transportation and Development

Louisiana Statewide Intermodal Plan. Working Paper on Water, Rail, and Intermodal Freight Transportation. 1995. Louisiana State University, National Ports Waterways Institute.

Louisiana Works. 2005. Louisiana Department of Labor. p.6

MarineLog Home Page. Retrieved June 27. News Release February 17, 2006. < http://www.marinelog.com/DOCS/NEWSMMVI/2006feb000174.html >

National Oceanic Atmospheric Administration Home Page. Retrieved June 27, 2007. www.noaa.gov/about-noaa.html

Osprey Line, Ltd. Home Page. Retrieved June 27, 2007. www.ospreyline.com

Paying Our Way: Estimating Marginal Social Costs of Freight Transportation. 1996 Special Report, TRB, National Academy Press, Washington, D.C.

Prater, Marvin and Keith Klindworth, United States Department of Agriculture. "Long Term Trends in Railroad Service and Capacity for US Agriculture"**.** 2000.

Prentice, B. "Re-Engineering Grain Logistics: Bulk Handling versus Containerization". 1998.

Prioritizing America's Water Resources Investments: Budget Reform for Civil Works Construction Projects at the U.S. Army Corps of Engineers. 2007. National Academy of Public Administration.

Railroad Service in the United States, 2005. Association of American Railroads Home Page. Retrieved November 2006.

Sampson, Roy and Martin, Farris. "Domestic Transportation: Practice, Theory and Policy, Third Edition." 1975.

Spearing, Darwin. "Roadside Geology of Louisiana." 1995.

State and Local Government Finances by Level of Government and by State. 2004. United States Census Bureau <http://www.census.gov/govs/www/estimate04.html>

Summarized Port Series Reports by Reports Year. 2006. United States Army Corp of Engineers. < http://www.iwr.usace.army.mil/ndc/ports/ps/psbooks.htm>

The 1992 Inland Waterway Review. 1992. United States Army Corp of Engineers. <http://www.iwr.usace.army.mil/inside/products/pub/iwrreports/92-R-7.pdf>

The Bulk Carrier Register. 1996. Clarkson Research Studies.

The Greater Baton Rouge Port Commission. General Tariff. May 31, 2006.

The Rail Transportation of Grain Volume I. 2003. Association of American Railroads.

Transportation Security Agency Home Page. Retrieved June 27, 2007. www.tsa.gov/what_we_do/tsnm/index.shtm#maritime

United States Army Corps of Engineers Navigation Data Center. Inland Waterway Grain Handling Facilities with Rail Connections. 1992.

United States Army Corps of Engineers New Orleans District Home Page. Retrieved June 27, 2007. < www.mvn.usace.army.mil/pao/RELEASES/smallbusiness.pdf>

United States Army Corps of Engineers, Institute of Water Resources. U.S. Inland Waterway Traffic Projections 1999. December 1999

United States Army Corps of Engineers. Navigation Data Center. 2002.

United States Army Corps of Engineers. Mississippi River Ports Below and Above New Orleans. 1991.

United States Army Corps of Engineers. National Dredging Needs Study of US Ports and Harbors: Update 2000. 2003.

United States Army Corps of Engineers. Port Series No. 20: Mississippi River Ports Below & Above New Orleans, LA. 2002.

United States Army Corps of Engineers. Port Series No. 21: The Ports of Baton Rouge & Lake Charles, LA. 2002.

United States Army Corps of Engineers. Port Series No. 68: Ports on the Arkansas, Red, and Ouachita Rivers Systems and Missouri River. 2000.

United States Army Corps of Engineers. The 1992 Inland Waterway Review. 1992.

United States Army Corps of Engineers. Upper Mississippi River—Illinois Waterway System Navigation Feasibility Study. 2004.

United States Army Corps of Engineers. Water Resources Development in Louisiana 1998. 1998.

United States Army Corps of Engineers. Waterborne Commerce of the United States: Part 2 Waterways and Harbors (Gulf Coast, Mississippi River System and Antilles). 2000.

United States Army Corps of Engineers. Waterborne Commerce of the United States: Part 2 Waterways and Harbors (Gulf Coast, Mississippi River System and Antilles). 2001.

United States Army Corps of Engineers. Waterborne Commerce of the United States: Part 2 Waterways and Harbors (Gulf Coast, Mississippi River System and Antilles). 2002.

United States Army Corps of Engineers. Waterborne Commerce of the United States: Part 2 Waterways and Harbors (Gulf Coast, Mississippi River System and Antilles). 2003.

United States Army Corps of Engineers. Waterborne Commerce of the United States: Part 2 Waterways and Harbors (Gulf Coast, Mississippi River System and Antilles). 2004.

United States Bureau of Transportation Statistics. Commodity Flow Survey. 2002.

United States Census Bureau. State and Local Government Finances by Level of Government and by State. 2004. Retrieved June 2007. < http://www.census.gov/govs/www/state04.html>

United States Department of Agriculture, Agricultural Statistics Board, NASS. Crop Production 2002 Summary. January 2003.

United States Department of Agriculture, Inland Waterborne Transportation. An Industry Under Siege. 2000.

United States Department of Agriculture. USDA Agricultural Baseline Projection to 2013. January 2004.

United States Department of Transportation Home Page. Retrieved June 27, 2007. www.marad.dot.gov/welcome/mission.html

United States Department of Transportation. Louisiana Transportation Profile. 2000.

United States Energy Information Administration. Annual Energy Outlook with Projections to 2030.

United States Geological Survey. Minerals Information. Retrieved June 27, 2007. www.usgs.gov

United States Geological Survey. Minerals Yearbook. 2005.

United States Geological Survey. USGS Fact Sheet FS-155-98. September 1999.

United States International Trade Commission Home Page. Retrieved June 27, 2007. www.usitc.gov

United States International Trade Commission. Steel: Monitoring Developments in the Domestic Industry, Publication No. 3632. September 2003.

Vickerman, John; TranSystems. Presentation: North American Marine Trade & Transportation Trends. 2006.

Waterborne Commerce of the United States, Part 5-National Summaries. 2004. U.S. Army Corp of Engineers, Institute for Water Resources.

Waterborne Commerce of the United States: Part 5- National Summaries. 2001. U.S. Army Corp of Engineers, Institute for Water Resources.

Weisbrod, Glen, and Weisbrod, Burton. "Transportation Research Circular Number 477: Assessing the Economic Impact of Transportation Projects." October 1997. Transportation Research Board.

Appendix A
Navigable Waterways

Table A-1. Waterway Reaches Within Each Basin

Federally Maintained Waterways are Shown in White Cells, Non-federally Maintained Waterways are Shown in Green

Waterway Basin (System)	Waterway Reach
I. Atchafalaya River	
	Old River to Morgan City
	Morgan City to the Gulf
	Bayou Des Glaise Diversion Canal
	Flat Lake
	Bayou Sorrel
	Sweet Bay Lake, Lake Salve
	Henderson Lake, Lost Lake, Cow Island Lake
	H. East Grand Lake, Grand Lake, Duck Lake, Wax Lake
	East Cote Blanch Bay, West Cote Blanche Bay
	American Pass
	Little Pigeon Bayou
	Big Pigeon Bayou
	Orange Barrel Canal (Exxon Camp Canal)
II. And III. Barataria and Terrebonne Basins	
	Houma Navigation Canal
	Bayou Lafourche and Lafourche-Jump Waterway
	Barataria Bay Waterway
	Bayou Terrebonne
	Waterway from GIWW to Bayou Dulac
	Bayou Segnette Waterway
	Bayou Grosse Tete
	Little Caillou Bayou
	The Pen
	Bayou Perot
	Bayou Rigolettes
	Harvey Cut
	WIkinson Canal
	Goose Bayou
	Bayou Dupont
	Bayou Rigauld, Bayou des Oiles
	Bayou Lassene, Lac Des Allemands
	Bayou Boeuf, Lake Boeuf
	Bayou Verret, Lake Cataouatche, Lake Salvador
	Dupre Cutoff Canal, Hackberry Bay
	Bayou Dupont, Bay Batiste
	Caminada Bay, Bay Champagne
	Catfish Lake, Little Lake
	Bayou Pointe Au Chene
	Lake Chien, Lake Felicity, Old Lady Lake, Timbalier Bay
	Lake Tambour, Lake Barre, Bay Cocodrie
	Lake Pello, Pelican Lake
	Lake Boudreaux
	Bayou Du Large, Caillou Lake, Lake Menchant, King Lake, Caillou Bay
	Bayou Meringouin, Bay Natchez, Belle River, Lake Verret
	Bayou Chene, Bayou Penchant, Lake Penchant
	Four Mile Bayou, Grassy Lake, Lake Palourde
IV. Calcasieu River and Pass	
	Phillips Bluff to the 24-foot contour in the Gulf
	Lake Charles, Moss Lake, Black Lake, Brown Lake

Table A-1. Waterway Reaches Within Each Basin

Federally Maintained Waterways are Shown in White Cells, Non-federally Maintained Waterways are Shown in Green

Waterway Basin (System)	Waterway Reach
V. Mermentau River	
	Mermentau River
	Mermentau River, Gulf Navigation Channel
	Bayous Nezpique and Des Cannes
	Inland Waterway from Franklin to Mermentau River (GIWW)
	Bayou Plaquemine Brule
	Lake Arthur
	Bayou Lacassine
	Grand Lake, White Lake
VI. Mississippi River	
	LA-AR Border to Baton Rouge
	Baton Rouge to New Orleans
	New Orleans to Gulf of Mexico
	Baptiste Collette and Grand Tiger Pass
	South Pass
	Southwest Pass
	Waterway from Empire, LA to the Gulf
	North Pass
	Southeast Pass
	Main Pass
	Pass a Loutre
VII. Ouachita River	
	Ouachita-Black River AR and LA
	Bayou Loutre
	Comey Bayou
	Bayou D'Arbonne Lake
	Black Bayou Lake
	Bayou LaFourche Diversion Canal
	Boeuf River
	Turkey Creek
VIII. Pearl River	
	Pearl River
IX. Ponchartrain and Breton Sound	
	MRGO
	Amite River and Bayou Manchac
	Bayous LaLoutre, St. Malo and Yscloskey
	Tchefuncte River and Bogue Falaya
	Tickfaw, Natalbany, Ponchatoula, and Blood River
	Bayou Dupre
	Bayous LaLoutre, St. Malo and Yscloskey
	Tangipahoa
	Rigolets Pass
	Manchac Pass (Included with Amite River)
	Lake Maurepas
	Lake St. Catherine
	Lake Borgne
	Lake Athanasio
	Black Bay, California Bay, Quarantine Bay, Grand Bay
	Bayou Bonfouca
	Bayou Lacombe

Table A-1. Waterway Reaches Within Each Basin

Federally Maintained Waterways are Shown in White Cells, Non-federally Maintained Waterways are Shown in Green

Waterway Basin (System)	Waterway Reach
X. Red River	
	Red River Waterway Below Shreveport
XI. Sabine River	
	Sabine-Neches Waterway
	Black Bayou, Greens Lake
	Houston River Canal (Sulphur Canal)
XII. Vermilion-Teche River	
	Vermilion River and Bayou Teche
	Freshwater Bayou
	Petite Anse, Tigre, and Carlin Bayous
	Boeuf-Cocodrie Diversion Channel
	Weeks Bay, Vermilion Bay
	Little White Lake, Feaman Lake
	Lake Peigneur
	St. Martinville to New Iberia
	New Iberia to Charenton Canal
	Charenton Village to Franklin
	Franklin to Wax Lake Outlet
	Wax Lake Outlet to lock at Atchafalaya River
	Franklin Canal
	Lake Fausse
GIWW	
	GIWW Louisiana Portion
	Inner Harbor Navigation Canal
	GIWW-Morgan City to Port Allen Route
	Algiers Canal
	Harvey Canal

System Summary
Atchafalaya River Basin

1. Old River Lock
   - 1200 feet long
   - 75 feet wide
   - 9 feet deep
   - 35 foot lift
2. Port Allen Lock
   - 1200 feet long
   - 84 feet wide
   - 14 feet deep
   - 45 lift
3. Bayou Sorrel Lock
   - 800 feet long
   - 56 feet wide
   - 14 feet deep
   - 21 foot lift
4. Berwick Lock
   - 300 feet long
   - 45 feet wide
   - 9 feet deep
   - 14 foot lift
5. Bayou Boeuf Lock
   - 1148 feet long
   - 75 feet wide
   - 13 feet deep
   - 11 foot lift

Description:
The upper Atchafalaya (Old River to Morgan City) is 123 miles in length and 12 feet deep. The lower Atchafalaya (from Morgan City to the Gulf) is 20 miles in length and 20 feet in depth. Primary uses include cargo transport for petroleum and petroleum products, crude materials, and food and farm products as well as fisheries and recreation activates.

Main Waterway Reaches:
- Old River to Morgan City
- Morgan City to the Gulf

Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

N

20 10 0 20 Miles

ldotd_279_0027_atchafalaya_letter

System Summary
Barataria and Terrebonne Basins

Description:
This basin includes three primary navigation channels and the GIWW. The Houma Navigation Canal flows from the intersection of the GIWW at Houma, LA south to the Gulf and is 37 miles long, 300 feet wide, and between 15-16 feet deep. Bayou Lafourche flows into the Gulf from Lockport, LA, and is 50 miles long, 100 feet wide, and 9 feet deep in the north reach to 28 feet at Port Fourchon. The Barataria Waterway is 37 miles in length, 125 feet wide, and 12 feet deep. Primary uses include barge transport, mainly petroleum related, as well as support traffic to the offshore oil and gas industry and commercial fisheries activities.

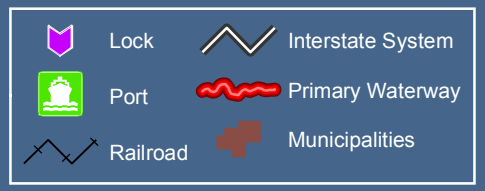
Main Waterway Reaches:
- Houma Navigation Canal
- Bayou LaFourche
- Barataria Waterway

ldotd_279_0028_barataria_terrebonne_letter

System Summary
Calcasieu River

1. Calcasieu Lock (GIWW)
   - 1200 feet long
   - 75 feet wide
   - 13 feet deep
   - 0 foot lift

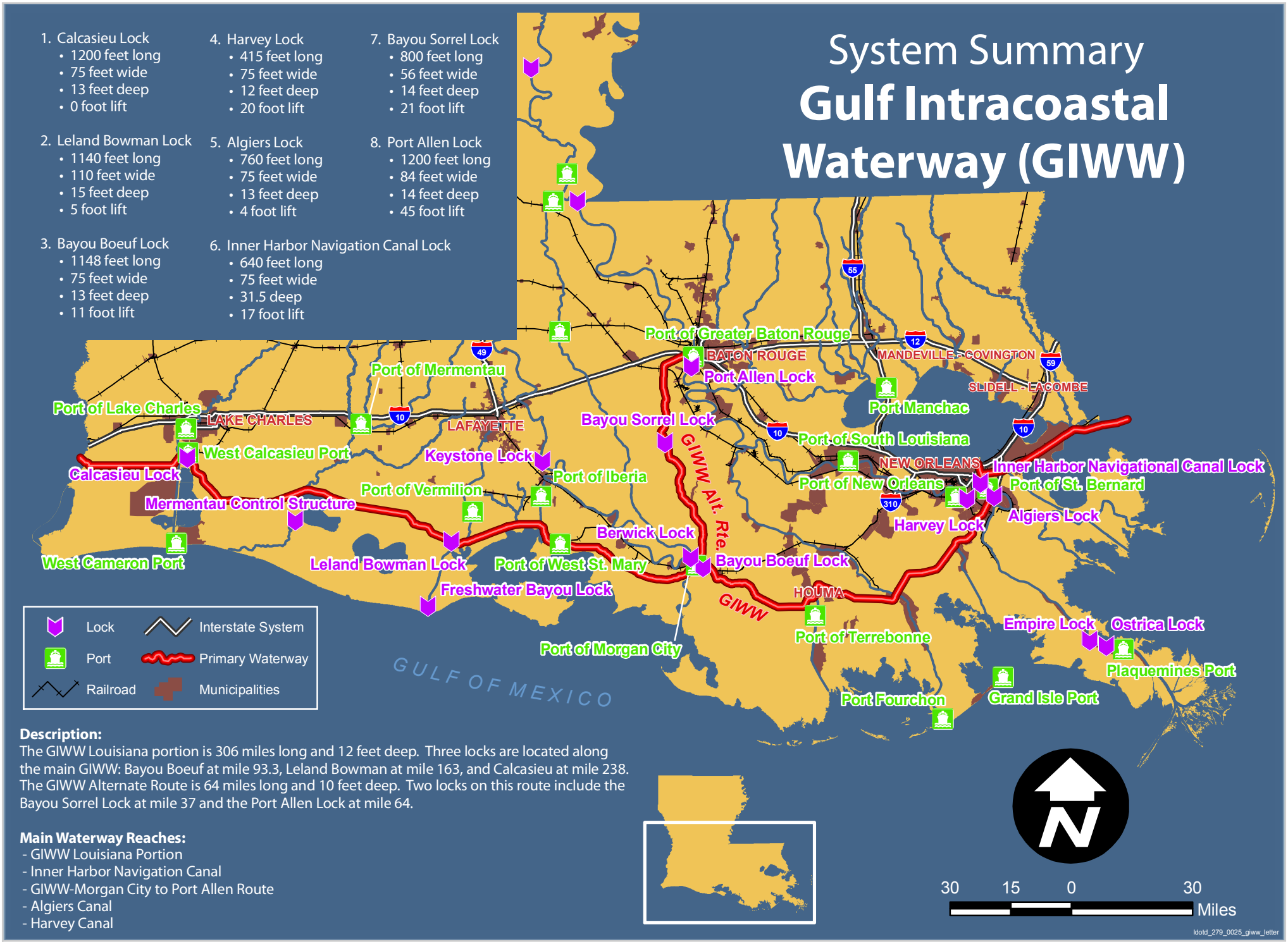
Description:
The Calcasieu River and Ship Channel is 109.5 miles in length, the navigable portion is 52 miles from the mouth of the river to the inland. The bar channel, the jetty channel, and up to Lake Charles is 40 feet in depth. From mile 34 to mile 36, the river is 36 feet in depth. To mile 56, the channel is 7 feet in depth. A saltwater control structure is located north of I-10. The river is used primarily for waterborne commerce particularly liquefied natural gas and other petroleum cargo, oil and gas support activities, and fisheries.



ldotd_279_0026_calcasieu_letter

System Summary
Gulf Intracoastal Waterway (GIWW)

1. Calcasieu Lock
   - 1200 feet long
   - 75 feet wide
   - 13 feet deep
   - 0 foot lift
2. Leland Bowman Lock
   - 1140 feet long
   - 110 feet wide
   - 15 feet deep
   - 5 foot lift
3. Bayou Boeuf Lock
   - 1148 feet long
   - 75 feet wide
   - 13 feet deep
   - 11 foot lift
4. Harvey Lock
   - 415 feet long
   - 75 feet wide
   - 12 feet deep
   - 20 foot lift
5. Algiers Lock
   - 760 feet long
   - 75 feet wide
   - 13 feet deep
   - 4 foot lift
6. Inner Harbor Navigation Canal Lock
   - 640 feet long
   - 75 feet wide
   - 31.5 deep
   - 17 foot lift
7. Bayou Sorrel Lock
   - 800 feet long
   - 56 feet wide
   - 14 feet deep
   - 21 foot lift
8. Port Allen Lock
   - 1200 feet long
   - 84 feet wide
   - 14 feet deep
   - 45 foot lift

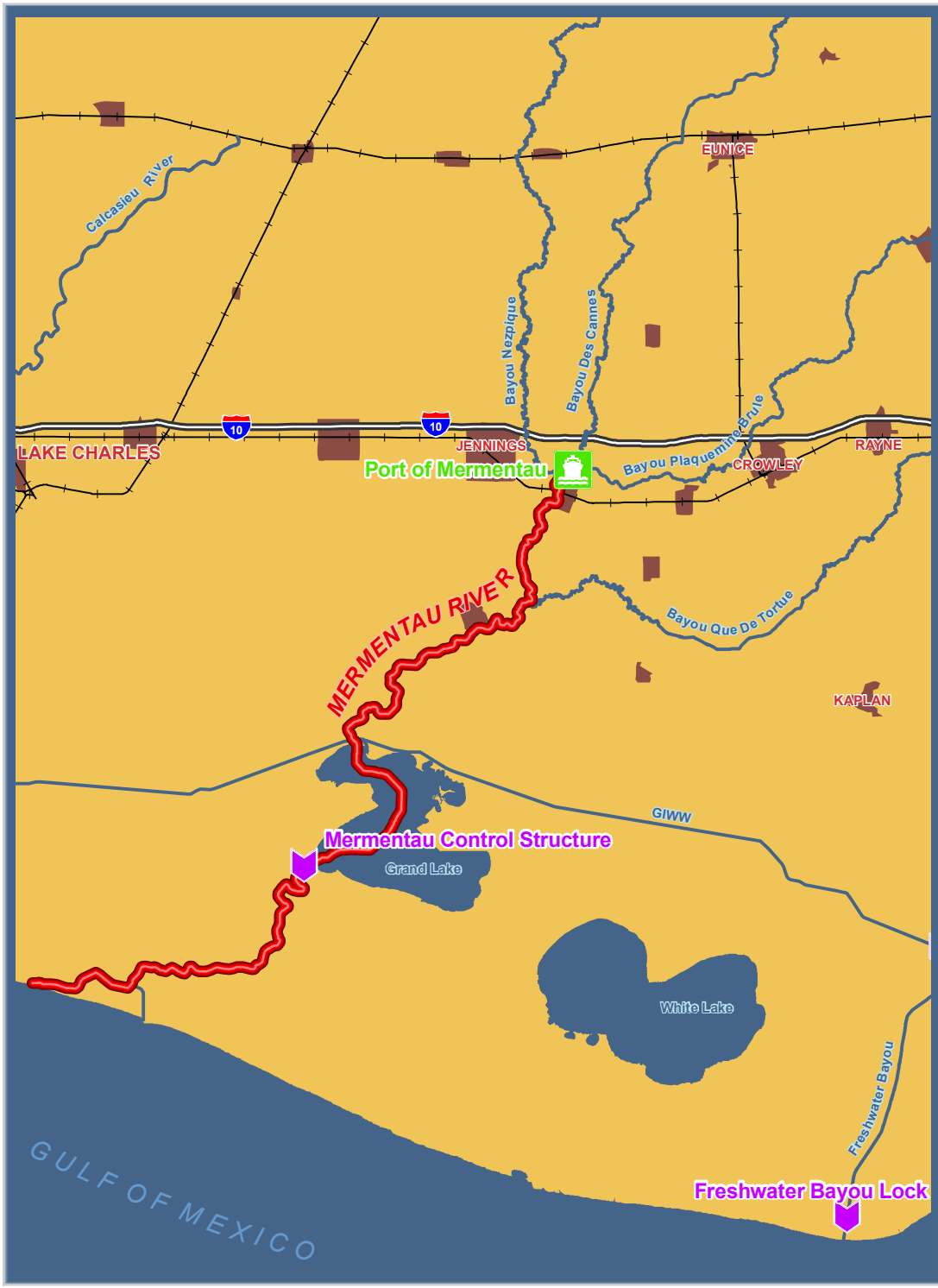


Description:
The GIWW Louisiana portion is 306 miles long and 12 feet deep. Three locks are located along the main GIWW: Bayou Boeuf at mile 93.3, Leland Bowman at mile 163, and Calcasieu at mile 238. The GIWW Alternate Route is 64 miles long and 10 feet deep. Two locks on this route include the Bayou Sorrel Lock at mile 37 and the Port Allen Lock at mile 64.

Main Waterway Reaches:
- GIWW Louisiana Portion
- Inner Harbor Navigation Canal
- GIWW-Morgan City to Port Allen Route
- Algiers Canal
- Harvey Canal

ldotd_279_0025_giww_letter

System Summary
Mermentau River



Description:
The head of the Mermentau is located at the junction of Bayou Nezpique and Des Cannes. The river flows 71.5 miles to the Gulf. The Mermentau flood control structure is located at river mile 3.4. The navigation channel begins at the entry of the Mermentau River into Lower Mud Lake and extends 4.6 miles into the Gulf. Primary uses include small amounts of cargo, fisheries and recreation.

Main Waterway Reaches:
- Mermentau River
- Bayous Nezpique and Des Cannes

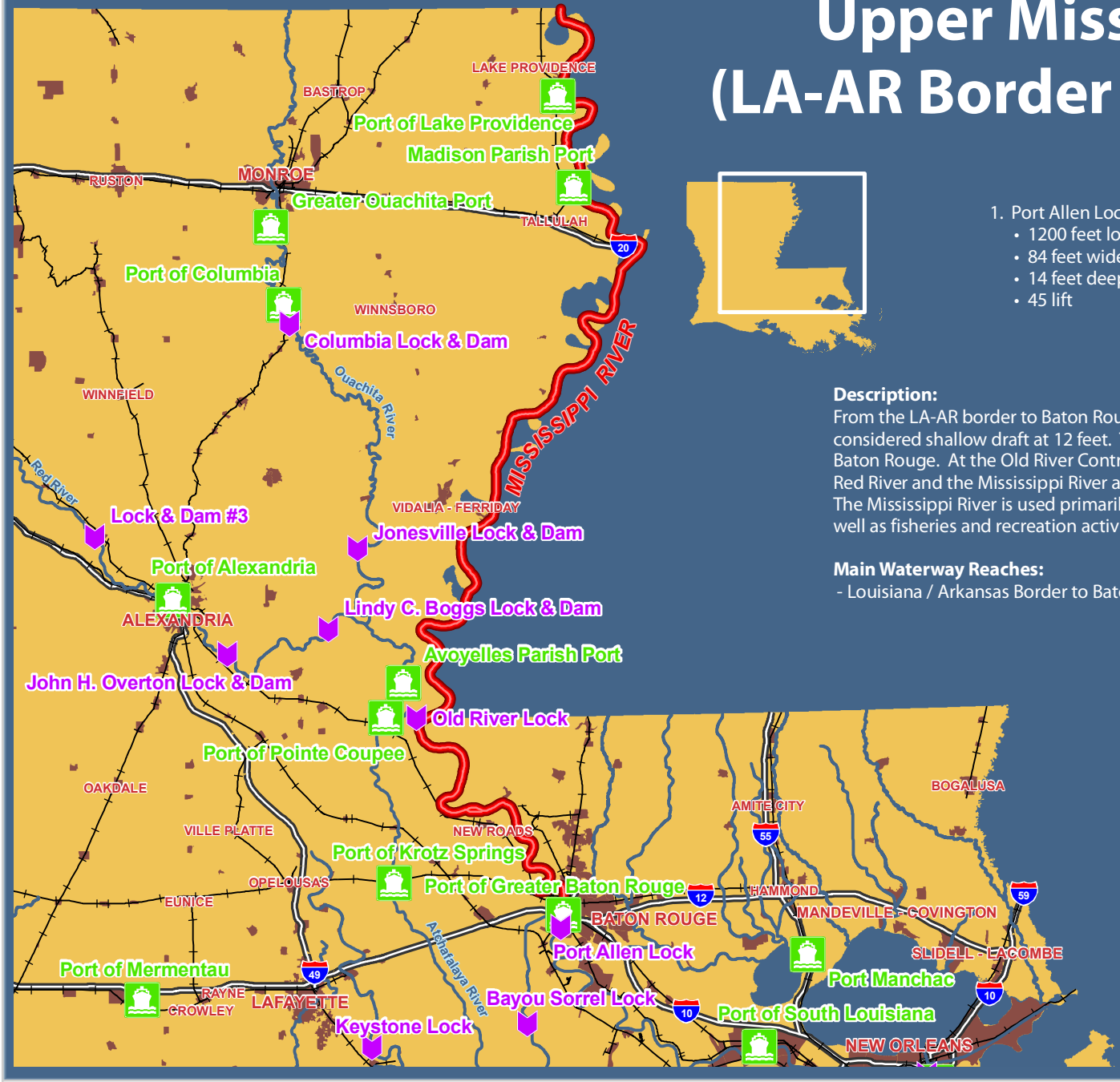
Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

10 5 0 10 Miles

ldotd_279_0033_mermentau_letter

System Summary

Upper Mississippi River (LA-AR Border to Baton Rouge)



1. Port Allen Lock
   - 1200 feet long
   - 84 feet wide
   - 14 feet deep
   - 45 lift
2. Old River Lock
   - 1200 feet long
   - 75 feet wide
   - 9 feet deep
   - 35 foot lift

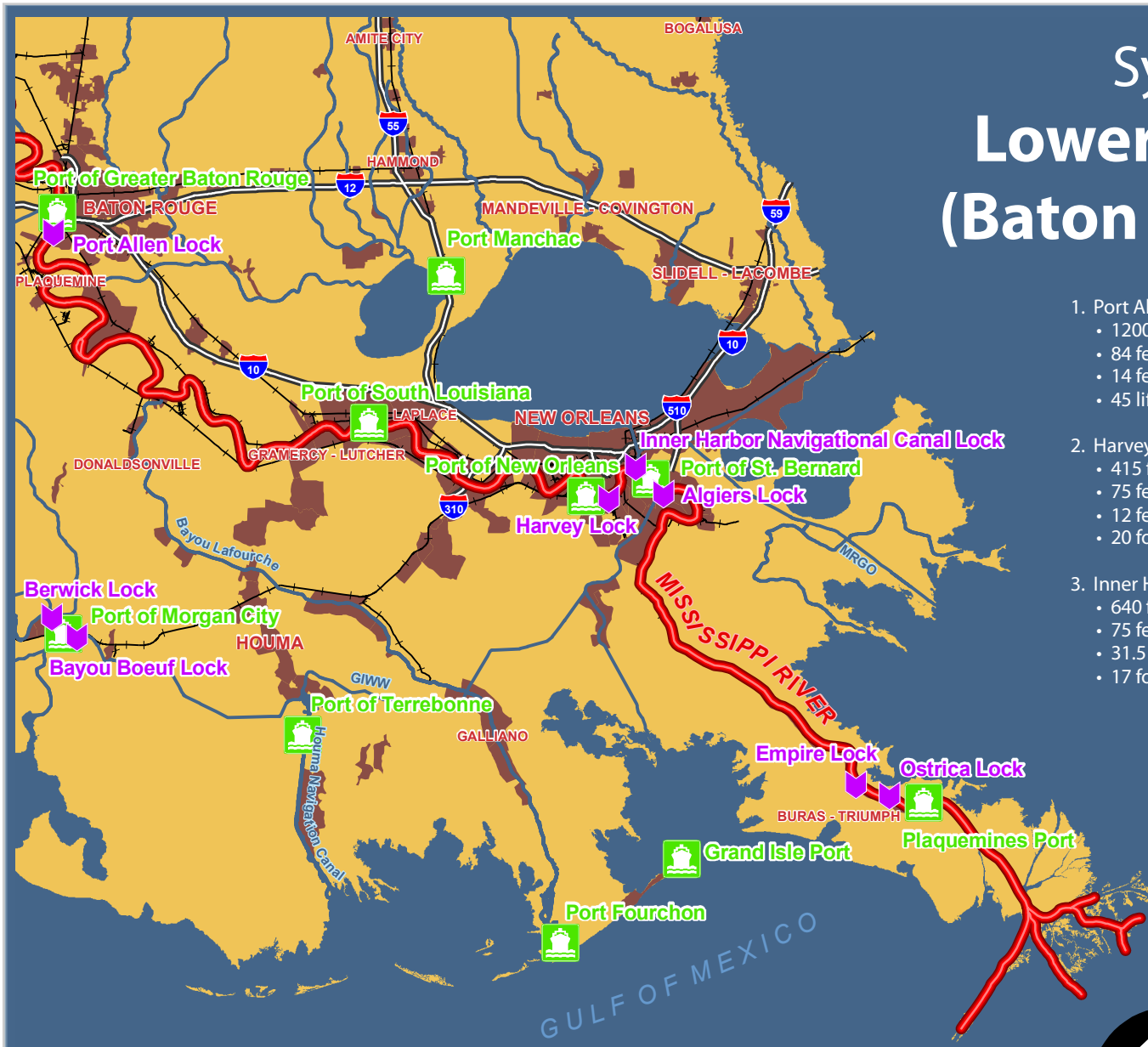
Description:
From the LA-AR border to Baton Rouge, the channel is 300 feet wide. The river is considered shallow draft at 12 feet. The Port Allen Lock is located on the river at Baton Rouge. At the Old River Control Structure 30% of the combined flows of the Red River and the Mississippi River are joined to become the Atchafalaya River system. The Mississippi River is used primarily for transporting a variety waterborne cargo as well as fisheries and recreation activities.

Main Waterway Reaches:
- Louisiana / Arkansas Border to Baton Rouge

Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

ldotd_279_0024_upper_miss_letter

System Summary
Lower Mississippi River (Baton Rouge to the Gulf)



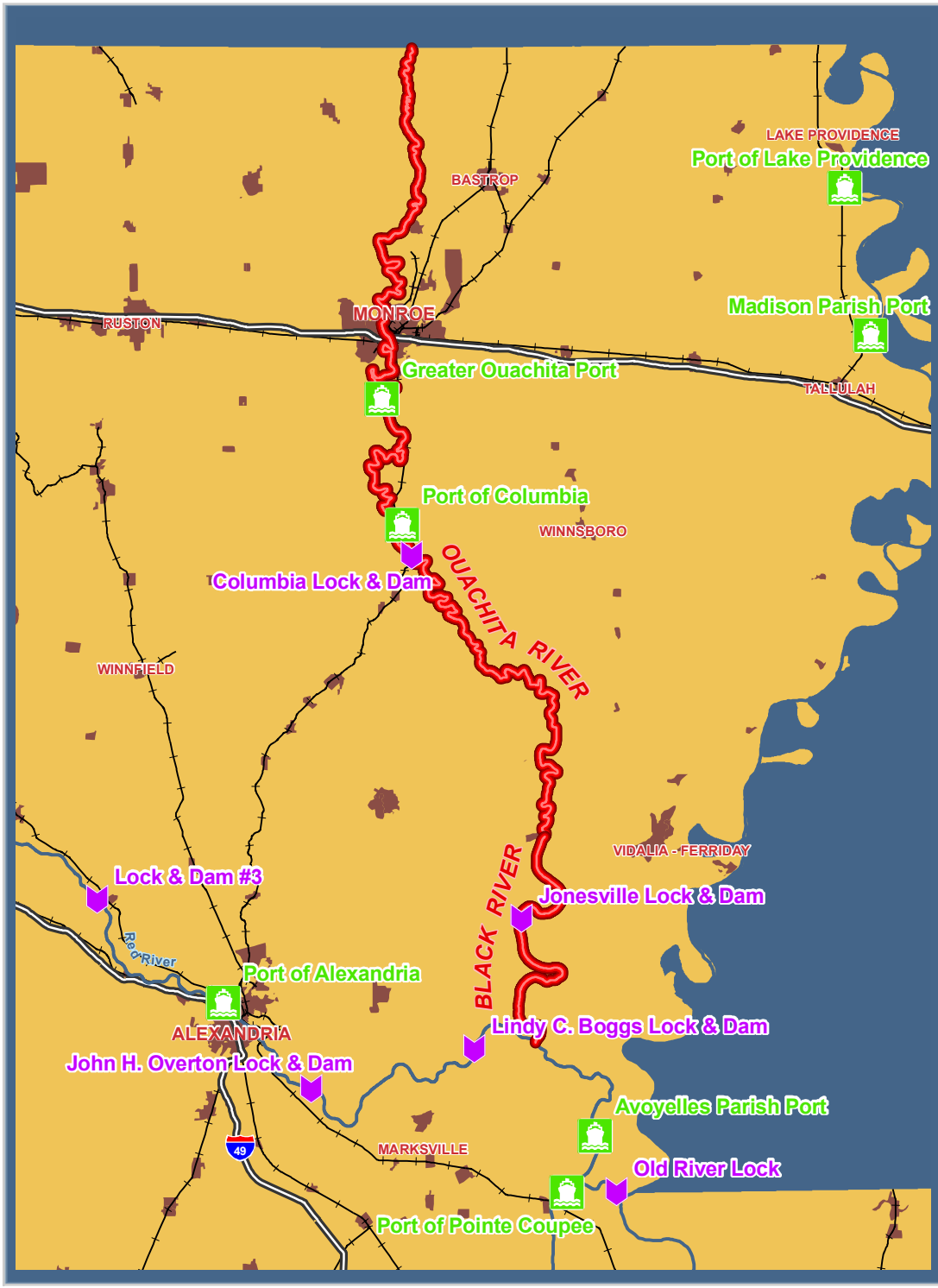
1. Port Allen Lock
   - 1200 feet long
   - 84 feet wide
   - 14 feet deep
   - 45 lift
2. Harvey Lock
   - 415 feet long
   - 75 feet wide
   - 12 feet deep
   - 20 foot lift
3. Inner Harbor Navigation Canal Lock
   - 640 feet long
   - 75 feet wide
   - 31.5 feet deep
   - 17 foot lift
4. Algiers Lock
   - 760 feet long
   - 75 feet wide
   - 13 feet deep
   - 4 foot lift
5. Empire Lock
   - 200 feet long
   - 40 feet wide
   - 10 feet deep
   - 0 foot lift
6. Ostrica Lock
   - 200 feet long
   - 40 feet wide
   - 10 feet deep
   - 0 foot lift

Description:
From Baton Rouge to the Gulf, the channel is 500 feet wide. The river is considered deep draft at 45 feet. The Port Allen Lock, connecting the GIWW Alternate Route, is located on the river at Baton Rouge. The passes emptying into the Gulf at the river mouth have variable depths from 13 to 45 feet. The Mississippi River is used primarily for transporting a variety waterborne cargo as well as fisheries and recreation activities.

Main Waterway Reaches:
- Baton Rouge to the Gulf

ldotd_279_0023_lower_miss_letter

System Summary
Ouachita River



1. Columbia Lock and Dam
   - 600 feet long
   - 84 feet wide
   - 9 feet deep
   - 18 foot lift

2. Jonesville Lock and Dam
   - 600 feet long
   - 84 feet wide
   - 9 feet deep
   - 0 foot lift

Description:
Total river miles are 336 with a depth of 9 feet. The four locks on the river include the Colombia, the Jonesville, Felthensal, and the HK Thatcher. The Felsenthal and Thatcher Locks are located in Arkansas. Primary uses include cargo transport of petroleum and petroleum products, crude materials, farm and food products.

Main Waterway Reaches:
- Ouachita-Black River

Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

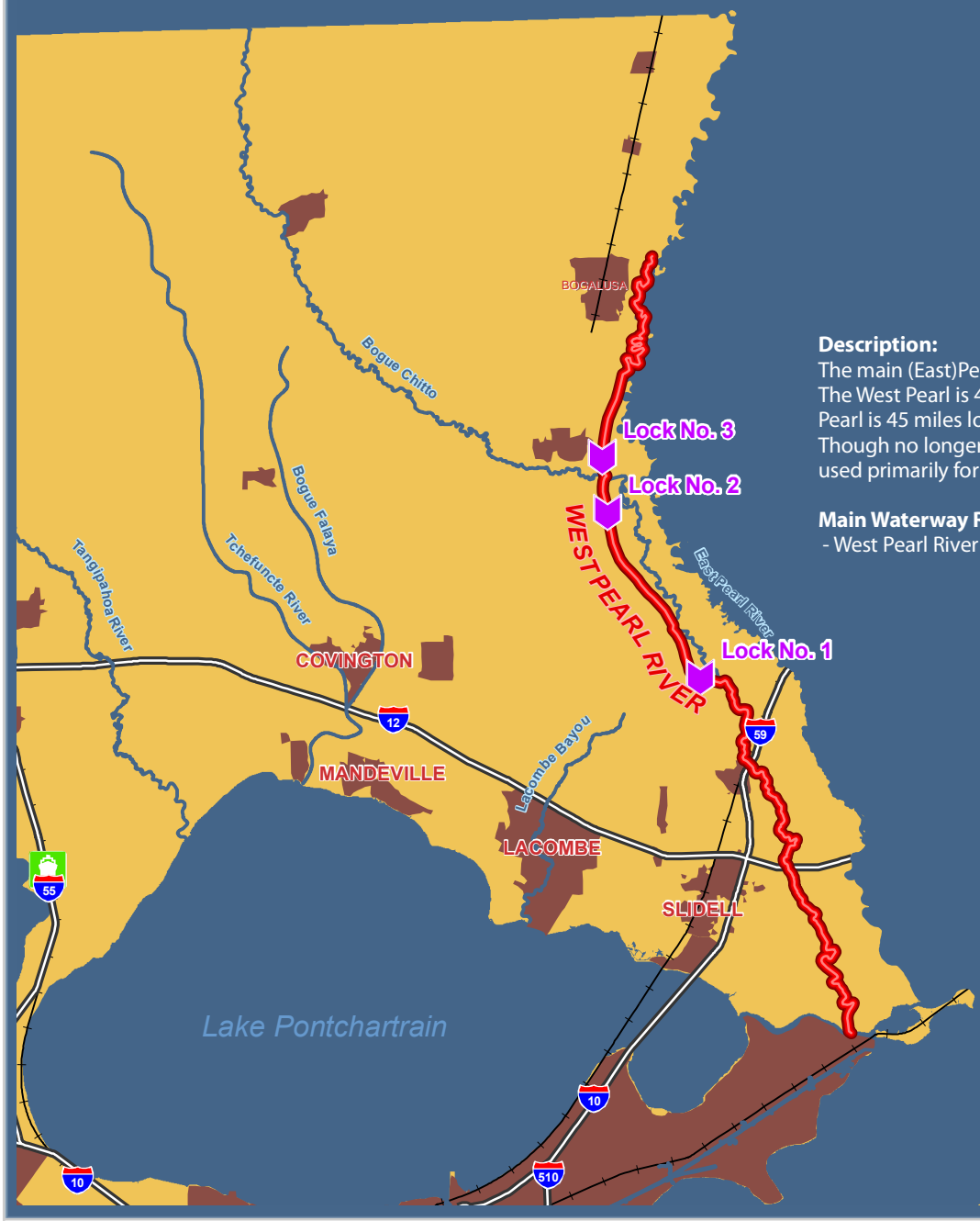
N

20 10 0 20 Miles

ldotd_279_0030_ouachita_letter

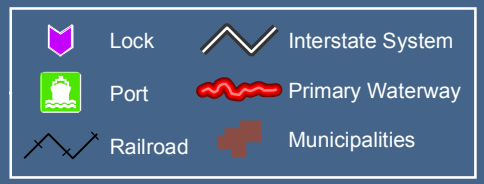
System Summary
Pearl River

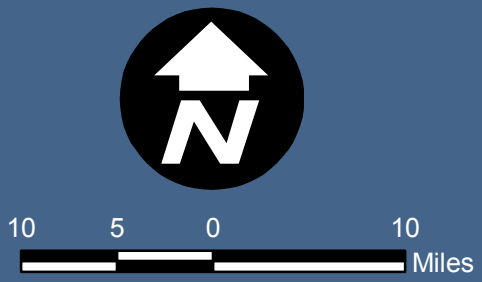
1. Lock No. 1
   - 310 feet long
   - 65 feet wide
   - 10 feet deep
2. Lock No. 2
   - 310 feet long
   - 65 feet wide
   - 10 feet deep
3. Lock No. 3
   - 310 feet long
   - 65 feet wide
   - 10 feet deep



Description:
The main (East)Pearl originates in Mississippi and is an interbraided river with west and east channels. The West Pearl is 44 miles in length and is a navigation channel that originates in Bogalusa. The East Pearl is 45 miles long. Channel depths were originally 7 feet and is not maintained for navigation. Though no longer operational, three locks are located along the West Pearl River. The channels are used primarily for small boating traffic and recreation.

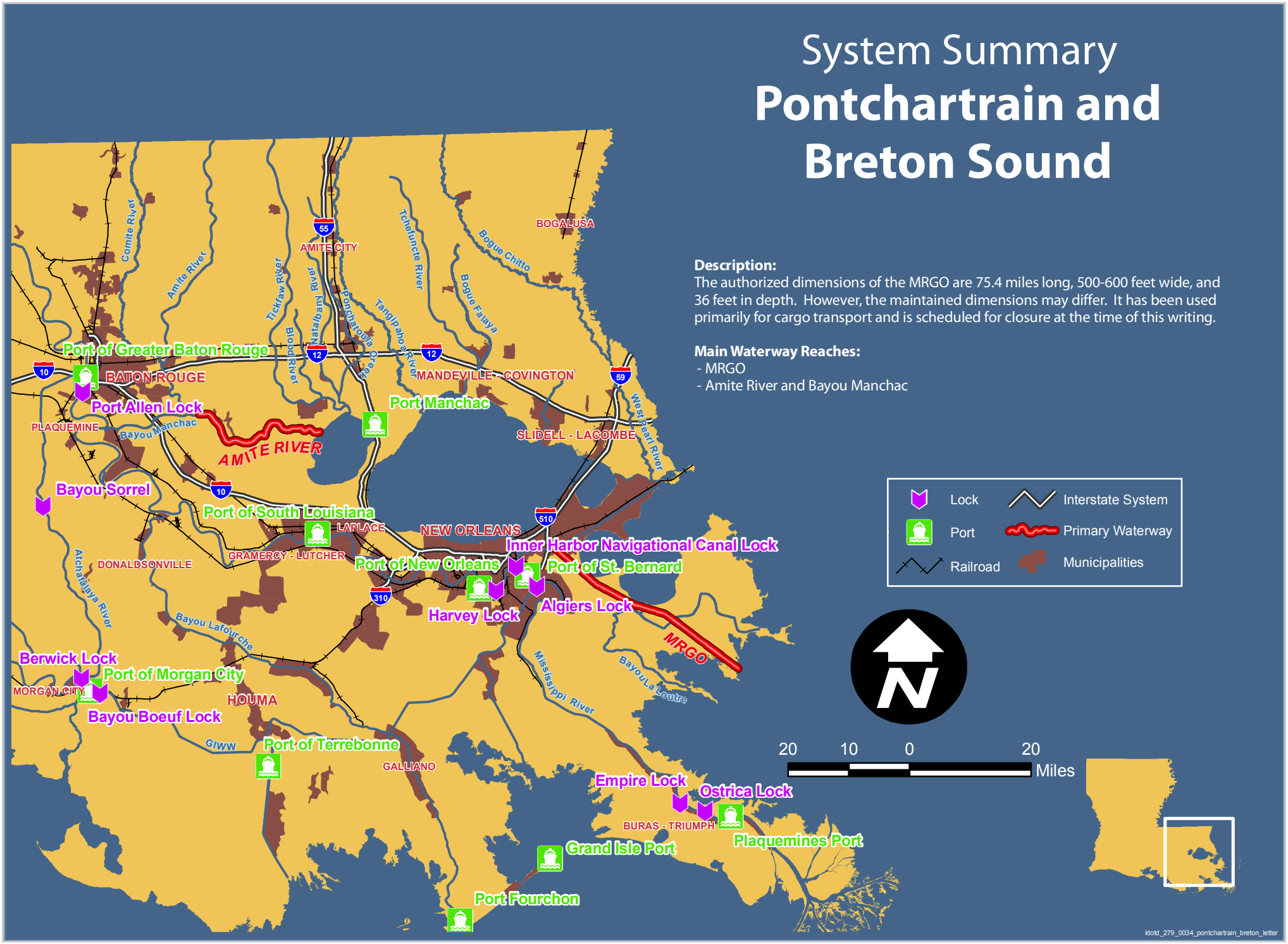
Main Waterway Reaches:
- West Pearl River





ldotd_279_0035_pearl_letter

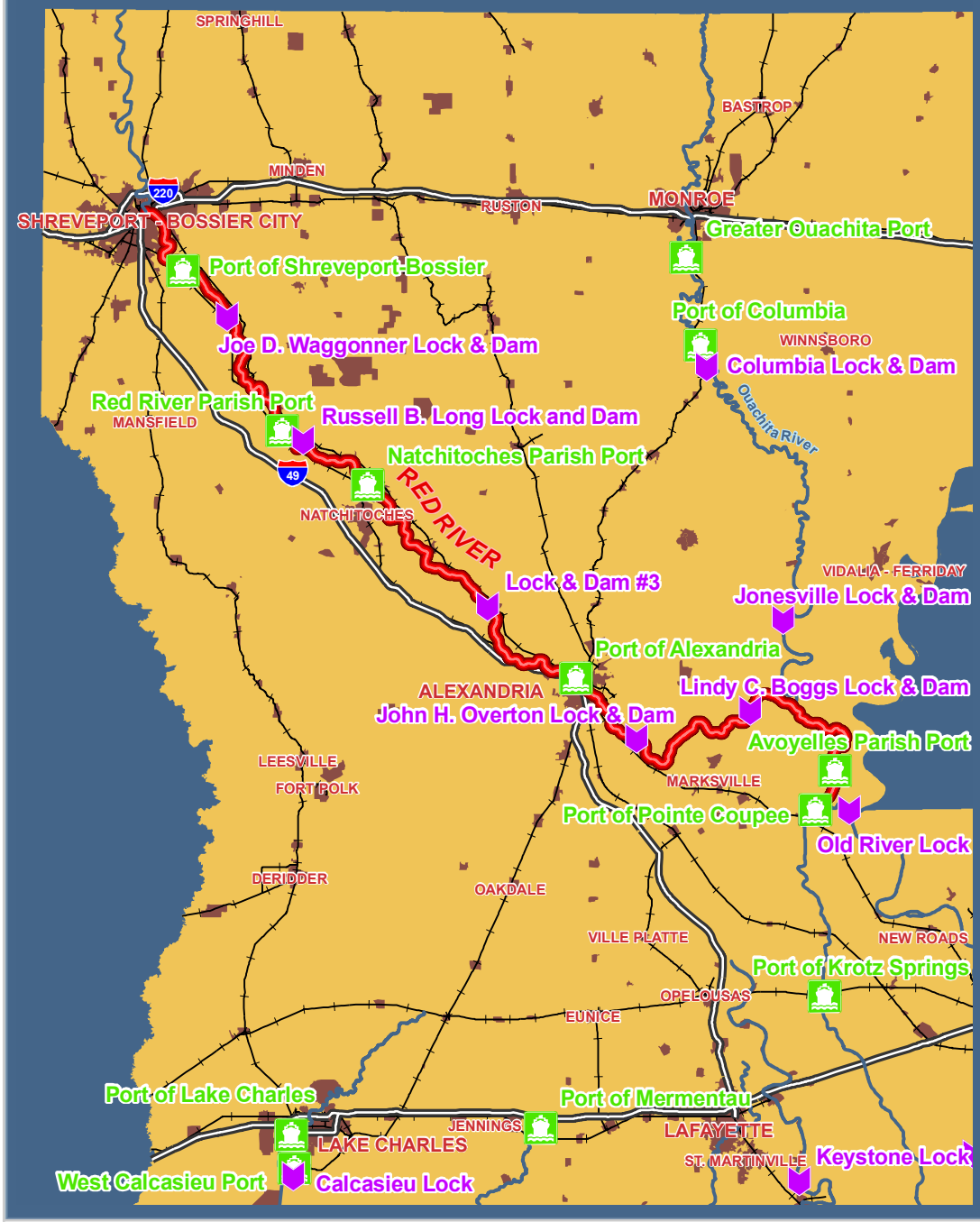
System Summary
Pontchartrain and Breton Sound



Description:
The authorized dimensions of the MRGO are 75.4 miles long, 500-600 feet wide, and 36 feet in depth. However, the maintained dimensions may differ. It has been used primarily for cargo transport and is scheduled for closure at the time of this writing.

Main Waterway Reaches:
- MRGO
- Amite River and Bayou Manchac

System Summary
Red River



1. Old River Lock
   - 1200 feet long
   - 75 feet wide
   - 9 feet deep
   - 35 foot lift
2. Lindy C. Boggs Lock
   - 705 feet long
   - 84 feet wide
   - 9 feet deep
   - 36 foot lift
3. John H. Overton Lock
   - 705 feet long
   - 84 feet wide
   - 9 feet deep
   - 24 foot lift
4. Lock 3
   - 705 feet long
   - 84 feet wide
   - 9 feet deep
   - 31 foot lift
5. Russell B. Long Lock
   - 705 feet long
   - 84 feet wide
   - 9 feet deep
   - 25 foot lift
6. Joe D. Waggonner
   - 705 feet long
   - 84 feet wide
   - 9 feet deep
   - 25 foot lift

Description:
North of Shreveport, the Red has not been developed as a navigable channel. From Shreveport to Alexandria the river depth is 9 feet. Five locks are located along the Red. Primary uses are cargo traffic for petroleum products, crude materials, chemical related materials, and recreation.

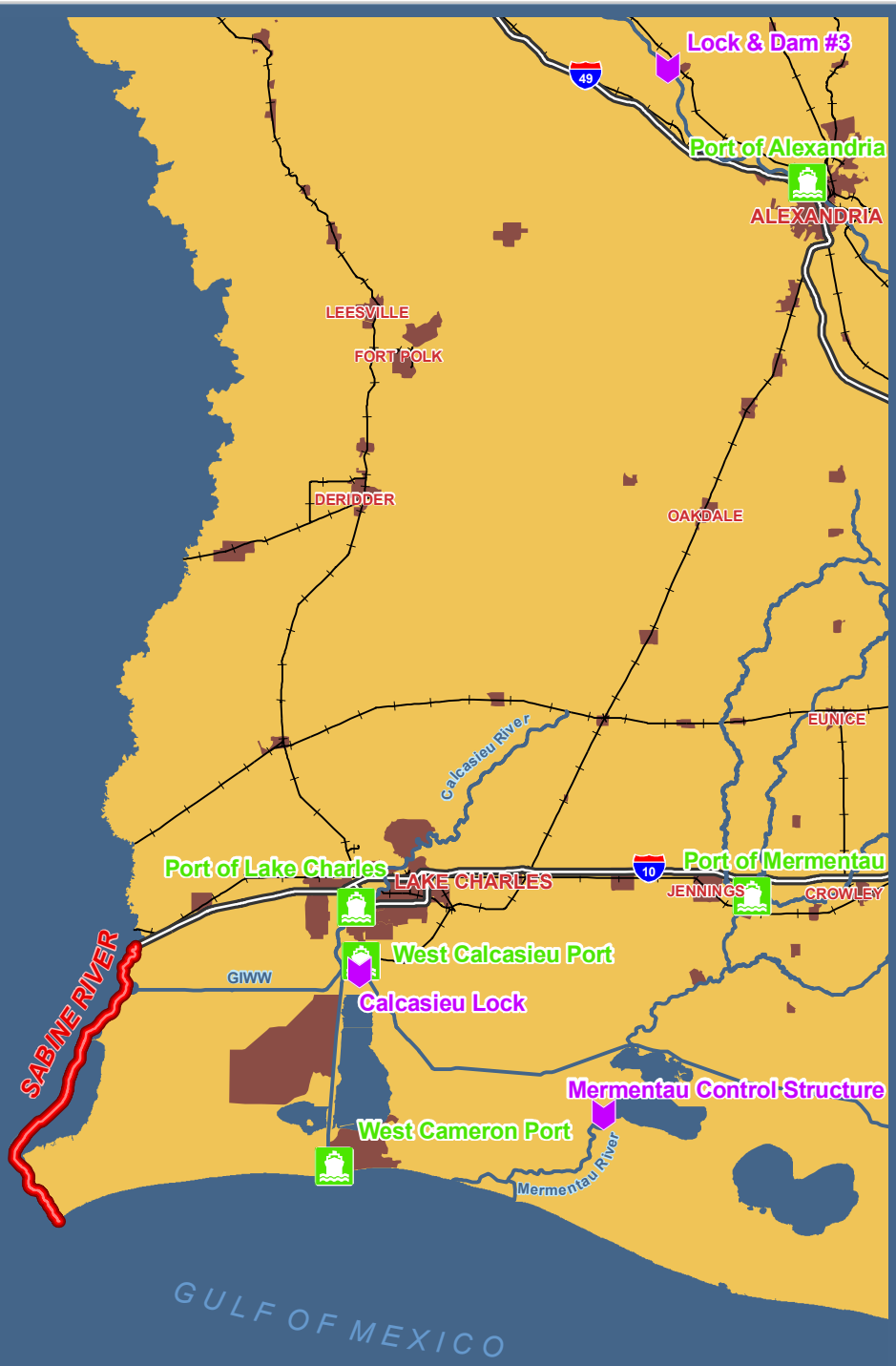
Main Waterway Reaches:
- Red River waterway Below Shreveport

Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

30 15 0 30 Miles

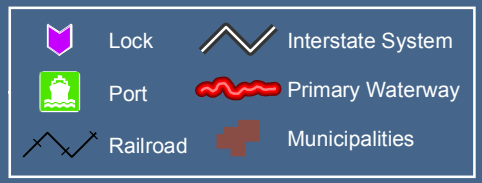
ldotd_279_0031_red_letter

System Summary
Sabine River



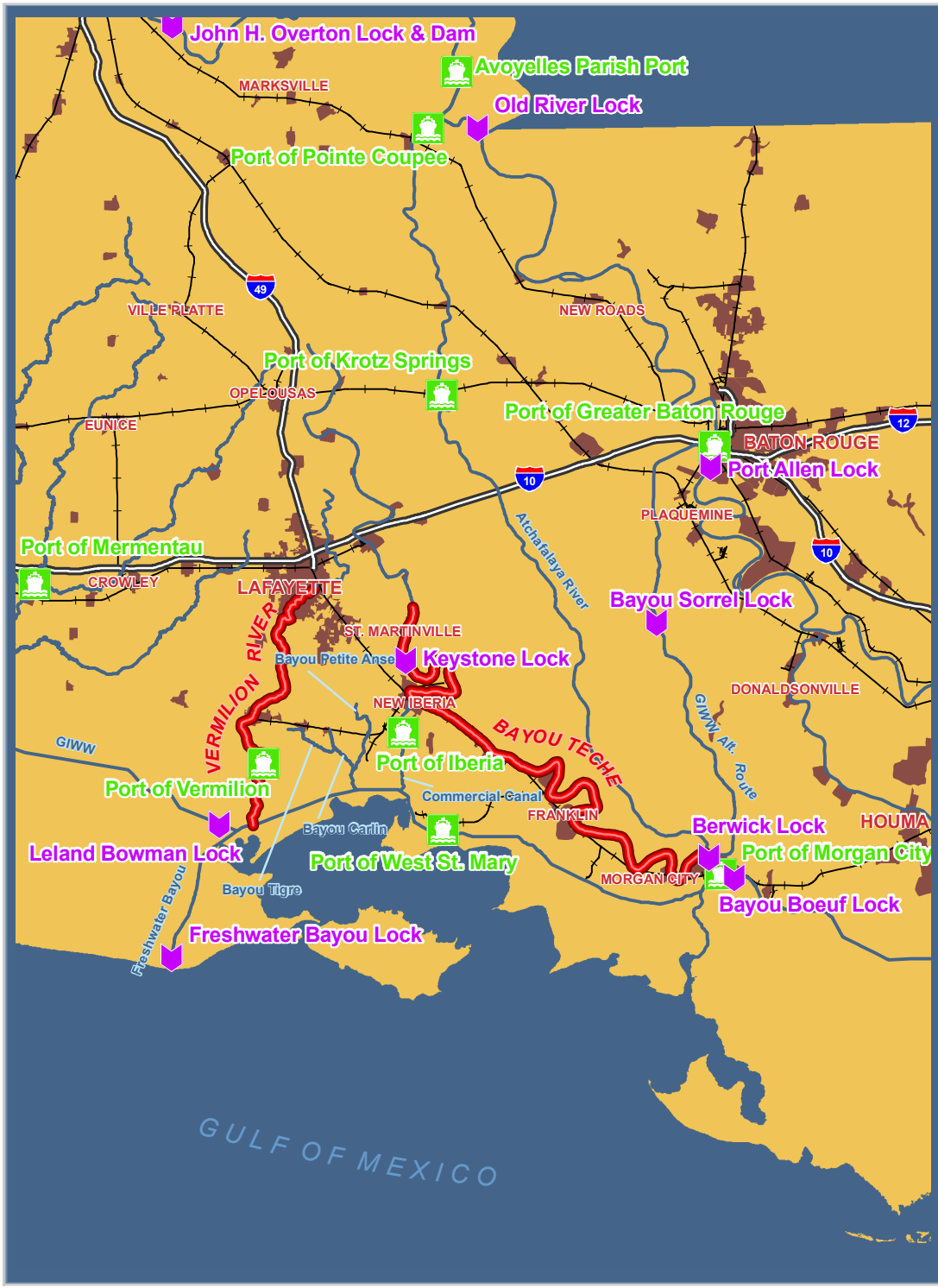
Description:
The Sabine River flows from northeast Texas, to southwest of Shreveport at the 32nd parallel, where it establishes the Texas-Louisiana boundary. It flows south, forming the state line for the remainder of its course. It is impounded 10 mi west of Leesville, Louisiana to form the 70 mi long Toledo Bend Reservoir, Channel width varies between 150 and 200 feet; channel depth is 30 feet. Primary uses include small amounts of cargo, fisheries and recreation.

Main Waterway Reaches:
- Sabine River



ldold_279_0032_sabine_letter

System Summary
Vermilion-Teche Basin



1. Leland Bowman Lock
   - 1140 feet long
   - 110 feet wide
   - 15 feet deep
   - 5 foot lift
2. Berwick Lock
   - 300 feet long
   - 45 feet wide
   - 9 feet deep
   - 14 foot lift
3. Keystone Lock
   - 160 feet long
   - 36 feet wide
   - 9 feet deep
   - 8 foot lift

Description:
The Vermilion River is 52 miles in length and ranges from 5 to 11 feet in depth from the headwaters to the bay. Bayou Teche is 107 miles in length and ranges from 3 to 7 feet in depth. Primary uses include cargo transport for petroleum and petroleum related products, crude materials, food and farm products, as well as fisheries and recreation.

Main Waterway Reaches:
- Vermilion River
- Bayou Teche
- Freshwater Bayou
- Petite Anse, Tigre, and Carlin Bayous
- Commercial Canal

Lock
Port
Railroad
Interstate System
Primary Waterway
Municipalities

N

20 10 0 20 Miles

ldotd_279_0029_vermilion_teche_letter

Appendix B
Contacts List and Survey Information

Contact List for
DOTD Marine Transportation System Plan Survey

Ports	Contact	Contact Phone No.	E-mail	Basin	action	follow-up	2nd follow-up	Rec'd	Not rec'd
Lake Charles Harbor & Terminal District	R. Adam McBride	337-439-3661	amcbride@portlc.com	Calcasieu		rec'd at mtg with Shaw		1	
Port of Lake Charles	Channing Hayden	337-493-3620	chayden@portlc.com	Calcasieu			rec'd 1/22/07	1	
Port of New Orleans	Patrick J. Gallwey Joe Cocchiara	504-528-3305 504-528-3206	patg@portno.com joe@portno.com	Mississippi	emailed 10/3	CM called 10/16		1	
Lake Providence Port Commission	W. Wyly Gilfoil, Sr.	318-559-2365	Wyly_gilfoil@msn.com	Ouachita	Mtg. notes (Jamie)			1	
The Port of Shreveport Bossier	Eric England Hugh McConnelly Brenda Levinson	318-524-2272	port@portsb.com hugh@portsb.com brenda@portsb.com	Red River	emailed 10/3	CM called 10/16 - call back 10/19	KRP called & emailed Brenda 11/6; rec'd 11/13	1	
N/A	N/A	N/A	N/A	Sabine					
Mermentau River Harbor and Terminal District	Stephen Broussard	337-581-3369	stbroussard@la.gov	Mermentau	emailed 10/3	KRP called 11/6 - emailed survey	KRP called 11/27 - Steve sent to Lake Chas. Pilots, he will follow up. Rec'd brief survey 12/1	1	
Port of West St. Mary	A. Philip Prejean	337-828-3410 337-828-3411 (fax)	portofwsm@cox-internet.com	Vermilion-Teche	faxed 10/3	CM called 10/16	KRP called 11/6 - call back at 4 PM	1	
Port of Greater Baton Rouge	Karen St. Cyr	225-342-1660	stcyrk@portgbr.com	Mississippi	emailed 10/9	KRP called 10/16 - KSC will talk w/ dir., 2-3 days.	KRP called 11/6- left msg. KRP called 11/27 - Karen will look at.		1
The Port of Iberia	Roy Pontiff Penny Dufrene	337-364-1065	royp@portofiberia.com pennyd@portofiberia.com	GIWW	emailed 10/3	CM called 10/16		1	
Port of Krotz Springs	Gary Soileau	337-566-8867	portofks@bellsouth.net	Atchafalaya	emailed 10/3		KRP called 11/27	1	
Morgan City	Jerry Hoffpauir	985-384-0850	jerry@portofmc.com	Atchafalaya	emailed 10/3			1	
Port Fourchon	Ted M. Falgout	985-632-6701	ted@portfourchon.com	Barataria	emailed 10/3	CM called 10/16	KRP called 11/27 - left msg.	1	
Port of Terrebonne	David Rabalais	985-873-6428	drabalais@tpcg.org	Terrebonne	emailed 10/3	KRP called 11/28- working on deadlines, call back next week.			1
St. Bernard Port, Harbor and Terminal District	Robert J. Scafidel	504-277-8418	rscafidel@stbernardport.com	Mississippi	Mtg. notes (Jamie)			1	
Federal Agencies	**Contact**	**Contact Phone No.**	**E-mail**	**Basin**	**action**	**follow-up**	**2nd follow-up**		
USACE, Public Affairs for Water Resources	Ralph Scheid John Hall	Need Vicksburg Division-Jim Hannon 504-862-2995 504-862-2545	ralph.scheid@us.army.mil john.w.hall@mvn02.usace.army.mil	All	left msg. 10/3 (-2995 #)	left msg 11/28 (2995). emailed John Hall 11/28. Ralph ret'd call-will email to Op. Div's			
USACE, Flood Control Chief, Operations Division	Steven Schinetsky	504-862-2343	steven.a.schinetsky@mvn02.usace.army.mil	All	ret'd survey 11/30/06			1	
USACE	Sidney Formal	703-428-6380	Sidney.M.Formal@iwr01.usace.army.mil	All	v. mail 10/9; emailed 10/10	"not directed at gov." - David Grier			

Contact List for
DOTD Marine Transportation System Plan Survey

State Agencies	Contact	Contact Phone No.	E-mail	Basin	action	follow-up	2nd follow-up		
LA Oil Spill Coordinator's Office (Gov's Office)	David Gisclair	225-578-7819	dgisclair@lsu.edu dgisclair@losco.state.la.us	All	called 10/16 (no answer) emailed 10/16	called 11/28 (no ans). emailed to lsu.edu address			1
LDWF-Enforcement				All					1
Local Agencies/Operators	**Contact**	**Contact Phone No.**	**E-mail**	**Basin**	**action**	**follow-up**	**2nd follow-up**		
Red River Valley Association	Rich Brontoli	318-221-5233	redriverva@hotmail.com	Red River	left msg. 10/4	KRP spoke w/ 10/16		1	
Red River Waterway Commission	Randy Walters	318-352-7446	rrwcrw@cp-tel.net	Red River	spoke w/ 10/4			1	
Gulf Intracoastal Canal Association	Raymond Butler	281-996-6915	rbutler@houston.rr.com	GIWW	emailed 10/3	KRP re-emailed 10/16 (comp. problems)		1	
Ouachita River Association	Paul Revise	501-329-4771	dmg@conwaycorp.net	Ouachita	spoke w/ 10/3			1	
Pine Bluff Sand and Gravel	Scott McGeorge	870-534-7120	phyllis.harden@pbsgc.com	Red River (Arkansas)	emailed 10/5	KRP called 10/16; rec'd email 10/17		1	
Louisiana Chemical Association	Tia Edwards	225-344-2609	tia@lca.org	All	emailed 11/04	called and re-sent e-mail			1
Steamship Association of Louisiana	Sean Duffy	504-522-9392	sean@sshipla.org	All	emailed 11/04	called and re-sent e-mail			1
Harvey Canal Industrial Association	Gary Busby	504-367-1721	info@harveycanal.org	GIWW	left msg. 10/4	left msg & emailed 11/28.	11/29 - Peggy Bourgeois will email to members		1
Terral Barge Services	Johnny Martin Jimmy Munn	318-559-5351 225-492-3451	jmartin@terralriverservice.com		emailed 10/9	10/16 - not in call back tomorrow	11/10 & 11/28 - left msg. for J. Munn		1
Morgan City Industrial Users				Terrebonne, Barataria					
Pilot Associations	**Contact**	**Contact Phone No.**	**E-mail**	**Basin**	**action**	**follow-up**	**2nd follow-up**		
Association Branch Pilots of the Port of New Orleans	Craig Sanders	504-831-6615	craig.sanders@barpilot.com	Mississippi	emailed 10/9	KRP left msg. 10/16	called 11/28 - he will call back.		1
Crescent River Port Pilots Association	A.J. Gibbs	504-392-8001 x312	www.crescentpilots.com	Mississippi	v. mail 10/5; faxed 10/10	KRP left email 10/16	faxed 11/28.		1
New Orleans-Baton Rouge Steamship Pilots Assn.	Linda Scallin - sec'y	985-871-8450		Mississippi	v. mail w/ sec'y 10/5	called 11/28 - left msg.			1
Lake Charles Pilots	Capt. Mike Miller	337-436-0372	www.lakecharlespilots.com	Calcasieu	left msg. 10/9	Joe called	rec'd 1/10/07	1	
Louisiana River Pilots Association	Ed Peterson	985-249-5662	corporate office - no one to answer navigation questions	All	KRP called 10/5				
								19	**11** **subtotals**
								63%	**% rec'd**

BASIN/AGENCY	CONSTRAINTS							
	Main Concerns	Structure Rehab. Needs	Navigation Safety	System Bottlenecks	System Expansion	Transportation Service	Intermodal Connectivity	Dredge Disposal
I. Mississippi River								
Port of Greater Baton Rouge	*Karen St. Cyr will look at*							
St. Bernard Port, Harbor and Terminal District		GIWW locks & bridges are outdated. Bridge out at Bayou Yscloskey.	None	Rail crossing, particularly the east-west transfer, south regional	None	None	None	Bayous Yscloskey & Bayou LaLoutre need dredging
Lake Providence Port Commission		Boat ramps at low water-safety issue, locks/dams outside LA	Boat ramps at low water	Boat ramps, dredging schedules	None	Locks/dams outside LA, grain elevators effected	Rail-no Fed. Level constraints or incentives between water & rail	None
Assn. Branch Pilots of the Port of N.O.								
Crescent River Port Pilots Assn								
N.O.-BR Steamship Pilots Assn.								
Pine Bluff Sand and Gravel	Need to deepen N.O.-Baton Rouge channel to 55'.	None	None	None	Dredge to 55'	None	None	None
Harvey Canal Industrial Assn	*Peggy Bourgeois emailed survey to members*							
II. Calcasieu River and Pass								
Lake Charles Harbor & Terminal Distr.								
Lake Charles Pilots								
III. Red River								
Red River Valley Assn.	No major problems	None	Check navigation lights and gauge boards	None	None	None	Caddo/Bossier handles.	Dredge in-river, no upland disposal issues.
Red River Waterway Commission	9'-12' channel, need auth from Congress ASE reach cost/benefit	None	None	None	channel-can't load past 9' in upper MS - 10'6"-dry, 8'6" liquid	More towboat operators on river	N/A	None
Port of Shreveport Bossier	Needs a 12' draft & a rail crossing to Bossier	None	None	Power availability at Old River to support growing system needs into Shreveport-Bossier	Increase min. depth standard to 12'. System is limited to barge tow per each locking. Majority of river already naturally 12' or more & this would allow 25% more capacity for same costs per shipment	More tow boats willing to come to the Port of Shreveport-Bossier	RR bridge in vicinity of I-69 crossing to allow KCS rail to cross from East to West side. Would provide Bossier second class 1 rail to support the Port & would eliminate/min. rail traffic through Bossier City	None
Pine Bluff Sand and Gravel	Needs a 12' channel	Most of channel is 12' and locks will not need modification.	None	None	Tow haulage needed on locks to allow 8, 10, or 12 barges instead of 6. Cleco plant will bring millions of tons of pet coke to Alexandria.	Navigation of the Red River to Texarkana, Arkansas is being studied. River will be more viable with navigation into Arkansas.	None	None
IV. Ouachita River								
Ouachita River Association	Maint funds for locks & dams, erosion, dredging, marketing	Replace lift bridges	Approaches to bridges	None	Recreational marina, buy fuel, launch boats	None	Working on W. Monroe	None
V. Atchafalaya River								
Port of Morgan City	Maintaining river depth at the mouth	Extended dock area	Continue dredging the mouth of the Atchafalaya River	none	Constructing jetties at the River Mouth	Keeping what we have in good condition	in good shape	Discovering beneficial use of dredged material
Port of Krotz Springs	No major problems	None	None	None	None	None	None	not applicable--no dredging
VI. Vermilion-Teche River								
Port of West St. Mary (GIWW)	Needs to be deeper; asking Congr. for 20' (currently 12')	None	None	Bottlenecks at locks; no suggestions on how to change.	None	None	None	None
VII. Pearl River								
VIII. Sabine River								
IX. Mermentau River								
Mermentau River Harbor & Term. Distr.	Not many loading and unloading facilities.	Rehabilitation of the Port slips.	Silting at the mouth of Intercoastal Waterway and the Mermentau River	Sometimes barges must wait until high tide to enter the Mermentau River	None	None	None	None
Steven Broussard sent survey to Lake Charles Pilot Assn.--did not receive response								
XI. And XII. Barataria and Terrebonne Basins								
Port Fourchon	Congestion on Bayou Lafourche	LA 1 impediment to growth. Need elevated hwy to Golden Meadow	None	Bayou congested due to # of bridges. Tow size limited to single barge.	Need alternate route to connect to GIWW--connect Houma navigation canal to port to allow Intercoastal tow. Increase draft from 26' to 50' to accom drilling rig services.	None	Efficient inland waterway would increase intermodal use (currently 1,200 trucks/day).	None--dredge materials used to rebuild marsh. Plenty of storage space for dredge material.
Port of Terrebonne								
XIII. GIWW								
Port of Iberia		Channel at 12', Inadequate for Port Industries	None	Freshwater locks requires deepening and widening	Dredging waterways to 20'	None	Short line RR requires rail upgrades, U.S., Hwy. 90 to I-49	None
Gulf Intracoastal Canal Association	Comp. of Inner Harbor Navg. Canal Lock in NO, O&M Funds	Inner Harbor Nav. Lock is 85 yrs old. Eliminate swing bridges	Maint. of full proj. depth of 12' for entire length of waterway	Intracoastal waterway as flood aqueduct during flooding	Increased width, keeping full, useable project depth	Standardized, consistent & well thought out bridge oper procedures	Container-on-Barge is trend of future, plans should incorp. this	None
Port of New Orleans		IHNC Lock is 83 yrs old. Needs replacement	None	Old IHNC lock-tows are delayed 24-36 hours at times.	New IHNC lock will provide continued deep draft access to Port of NO	None	None	None
Pine Bluff Sand and Gravel	IHNC "total piece of junk" & needs to be replaced. Main artery going east.	Fix IHNC (built in 1930s) as soon as possible	None	None	None	None	None	None
ALL								
U.S. Army Corps of Engineers								
LA Oil Spill Coordinator's Office								
LDWF-Enforcement								
Terral Barge Services								

BASIN/AGENCY	Constraints--cont.		ONGOING PROJECTS	INSTITUTIONAL CONSTRAINTS		
	Security/Safety	Other		Fed/State Regs	Project Authorization/Funding	Maritime Fees/Other
I. Mississippi River						
Port of Greater Baton Rouge						
St. Bernard Port, Harbor and Terminal District	None	None	None	Harbor Maintenance taxes are collected fees that are not returned to justifiable ends	USACE formula for budget determinations to perform maintenance & budget for commerce cutting large amounts of budget	Imported Cargo receives a greater tariff
Lake Providence Port Commission	None	None	None	USACE - Project specific funding limit usability	None	None
Assn. Branch Pilots of the Port of N.O.						
Crescent River Port Pilots Assn						
N.O.-BR Steamship Pilots Assn.						
Pine Bluff Sand and Gravel	None	None			Waiting on authorization and funding	
Harvey Canal Industrial Assn						
II. Calcasieu River and Pass						
Lake Charles Harbor & Terminal Distr.						
Lake Charles Pilots						
III. Red River						
Red River Valley Assn.	Port issues addressed by USACE and Coast Guard	Need Continued O & M funds.	CORPS projects, cap out dikes & revetments	C.G. procedures for licensing tow captains, time, restrictions & req.	None	None
Red River Waterway Commission	Port Issue	None	A. Synfuel - 2.5 mm tons. New project affects 4 ports, 20mm tons lignite/2011 B. Steelscape Port of Shrev/$210 mm, 100K tons steel C. Cleco Power $1B project Boyce, LA. 2MM+ tons/yr pet coke barged up Atch./Mississippi to Red River	None	None	None
Port of Shreveport Bossier	RR bridge in vicinity of I-69 crossing would eliminate/min. rail traffic through Bossier City	None	US Army Corps of Engineers feasibility study, Red River from Shreveport to Endex Arkansas, to determine viability of navigation to Texarkana	None	None	None
Pine Bluff Sand and Gravel	None	None	Study of navigation of Red River to Texarkana, Arkansas.	None	Waiting on authorization and funding	None
IV. Ouachita River						
Ouachita River Association	Disgruntlement, Biometric Cards	None	Port of W. Monroe Ouachita Term. City of Columbia Port Exp.	None	Bank stabilization	Marine fuel
V. Atchafalaya River						
Port of Morgan City	More sophisticated electronic surveillance system	None	CORPS dredging of Berwick Bay Harbor & mouth of Atchafalaya	Maintaining river depth at mouth		
Port of Krotz Springs	None	None				
VI. Vermilion-Teche River						
Port of West St. Mary (GIWW)	None	None	None	No one likes Harbor Maint. Tax--fair if same fees for everyone.	Waiting for 20' dredging and O&M funding authorization.	Counter-terrorism measures a pain (cards/electronic readers).
VII. Pearl River						
VIII. Sabine River						
IX. Mermentau River						
Mermentau River Harbor & Term. Distr.	None	None	None	None	None	None
Steven Broussard sent survey to Lake Charles Pilot Assn.--did not receive response						
XI. And XII. Barataria and Terrebonne E						
Port Fourchon	None	Deepening the channel would let LA compete in billion $ drilling rig repair and inspection industry. Competing ports in TX, MS and AL service LA rigs.	-Numerous dredging projects -Waterfront and docking facilities	Need more revenue sharing from federal gov.	Process very lengthy ("takes a lifetime").	None
Port of Terrebonne						
XIII. GIWW						
Port of Iberia	None	None	Acadiana Gulf of Mexico Access Channel (AGMAC) Deepening of Channels from 12'-20'	None	Six years to pass the WRDA. Inadequate funding in LA port Const. & Development Priority Prog.	None
Gulf Intracoastal Canal Association	Inland barge industry personnel identification/ credentialing issues	Protection of waterway from erosion of protective barrier island	- Calcasieu Lock/Mermentau Basin Flood Damage Reduction. - Inner Harbor Navigational Canal Lock Replacement -Bayou Sorrell Lock Replacement	Use of Intracoastal waterway for flood relief instead of navigation.	LA should join w/GICA to have the entire Intracoastal Waterway viewed by the USACE as a single operational "water highway system"	None
Port of New Orleans	None	None	IHNC Replacement Lock, US Army Corps of Engineers	None	Has been adequate to begin construction	None
Pine Bluff Sand and Gravel	None	None			Waiting on authorization and funding	
ALL						
U.S. Army Corps of Engineers			1. Bayou Sorrel Lock Replacement--along Port Allen to Morgan City (Alternate Route) of GIWW 2. Calcasieu Lock Replacement--GIWW 3. IHNC Lock Replacement 4. Port of Iberia Feasibility Study--Recommends deepening 60 mi. from Port of Iberia thru Commercial Canal, Freshwater Bayou, and GIWW to the Gulf.			
LA Oil Spill Coordinator's Office						
LDWF-Enforcement						
Terral Barge Services						

Appendix C
Initial List of Physical Constraints

Appendix C: Initial List of Constraints from Coast Pilot

ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
1	Old River Navigation Canal	Atchafalaya River	31° 0'30.86"N	91°40'48.92"W	Point Breeze	Controlling Depth	Water	Immediate			12			11354	379	The Federal project provides for a dredged channel 12 feet deep and about 2.3 miles long from the Mississippi to Old River about 1.6 miles W of the dam, thence 12 feet to the junction at Barbre Landing with the Red and Atchafalaya Rivers at A.R. Mile 0.0.
2	Old River Navigation Canal	Atchafalaya River	31° 0'11.29"N	91°40'24.48"W	Point Breeze	Lift Bridge	Highway	Future	0	53		75		11354	379	State Route 15 highway vertical lift bridge over the lock has a clearance of zero feet down and 53 feet up.
3	Atchafalaya River Route	Atchafalaya River	30°19'37.34"N	91°37'35.69"W	Des Glaise	Controlling Depth	Water	Immediate			12			11354	379	Atchafalaya River Route flows S into the Gulf of Mexico from its confluence with the Red and Old Rivers. The 116.8-mile section, the confluence to Morgan City, has a Federal project depth of 12 feet.
4	Atchafalaya River Route	Atchafalaya River	30°32'45.29"N	91°44'59.88"W	Krotz Springs	Fixed Bridge	Highway	Future	58			475		11354		
5	Atchafalaya River Route	Atchafalaya River	30°32'19.21"N	91°44'45.94"W	Krotz Springs	Swing Bridge	Rail	Future	6			129		11354		
6	Atchafalaya River Route	Atchafalaya River	30°31'38.77"N	91°44'22.38"W	Krotz Springs	Overhead Cables		Future	81					11354		
7	Atchafalaya River Route	Atchafalaya River	30°27'39.75"N	91°44'31.69"W	Krotz Springs	Overhead Cables		Future	93					11354		
8	Atchafalaya River Route	Atchafalaya River	30°22'2.20"N	91°38'19.53"W	Des Glaise	Overhead Cables		Future	70					11354		
9	Atchafalaya River Route	Atchafalaya River	30°21'54.58"N	91°38'16.15"W	Des Glaise	Fixed Bridge	Highway	Future	52			250		11354		
10	Atchafalaya River Route	Atchafalaya River	30°21'27.90"N	91°38'9.68"W	Des Glaise	Overhead Pipeline	Pipeline	Future	58					11354		
11	Atchafalaya River Route	Atchafalaya River	30°58'55.07"N	91°47'52.93"W	Simmesport	Swing Bridge	Rail	Critical	5			131		11354		
12	Atchafalaya River Route	Atchafalaya River	30°58'53.38"N	91°47'56.10"W	Simmesport	Overhead Cables		Future	58					11354		
13	Atchafalaya River Route	Atchafalaya River	30°58'39.03"N	91°48'12.29"W	Simmesport	Fixed Bridge	Highway	Future	50			504		11354		
14	Atchafalaya River Route	Atchafalaya River	30°42'33.13"N	91°44'11.50"W	Melville	Overhead Pipeline		Future	52					11354		
15	Atchafalaya River Route	Atchafalaya River	30°41'27.20"N	91°44'4.72"W	Melville	Lift Bridge	Rail	Future	3	53		160		11354		
16	Atchafalaya River Route	Atchafalaya River	30°33'15.77"N	91°45'11.61"W	Krotz Springs	Overhead Pipeline		Future	60					11354		
17	Atchafalaya River Route	Atchafalaya River	29°43'9.32"N	91°13'27.86"W	Berwick	Lock	Water	Immediate			9	45	300	11354	397	Bayou Teche is a navigable waterway in S Louisiana parallel to and 35 miles W of the Mississippi River, meandering NW for about 93 miles from its junction with Lower Atchafalaya River, about 8 miles W of Berwick Lock, to its sources in St. Landrys Parish. The lock has a length of 300 feet, width of 45 feet, and depth over the sill of 9 feet at mean low water.
18	Atchafalaya River Route	Atchafalaya River	29°41'47.27"N	91°12'50.98"W	Morgan City	Fixed Bridge	Highway	Future	50			583		11354	395	U.S. 90 fixed highway bridges, about 400 and 500 yards above the railroad bridge, have clearances of 73 feet and 50 feet, respectively.
19	Atchafalaya River Route	Atchafalaya River	29°41'43.71"N	91°12'48.90"W	Morgan City	Fixed Bridge	Highway	Future	73			525		11354	395	U.S. 90 fixed highway bridges, about 400 and 500 yards above the railroad bridge, have clearances of 73 feet and 50 feet, respectively.
20	Atchafalaya River Route	Atchafalaya River	29°41'31.74"N	91°12'45.75"W	Morgan City	Lift Bridge	Rail	Future	4	73		320		11354	395	The Southern Pacific railroad vertical lift bridge has a clearance of 4 feet down and 73 feet up.
21	Atchafalaya River Route	Atchafalaya River	29°40'41.89"N	91°13'17.72"W	Morgan City	Overhead Cables		Future	130					11354		
22	Atchafalaya Bay Ship Channel	Atchafalaya River	29°27'54.49"N	91°16'41.02"W	Shell Island	Controlling Depth		O&M			20			11351	394	Atchafalaya Bay Ship Channel extends in a NE direction from the Gulf to near the mouth of the Lower Atchafalaya River. A Federal project provides for a 20-foot by 400-foot dredged channel from the 20-foot contour in the Gulf to about 4 miles SW of the mouth of the Lower Atchafalaya River.
23	Wax Lake Outlet	Atchafalaya River	29°41'55.68"N	91°22'25.48"W	Calumet	Fixed Bridge	Rail	Future	2			97		11350	399	Three bridges with fixed channel spans and a minimum clearance of 2 feet control navigation in the canal S of Bayou Teche.
24	GIWW	Atchafalaya River	29°40'51.38"N	91°28'17.52"W	North Bend	Fixed Bridge	Highway	Future	73			125		11350		
25	GIWW	Atchafalaya River	29°40'47.28"N	91°28'9.55"W	North Bend	Overhead Cables		Future	94					11350		
26	GIWW	Atchafalaya River	29°41'6.81"N	91°11'24.61"W	Morgan City	Cable Ferry	Water	Future						11355		Cable across the river may be at or near the waters surface. Mariners should use caution
27	GIWW	Atchafalaya River	29°40'58.18"N	91°10'26.88"W	Morgan City	Lock		Critical			13	75	1148	11355		
28	Bayou Grosse Tete	Atchafalaya River	30°24'25.34"N	91°25'26.34"W	Grosse Tete	Swing Bridge	Rail	Future								

Appendix C: Initial List of Constraints from Coast Pilot

ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
29	Bayou Grosse Tete	Atchafalaya River	30°33'15.32"N	91°33'28.96"W	Livonia	Fixed Bridge	Rail	Future								
30	Grand Bayou Pass	Barataria	29°17'40.16"N	89°40'59.80"W	Lanaux Island	Controlling Depth		O&M			6			11364	383	Grand Bayou Pass, W of the island, is the main entrance to Bastian Bay and also to Grand Bayou. Controlling depth in the dredged channel over the bar in the pass was 6 feet in 1961.
31	Grand Bayou	Barataria	29°18'43.19"N	89°40'25.98"W	Lanaux Island	Controlling Depth		O&M			3			11364	383	Grand Bayou, is used considerably by local fishing boats. On a favorable tide, about 3 feet can be carried through Grand Bayou and Meyers Canal and thence across Adams Bay to the Doullut Canal connecting with the Mississippi River at Empire, a distance of 9 miles.
32	Barataria Waterway	Barataria	29°16'41.32"N	89°57'45.92"W	Grand Isle	Controlling Depth		O&M			3			11364	384	A dredged channel leads across the bar at Barataria Pass into Barataria Bay, thence in landcuts through Beauregard, Mendicant and other islands on the W side of Barataria Bay, thence through Mud Lake, Bayou St. Denis, and Bayou Cutler, thence through a landcut known as Dupre Cut, and thence through Bayou Barataria to the Intracoastal Waterway. In October-November 2005, the controlling depth was 11 feet across the bar, thence 3 feet to Light 19, thence 4 feet to Light 43; thence in February 2006, 7 feet to the entrance of Bayou Rigolettes, thence 3 feet to the junction with the Intracoastal Waterway.
33	Bayou Grand Caillou	Barataria	29°11'25.01"N	90°55'27.34"W	Houma	Controlling Depth		O&M			5			11356	392	Bayou Grand Caillou empties into Caillou Bay 6.5 miles N of Raccoon Point. The entrance is marked by lights. In May 1995, the controlling depth in the bayou was 5 feet from the entrance to Dulac, about 20 miles above the mouth.
34	GIWW	Barataria	29°34'37.61"N	90°22'49.04"W	Larose	Fixed Bridge	Highway	Future	73			150		11355		
35	GIWW	Barataria	29°34'44.72"N	90°22'43.50"W	Larose	Overhead Cables		Future	90					11355		
36	GIWW	Barataria	29°34'58.40"N	90°22'33.54"W	Larose	Overhead Cables		Future	110					11355		
37	GIWW	Barataria	29°39'20.18"N	90°13'38.95"W	Larose	Overhead Cables		Future	191					11355		
38	GIWW	Barataria	29°45'42.05"N	90° 6'0.16"W	Crown Point	Fixed Bridge	Highway	Future	73			125		11365		
39	GIWW	Barataria	29°46'23.13"N	90° 4'27.13"W	Crown Point	Overhead Cables		Future	99					11367		
40	GIWW	Barataria	29°51'10.90"N	90° 3'49.45"W	Harvey Tunnel	Overhead Cables		Future	124					11367		
41	GIWW	Barataria	29°51'21.65"N	90° 3'52.92"W	Harvey Tunnel	Overhead Cables		Future						11367		
42	GIWW	Barataria	29°52'16.08"N	90° 4'10.74"W	Harvey	Bascule Bridge	Highway	Future	45			150		11367		
43	GIWW	Barataria	29°53'0.37"N	90° 4'27.52"W	Harvey	Overhead Cables		Future	135					11367		
44	GIWW	Barataria	29°53'52.65"N	90° 4'45.61"W	Harvey	Fixed Bridge	Highway	Future	95			300		11367		
45	GIWW	Barataria	29°53'53.50"N	90° 4'46.25"W	Harvey	Tunnel	Highway	Future						11367		
46	GIWW	Barataria	29°54'28.17"N	90° 4'59.57"W	Harvey	Bascule Bridge	Highway	Future	7			65		11367		
47	Company Canal	Barataria	29°38'41.52"N	90°32'40.39"W	Lockport	Lift Bridge	Highway	Future	5	50		125		11365		
48	Bayou Lafourche	Barataria	29°38'48.64"N	90°32'12.29"W	Lockport	Swing Bridge	Highway	Future	6			85		11365		
49	Bayou Lafourche	Barataria	29°38'46.68"N	90°32'7.35"W	Lockport	Overhead Cables		Future	90					11365		
50	Bayou Lafourche	Barataria	29°38'11.19"N	90°30'46.60"W	Lockport	Swing Bridge	Highway	Future	6			80		11365		
51	Bayou Lafourche	Barataria	29°35'31.20"N	90°28'2.49"W	Valentine	Pontoon Bridge	Highway	Future				90		11365		
52	Bayou Lafourche	Barataria	29°35'10.48"N	90°26'16.90"W	Ludivine	Overhead Cables		Future				78		11365		
53	Bayou Lafourche	Barataria	29°34'33.33"N	90°23'55.71"W	Larose	Lift Bridge	Highway	Future						11365		
54	Bayou Lafourche	Barataria	29°34'31.35"N	90°23'39.67"W	Larose	Pontoon Bridge	Highway	Future				93		11365		
55	Bayou Lafourche	Barataria	29°34'30.74"N	90°23'34.84"W	Larose	Overhead Cables		Future	68					11365		
56	Bayou Lafourche	Barataria	29°34'14.71"N	90°22'52.84"W	Larose	Floodgate	Highway	Future						11365		
57	Bayou Lafourche	Barataria	29°34'12.93"N	90°22'48.56"W	Larose	Pontoon Bridge	Highway	Future				92		11365		
58	Bayou Lafourche	Barataria	29°33'5.10"N	90°20'49.64"W	Cut Off	Overhead Cables		Future						11365		
59	Bayou Lafourche	Barataria	29°32'55.36"N	90°20'37.43"W	Cut Off	Lift Bridge	Highway	Future	4	73		80		11365		
60	Bayou Lafourche	Barataria	29°30'54.00"N	90°19'59.49"W	Cut Off	Pontoon Bridge	Highway	Future						11365		
61	Bayou Lafourche	Barataria	29°28'19.25"N	90°18'52.67"W	Belle Aime	Lift Bridge	Highway	Future	3	73		80		11365		
62	Bayou Lafourche	Barataria	29°26'3.12"N	90°17'51.05"W	Galliano	Pontoon Bridge	Highway	Future						11365		
63	Bayou Lafourche	Barataria	29°25'35.75"N	90°17'37.28"W	Galliano	Overhead Cables		Future	92					11365		
64	Bayou Lafourche	Barataria	29°25'12.03"N	90°17'14.41"W	Galliano	Overhead Cables		Future	65					11365		
65	Bayou Lafourche	Barataria	29°23'21.12"N	90°15'51.90"W	Golden Meadow	Lift Bridge	Highway	Future	2	73		80		11365		
66	Bayou Lafourche	Barataria	29°21'43.99"N	90°15'13.53"W	Golden Meadow	Overhead Cables		Future						11365		
67	Bayou Lafourche	Barataria	29°20'34.25"N	90°14'44.94"W	Golden Meadow	Floodgate	Water	Future			9	56		11365		
68	Bayou Lafourche	Barataria	29°17'23.42"N	90°13'48.95"W	Leeville	Overhead Cables		Future						11365		
69	Bayou Lafourche	Barataria	29°14'47.82"N	90°12'31.57"W	Leeville	Lift Bridge	Highway	Future	40	73		125		11365		
70	Belle Pass	Barataria	29° 5'46.65"N	90°13'22.36"W	Port Fourchon	Controlling Depth		Immediate			26			11346		
71	Bayou Boeuf	Barataria	29°49'29.72"N	90°28'34.68"W	Des Allemands	Lift Bridge	Rail	Future								
72	Calcasieu Ship Channel	Calcasieu	29°44'41.83"N	93°20'28.21"W	Cameron	Caution	Water	Immediate						11339	408	Entrance to Calcasieu Jetties (29°44.7'N., 93°20.5'W.). This area has been the site of many collisions and near misses due to strong cross-currents that may run across the entrance. Vessels should avoid meeting situations, particularly with ships or tows, within one-quarter mile North or South of Lights 41 and 42 at the entrance to the jetties.

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73	Calcasieu Ship Channel	Calcasieu	29°47'1.78"N	93°20'45.79"W	Cameron	Caution	Water	Immediate						11339	408	Monkey Island (29°47.0'N., 93°20.8'W.). This area is used extensively by the fishing and offshore exploration industries. Numerous fishing and offshore exploration boats are homeported in this area. Vessels transiting this area may require speed reduction to reduce wake.
74	Calcasieu Ship Channel	Calcasieu	30° 5'27.82"N	93°19'32.82"W	Choupique Island	Caution	Water	Immediate						11347	408	Intracoastal Waterway (30°05.5'N., 93°19.5'W.). This represents the point at which this waterway crosses the Calcasieu River Channel. This water is extensively used by tows. The situation is further complicated by an LNG facility located on the Industrial Canal which is serviced by deep-draft vessels.
75	Calcasieu Ship Channel	Calcasieu	29°43'5.92"N	93°20'13.27"W	Cameron	Controlling Depth		O&M			42			11339	408	A Federal project provides for a channel 42 feet deep across the outer bar from that depth in the Gulf to the entrance jetties, thence 40 feet through the jetties, thence to and in the Industrial Canal and turning basin N of Choupique Island, thence to the Port of Lake Charles wharves, and thence 35 feet to the Interstate Route 10/U.S. Route 90 highway bridge.
76	Calcasieu Ship Channel	Calcasieu	29°45'20.65"N	93°20'35.75"W	Cameron	Controlling Depth		O&M			40			11339	408	A Federal project provides for a channel 42 feet deep across the outer bar from that depth in the Gulf to the entrance jetties, thence 40 feet through the jetties, thence to and in the Industrial Canal and turning basin N of Choupique Island, thence to the Port of Lake Charles wharves, and thence 35 feet to the Interstate Route 10/U.S. Route 90 highway bridge.
77	Calcasieu Ship Channel	Calcasieu	30°13'6.18"N	93°14'42.59"W	Lake Charles	Controlling Depth		O&M			35			11339	408	A Federal project provides for a channel 42 feet deep across the outer bar from that depth in the Gulf to the entrance jetties, thence 40 feet through the jetties, thence to and in the Industrial Canal and turning basin N of Choupique Island, thence to the Port of Lake Charles wharves, and thence 35 feet to the Interstate Route 10/U.S. Route 90 highway bridge.
78	Calcasieu Ship Channel	Calcasieu	29°47'47.65"N	93°19'46.81"W	Cameron	Overhead Cables		Future	84					11339	410	An overhead power cable with a clearance of 84 feet crosses the river at Cameron to Monkey Island. About 1 mile below Calcasieu Lake, Calcasieu River is crossed by another overhead power cable with a clearance of 54 feet.
79	Calcasieu Ship Channel	Calcasieu	29°49'25.74"N	93°20'13.52"W	Cameron	Overhead Cables		Future	54					11339	410	An overhead power cable with a clearance of 84 feet crosses the river at Cameron to Monkey Island. About 1 mile below Calcasieu Lake, Calcasieu River is crossed by another overhead power cable with a clearance of 54 feet.
80	Calcasieu Lake	Calcasieu	29°50'42.05"N	93°19'43.09"W	Cameron	Controlling Depth		Future			6			11347	410	The controlling depth off the entrance at the S end was reported to be 6 feet in July 1982.
81	Calcasieu Lake	Calcasieu	30° 3'13.54"N	93°18'50.69"W	Mud Lake	Controlling Depth		O&M			3			11347	410	The controlling depth at West Pass, at the N end, was about 3 feet, but the lake bottom is so soft that slightly greater drafts can drag through.
82	Calcasieu Ship Channel	Calcasieu	30°12'5.90"N	93°16'49.05"W	Rose Bluff	Fixed Bridge	Highway	Future	135			250		11347	410	A highway bridge at the N end of Rose Bluff Cutoff, about 1.5 miles below Port of Lake Charles, has a fixed channel span with a clearance of 135 feet.
83	Bayou d'Inde	Calcasieu	30°12'19.00"N	93°19'8.41"W	Rose Bluff	Controlling Depth		Future			9.5			11347	411	In November 1995, the controlling depth was 9½ feet to the highway bridge.
84	Bayou d'Inde	Calcasieu	30°12'10.88"N	93°19'31.14"W	Rose Bluff	Fixed Bridge	Highway	Future	8			38		11347	411	Bayou d'Inde, branching W from Rose Bluff Cutoff, is crossed by State Route 108 highway bridge 3.7 miles above the cutoff. The bridge has a 38-foot removable span with a clearance of 8 feet.
85	Bayou d'Inde	Calcasieu	30°12'11.29"N	93°19'34.07"W	Rose Bluff	Fixed Bridge	Rail	Future	6			33		11347	411	Just above it, the Kansas City Southern railroad bridge has a 33-foot removable span with a clearance of 6 fee
86	Contraband Bayou	Calcasieu	30°12'23.55"N	93°14'26.14"W	Lake Charles	Overhead Cables		Future	48					11347	411	An overhead power cable with a clearance of 48 feet crosses the bayou about 1.1 miles above the mouth.
87	Contraband Bayou	Calcasieu	30°11'53.83"N	93°14'11.53"W	Lake Charles	Fixed Bridge	Highway	Future	15			55		11347	411	A highway bridge crossing the bayou about 1.6 miles above the mouth has a fixed span with a clearance of 15 feet. The twin fixed spans of another highway bridge with a clearance of 15 feet are 0.1 mile above the first bridge.
88	Contraband Bayou	Calcasieu	30°11'49.09"N	93°14'16.11"W	Lake Charles	Fixed Bridge	Highway	Future	15					11347	411	A highway bridge crossing the bayou about 1.6 miles above the mouth has a fixed span with a clearance of 15 feet. The twin fixed spans of another highway bridge with a clearance of 15 feet are 0.1 mile above the first bridge.
89	Contraband Bayou	Calcasieu	30°12'3.40"N	93°14'24.39"W	Lake Charles	Controlling Depth		O&M			9			11347	411	In 1995, the controlling depth was 9 feet from the cargo wharves to the first bridge.
90	Calcasieu River	Calcasieu	30°14'13.82"N	93°14'48.73"W	Lake Charles	Fixed Bridge	Highway	Future	135			200		11347	414	Route 90 highway bridge that crosses the river and the N part of Lake Charles near Westlake has a fixed cantilever center span with clearance of 95 feet for a width of 380 feet and a clearance of 135 feet for the middle 200 feet of span.
91	Calcasieu River	Calcasieu	30°14'17.40"N	93°14'48.57"W	Lake Charles	Swing Bridge	Rail	Future	1			93		11347	414	Just N of the highway bridge, the Southern Pacific railroad swing bridge has a clearance of 1 foot.

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92	Calcasieu River	Calcasieu	30°15'13.93"N	93°13'6.34"W	Lake Charles	Lock	Water	Immediate			13	56		11347	414	The barrier consists of a 56-foot-wide navigation structure with a depth of 13 feet over the sill; a floodway control structure parallel to and immediately S of the navigation structure; and a dam on a loop of the river at Two O'Clock Point, about 3.9 miles above the floodway control structure.
93	Calcasieu River	Calcasieu	30°16'5.50"N	93°12'42.53"W	Bridge Junction	Controlling Depth		O&M			20			11347	414	In November 1995, the controlling depth in West Fork was 20 feet for 7 miles to its junction with Houston River, thence 13 feet for another 5 miles to the U.S. Route 90 fixed highway bridge at West Lake.
94	English Bayou	Calcasieu	30°16'19.87"N	93°10'57.62"W	Goosport	Fixed Bridge	Highway	Future	14			92		11347	414	U.S. Route 171 fixed highway bridge with a clearance of 14 feet crosses the bayou about 0.7 mile above its mouth.
95	English Bayou	Calcasieu	30°16'20.86"N	93°10'56.01"W	Goosport	Overhead Cables		Future	45					11347	414	An overhead power cable with a clearance of 45 feet crosses the bayou just above the bridge.
96	Calcasieu River	Calcasieu	30°17'9.77"N	93°11'18.33"W	Goosport	Fixed Bridge	Highway	Future	35			124		11347	414	U.S. Route 171 fixed highway bridge with a clearance of 35 feet crosses Calcasieu River about 4.6 miles above the navigation structure.
97	Calcasieu River	Calcasieu	30°15'42.78"N	93°12'27.64"W	Bridge Junction	Overhead Cables		Future	136					11347		
98	Calcasieu River	Calcasieu	30°15'10.86"N	93°14'27.75"W	Westlake	Controlling Depth		O&M			13			11347	414	In December 1996, the controlling depth in Calcasieu River was 13 feet from Interstate Route 10/U.S. Route 90 bridge to the junction with West Fork, thence 6½ feet to Point Fing and to Hecker; above this point, the river is not navigable because of snags and trees.
99	GIWW	Calcasieu	30° 5'15.29"N	93°17'35.04"W	Choupique Island	Lock	Water	Immediate			13	75	1194	11339		
100	GIWW	Calcasieu	30° 4'56.92"N	93°17'9.35"W	Choupique Island	Pontoon Bridge	Highway	Future				125		11339		
101	GIWW	Calcasieu	30° 0'39.76"N	93°13'41.88"W	Choupique Island	Bridge	Highway	Future								
102	GIWW	Calcasieu	29°56'2.19"N	93° 4'46.24"W	Gibbstown	Fixed Bridge	Highway	Future	73			250		11348		
103	GIWW	Calcasieu	29°56'1.21"N	93° 4'42.77"W	Gibbstown	Overhead Cables		Future	82					11348		
104	Algiers Alternate Route	GIWW	29°54'20.05"N	89°59'6.72"W	Belle Chasse	Overhead Cables		Future	175					11364	349	An overhead power cable with a clearance of 175 feet crosses the river about 1 mile above the Algiers Lock at about 89 miles AHP.
105	Algiers Alternate Route	GIWW	29°54'55.17"N	89°58'18.96"W	Terrytown	Lock	Water	Immediate								Chapter 12
106	Inner Harbor Navigational Canal	GIWW	29°57'53.30"N	90° 1'37.90"W	New Orleans	Lock	Water	Critical			31.5	75	640	11364	360	The lock is about 0.6 mile N of the Mississippi River Levee; inside dimensions are 640 feet long, 75 feet wide, and 31½ feet over the sills at low water in the Mississippi River.
107	Inner Harbor Navigational Canal	GIWW	29°59'13.86"N	90° 1'15.64"W	New Orleans	Controlling Depth		Immediate			29			11367	360	N from the lock in October 1995, the controlling depths were 29 feet to the Seabrook Highway and Southern Railway bridges at the N end of the canal, thence 14 feet across the bar into Lake Pontchartrain.
108	Inner Harbor Navigational Canal	GIWW	30° 1'11.80"N	90° 1'49.03"W	New Orleans	Controlling Depth		Immediate			14			11367	360	N from the lock in October 1995, the controlling depths were 29 feet to the Seabrook Highway and Southern Railway bridges at the N end of the canal, thence 14 feet across the bar into Lake Pontchartrain.
109	Inner Harbor Navigational Canal	GIWW	29°57'50.09"N	90° 1'38.86"W	New Orleans	Bascule Bridge	Highway	Future	0			70		11367	360	The St. Claude Avenue highway bridge at the S end of the navigation lock has a bascule span with a clearance of zero feet.
110	Inner Harbor Navigational Canal	GIWW	29°58'8.62"N	90° 1'32.68"W	New Orleans	Lift Bridge	Highway	Future	40	156		305		11367	361	The North Claiborne Avenue (Seeber) highway bridge, about 0.2 mile N of the lock, has a vertical lift span with a clearance of 40 feet down and 156 feet up.
111	Inner Harbor Navigational Canal	GIWW	29°58'50.77"N	90° 1'19.02"W	New Orleans	Lift Bridge	Rail	Future	0	156		300		11367	361	About 1 mile N of the lock, the combination Florida Avenue and Southern Railway bridge has a bascule span with a clearance of zero feet.
112	Inner Harbor Navigational Canal	GIWW	29°58'52.49"N	90° 1'18.59"W	New Orleans	Overhead Cables		Future	166					11367	361	An overhead power cable crossing close N of the bridge has a clearance of 166 feet.
113	Inner Harbor Navigational Canal	GIWW	30° 0'16.41"N	90° 1'33.11"W	New Orleans	Bascule Bridge	Rail	Future	0			90		11367	361	The combination Gentilly Road highway and Seaboard System Railroad (L&N) bridge, 2.8 miles N of the lock, has a bascule span with a clearance of zero feet.
114	Inner Harbor Navigational Canal	GIWW	30° 0'17.65"N	90° 1'33.41"W	New Orleans	Fixed Bridge	Highway	Future	120			250		11367	361	The U.S. Interstate Route 10 highway bridge close N of Gentilly Road bridge has a fixed span with a clearance of 120 feet for the middle 200 feet and 115 feet elsewhere.
115	Inner Harbor Navigational Canal	GIWW	30° 0'18.76"N	90° 1'33.63"W	New Orleans	Overhead Cables		Future	136					11367	361	An overhead power cable crossing close N of this bridge has a clearance of 136 feet.
116	Inner Harbor Navigational Canal	GIWW	30° 0'30.00"N	90° 1'37.58"W	New Orleans	Lift Bridge	Highway	Future	50	120		313		11367	361	Chef Menteur Highway (U.S. Route 90) bridge, 3 miles N of the lock, has a vertical lift span with clearances of 50 feet down and 120 feet up.
117	Inner Harbor Navigational Canal	GIWW	30° 1'52.80"N	90° 2'3.70"W	New Orleans	Bascule Bridge	Rail	Immediate	1			93		11367	361	The combination Seabrook Highway and Southern Railway Bridge across the N entrance of the canal, about 4.7 miles N of the lock, has a bascule span with a clearance of 1 foot.
118	Inner Harbor Navigational Canal	GIWW	30° 1'54.63"N	90° 2'4.50"W	New Orleans	Bascule Bridge	Highway	Future	44			84		11367	361	A highway bascule bridge with a clearance of 44 feet at the center crosses the canal close N of the Seabrook Highway and Southern Railroad Bridge.
119	Algiers Alternate Route	GIWW	29°52'16.31"N	90° 0'33.12"W	Belle Chasse	Tunnel	Highway	Future								

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120	Algiers Alternate Route	GIWW	29°52'18.81"N	90° 0'32.39"W	Belle Chasse	Lift Bridge	Highway	Future	40	100		125				
121	Algiers Alternate Route	GIWW	29°52'19.34"N	90° 0'31.41"W	Timberlane	Lift Bridge	Rail	Future	2	100		125				
122	GIWW MP	GIWW	29°44'11.51"N	91°10'38.76"W	Morgan City	Controlling Depth		Future			12			11354		
123	GIWW MP	GIWW	30° 7'54.70"N	91°19'21.08"W	Bayou Sorrel	Lock	Water	Critical			14	56	790	11354		
124	GIWW MP	GIWW	30° 9'18.19"N	91°19'53.20"W	Bayou Sorrel	Pontoon Bridge	Highway	Future				125		11354		
125	GIWW MP	GIWW	30°13'56.77"N	91°18'54.31"W	The Parks	Overhead Cables		Future						11354		
126	GIWW MP	GIWW	30°14'19.81"N	91°19'0.53"W	The Parks	Overhead Cables		Future	99					11354		
127	GIWW MP	GIWW	30°16'4.66"N	91°19'15.77"W	Plaquemine	Swing Bridge	Highway	Future	2			125		11354		
128	GIWW MP	GIWW	30°17'3.86"N	91°18'53.23"W	Plaquemine	Overhead Cables		Future	117					11354		
129	GIWW MP	GIWW	30°23'41.34"N	91°19'23.56"W	Choctaw	Lift Bridge	Highway	Future	7	73		125		11354		
130	GIWW MP	GIWW	30°24'51.85"N	91°18'38.37"W	Choctaw	Overhead Cables		Future	92					11354		
131	GIWW MP	GIWW	30°26'19.30"N	91°13'22.08"W	Port Allen	Overhead Cables		Future	90					11354		
132	GIWW MP	GIWW	30°25'57.16"N	91°12'41.47"W	Port Allen	Lift Bridge	Highway	Future	14	73		84		11354		
133	GIWW MP	GIWW	30°25'56.19"N	91°12'39.51"W	Port Allen	Fixed Bridge	Highway	Future	65			84		11354		
134	GIWW LR	GIWW	29°46'40.66"N	91° 9'57.60"W	Stephenville	Swing Bridge	Highway	Future	3			125		11354		
135	GIWW LR	GIWW	29°49'9.12"N	91° 9'20.90"W	Stephenville	Overhead Cables		Future						11354		
136	GIWW LR	GIWW	29°54'31.72"N	91°12'56.88"W	Belle River	Pontoon Bridge	Highway	Future				125		11354		
137	GIWW LR	GIWW	30° 4'9.60"N	91°17'6.94"W	Pigeon	Pontoon Bridge	Highway	Future				125		11354		
138	Algiers Alternate Route	GIWW	29°54'19.46"N	89°59'9.48"W	Terrytown	Fixed Bridge	Highway	Future	100			250				
140	Algiers Alternate Route	GIWW	29°52'18.71"N	90° 0'32.32"W	Belle Chasse	Fixed Bridge	Highway	Future	40	100		125				
142	Algiers Alternate Route	GIWW	29°52'26.20"N	90° 0'26.94"W	Belle Chasse	Overhead Cables		Future	120							
143	Algiers Alternate Route	GIWW	29°53'6.12"N	90° 0'3.59"W	Belle Chasse	Overhead Cables		Future								
144	Lake Borgne	Lake Pontchartrain	30° 4'57.65"N	89°33'57.10"W	Slidell	Controlling Depth		Future			6.5			11371	338	A dredged channel leads from N of the Intracoastal Waterway in Lake Borgne for 1.1 miles to the mouth of the Pearl River. In May 1980, the controlling depth from Lake Borgne to deeper water in the river was 6½ feet.
145	The Rigolets	Lake Pontchartrain	30° 9'49.87"N	89°39'36.48"W	Slidell	Controlling Depth		Future			11.2			11371	339	The Rigolets is a deep passage 7 miles long and about 0.4 mile wide connecting Lake Borgne and Lake Pontchartrain. The pass is bounded by low, marshy shores. In August 2002, the controlling depth was 11.2 feet.
146	The Rigolets	Lake Pontchartrain	30° 9'23.71"N	89°37'42.91"W	Rabbit Island	Swing Bridge	Rail	Future	11					11371	339	The first, the CSX Transportation, Inc. bridge about 0.4 mile N of Catfish Point in Lake Borgne, has a clearance of 11 feet; navigation is through the E draw. The bridgetender monitors VHF-FM channel 16 and works on channel 13; call sign KQ-7197.
147	The Rigolets	Lake Pontchartrain	30°10'14.15"N	89°44'2.58"W	Slidell	Swing Bridge	Highway	Future	14					11371	339	The second, about a mile E of Lake Pontchartrain, is U.S. Route 90 highway bridge that has a clearance of 14 feet. The bridgetender monitors VHF-FM channel 13; call sign KYZ-723.
148	The Rigolets	Lake Pontchartrain	30°10'8.56"N	89°44'10.49"W	Slidell	Fixed Bridge	Highway	Future	66					11371	339	In April 2005, a fixed bridge was under contruction with a design clearance of 66 feet close N of the bascule bridge; upon completion, it will replace the bascule bridge.
149	The Rigolets	Lake Pontchartrain	30°10'18.07"N	89°43'50.89"W	Slidell	Currents		Future						11371	339	Currents are very irregular and greatly influenced by winds. They set with great velocity through The Rigolets at times, and especially through the draws of the bridges. Velocities of 2.5 knots off Rigolets Light 5 and 3.8 knots at the railroad bridge have been observed. At the railroad bridge westerly currents set WSW onto the fender on the SW side of the draw, and easterly currents set E by N onto the fender on the NE side. The current has an average velocity of 0.6 knot.
150	Blind Rigolets	Lake Pontchartrain	30° 8'29.91"N	89°38'54.18"W	Slidell	Controlling Depth		Future			12			11371	339	Good anchorage for small craft is available in Blind Rigolets either N or S of the Intracoastal Waterway crossing. Depths of 12 feet or more are available for vessels entering Blind Rigolets via the Intracoastal Waterway.
151	Blind Rigolets	Lake Pontchartrain	30° 8'38.21"N	89°39'5.29"W	Slidell	Caution		Future						11371	339	Piles cross the width of the channel approximately 300 feet S of the CSX Transportation, Inc. bridge, which crosses Blind Rigolets 0.3 mile N of the Intracoastal Waterway. Mariners are cautioned not to attempt passage of this bridge. An overhead power cable, 250 feet N of the bridge has a clearance of 25 feet.
152	Chef Menteur	Lake Pontchartrain	30° 3'50.43"N	89°48'0.43"W	Chef Menteur	Swing Bridge	Rail	Future	10					11371	340	The CSX Transportation, Inc. bridge has a clearance of 10 feet.
153	Chef Menteur	Lake Pontchartrain	30° 4'1.95"N	89°48'16.32"W	Chef Menteur	Swing Bridge		Future	11					11367	340	The U.S. Route 90 highway bridge, crossing 0.3 mile NW of the railroad bridge, has a clearance of 11 feet.
154	Bayou Sauvage	Lake Pontchartrain	30° 4'16.02"N	89°49'35.89"W	New Orleans	Controlling Depth		Future			13			11367	340	Bayou Sauvage is an important waterway leading about 2.7 miles W from Chef Menteur Pass about 0.3 mile NW of the highway bridge. In February 2001, depths of 13 feet were reported in the bayou.

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155	Bayou Bienvenue	Lake Pontchartrain	29°59'31.07"N	89°52'20.76"W	New Orleans	Controlling Depth		Future			4.5			11367	340	Bayou Bienvenue empties into the W side of Lake Borgne about 5 miles SW of Chef Menteur Pass. The bayou connects Lake Borgne with the Mississippi River-Gulf Outlet Canal, and thence leads W for about 6.3 miles. In February 1996, the controlling depths were 5½ feet across the lake bar, thence 4½ feet to the Mississippi River-Gulf Outlet Canal and to State Route 47 highway bridge about 2 miles W.
156	Bayou Bienvenue	Lake Pontchartrain	29°58'53.84"N	89°56'39.08"W	New Orleans	Fixed Bridge	Highway	Future	3					11364	340	In February 1996, the controlling depths were 5½ feet across the lake bar, thence 4½ feet to the Mississippi River-Gulf Outlet Canal and to State Route 47 highway bridge about 2 miles W. The bridge has a 17-foot fixed channel span with a clearance of 3 feet. An overhead power cable with an unknown height is immediately W of the bridge.
157	Bayou Dupre	Lake Pontchartrain	29°56'40.82"N	89°50'15.75"W	Chalmette	Controlling Depth		Future			5			11364	340	A dredged channel leads from Lake Borgne into and through Bayou Dupre and Violet Canal to Violet. In October 1995, the controlling depth was 6 feet over the bar in Lake Borgne and thence 5 feet through Bayou Dupre to the head of the canal at Violet.
158	Violet Canal	Lake Pontchartrain	29°54'4.30"N	89°53'28.23"W	Violet	Fixed Bridge	Highway	Future	35					11364	340	Twin fixed highway bridges with a clearance of 35 feet are about 0.4 mile E of Violet.
159	Bayou Yscloskey	Lake Pontchartrain	29°51'36.76"N	89°40'33.17"W	Yscloskey	Controlling Depth		Future			5			11364	340	Bayou Yscloskey empties into the southernmost part of Lake Borgne. A dredged channel leads from Lake Borgne to the mouth of Bayou Ysclosky. In April 1997, the controlling depth was 5 feet.
160	Bayou Yscloskey	Lake Pontchartrain	29°51'36.76"N	89°40'33.17"W	Yscloskey	Overhead Cables		Future	30					11364	340	Overhead power cables crossing Bayou Yscloskey have a minimum clearance of 30 feet.
161	Bayou la Loutre	Lake Pontchartrain	29°49'53.39"N	89°40'49.68"W	Yscloskey	Controlling Depth		Future			6			11364	340	The dredged channel in the bayou is privately maintained from Yscloskey to Hopedale, a small settlement 3 miles SE. In April 1997, the controlling depth was 6 feet.
162	Bayou la Loutre	Lake Pontchartrain	29°50'19.83"N	89°41'15.38"W	Yscloskey	Lift Bridge	Highway	Future	2	53				11364	340	The bridge over Bayou la Loutre at Yscloskey has a vertical lift span with a width of 45 feet and clearance of 2 feet down and 53 feet up.
163	Bayou la Loutre	Lake Pontchartrain	29°48'56.06"N	89°38'51.00"W	Yscloskey	Overhead Cables		Future	68					11364	340	An overhead power cable crossing at Hopedale has a clearance of 68 feet.
164	Bayou la Loutre	Lake Pontchartrain	29°50'4.74"N	89°33'58.47"W	Yscloskey	Controlling Depth		Future			5			11364	340	From Hopedale, Bayou la Loutre Channel is a Federal project. In April 1997, the controlling depths were 5 feet to Bayou St. Malo, thence 5 feet through Bayou Eloi and the bar channel to deep water in Lake Eloi.
165	Bayou St. Malo	Lake Pontchartrain	29°51'21.66"N	89°34'7.59"W	Yscloskey	Controlling Depth		Future			2			11364	340/341	In October 1994, the controlling depth was 2½ feet to Lake Borgne and thence 2 feet in the channel across the bar. A light marks the bar channel.
166	Lake Pontchartrain	Lake Pontchartrain	30°10'40.25"N	90° 8'53.67"W	New Orleans	Water Level		Future						11369	341	The periodic tide is negligible, but the variation in the water level due to winds has an extreme range of 3.5 to 4 feet. It is reported that the surface of the lake is lowered at least 2 feet during the winter when NW winds prevail.
167	Lake Pontchartrain	Lake Pontchartrain	30°10'40.25"N	90° 8'53.67"W	New Orleans	Caution		Future						11369	341	There are numerous well platforms, piles, pipes, and other reported obstructions in Lake Pontchartrain. Caution is advised.
168	Lake Pontchartrain	Lake Pontchartrain	30°10'52.07"N	89°49'34.17"W	New Orleans	Fixed Bridge	Highway	Future	65					11369	341	U.S. Interstate Route 10 highway causeway, about 3.5 miles W of The Rigolets and crossing between Pointe aux Herbes and Howze Beach , has a bridge with a fixed span over the navigation channel about 1.2 miles from its NE end with a clearance of 65 feet.
169	Lake Pontchartrain	Lake Pontchartrain	30°12'13.78"N	89°50'5.61"W	New Orleans	Bascule Bridge	Highway	Future	13					11369	341	U.S. Route 11 highway causeway, W of U.S. Interstate Route 10 highway causeway and crossing from Pointe aux Herbes to North Shore, has two bascule bridges; one, about 1 mile SW of North Shore, has a clearance of 13 feet; the other, about 0.4 mile NE of Pointe aux Herbes, has a clearance of 12 feet.
170	Lake Pontchartrain	Lake Pontchartrain	30° 9'42.03"N	89°51'12.22"W	New Orleans	Bascule Bridge	Highway	Future	13					11369	341	U.S. Route 11 highway causeway, W of U.S. Interstate Route 10 highway causeway and crossing from Pointe aux Herbes to North Shore, has two bascule bridges; one, about 1 mile SW of North Shore, has a clearance of 13 feet; the other, about 0.4 mile NE of Pointe aux Herbes, has a clearance of 12 feet.
171	Lake Pontchartrain	Lake Pontchartrain	30°12'14.87"N	89°50'7.27"W	Slidell	Bascule Bridge	Rail	Future	4	68				11369	341	The Southern Railway causeway, W of U.S. Route 11 highway causeway and crossing between South Point and North Shore, has a bascule bridge about 1 mile SW of North Shore. The bridge has a clearance of 4 feet closed and 68 feet open (leaf coverhangs the channel).

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ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
172	Lake Pontchartrain	Lake Pontchartrain	30° 4'35.45"N	90° 8'35.32"W	New Orleans	Fixed Bridge	Highway	Future	22					11369	341	Lake Pontchartrain Causeway, twin toll highway bridges, extends 20.9 miles across Lake Pontchartrain from Indian Beach on the S shore to Lewisburg on the N shore. Five bridge openings, four twin fixed and one twin bascule, are at intervals of about 3.5 miles along the causeway. The first three openings N from Indian Beach are crossed by twin fixed bridges with clearances of 22 feet, 50 feet, and 22 feet, respectively. The next opening is crossed by twin bascule spans with clearances of 42 feet, and the northernmost opening is crossed by a twin fixed bridge with a clearance of 22 feet.
173	Lake Pontchartrain	Lake Pontchartrain	30° 8'3.54"N	90° 8'2.70"W	New Orleans	Fixed Bridge	Highway	Future	50					11369	341	Lake Pontchartrain Causeway, twin toll highway bridges, extends 20.9 miles across Lake Pontchartrain from Indian Beach on the S shore to Lewisburg on the N shore. Five bridge openings, four twin fixed and one twin bascule, are at intervals of about 3.5 miles along the causeway. The first three openings N from Indian Beach are crossed by twin fixed bridges with clearances of 22 feet, 50 feet, and 22 feet, respectively. The next opening is crossed by twin bascule spans with clearances of 42 feet, and the northernmost opening is crossed by a twin fixed bridge with a clearance of 22 feet.
174	Lake Pontchartrain	Lake Pontchartrain	30°11'33.43"N	90° 7'25.24"W	New Orleans	Fixed Bridge	Highway	Future	22					11369	341	Lake Pontchartrain Causeway, twin toll highway bridges, extends 20.9 miles across Lake Pontchartrain from Indian Beach on the S shore to Lewisburg on the N shore. Five bridge openings, four twin fixed and one twin bascule, are at intervals of about 3.5 miles along the causeway. The first three openings N from Indian Beach are crossed by twin fixed bridges with clearances of 22 feet, 50 feet, and 22 feet, respectively. The next opening is crossed by twin bascule spans with clearances of 42 feet, and the northernmost opening is crossed by a twin fixed bridge with a clearance of 22 feet.
175	Lake Pontchartrain	Lake Pontchartrain	30°15'0.68"N	90° 6'49.78"W	New Orleans	Bascule Bridge	Highway	Future	42					11369	341	Lake Pontchartrain Causeway, twin toll highway bridges, extends 20.9 miles across Lake Pontchartrain from Indian Beach on the S shore to Lewisburg on the N shore. Five bridge openings, four twin fixed and one twin bascule, are at intervals of about 3.5 miles along the causeway. The first three openings N from Indian Beach are crossed by twin fixed bridges with clearances of 22 feet, 50 feet, and 22 feet, respectively. The next opening is crossed by twin bascule spans with clearances of 42 feet, and the northernmost opening is crossed by a twin fixed bridge with a clearance of 22 feet.
176	Lake Pontchartrain	Lake Pontchartrain	30°18'28.09"N	90° 6'13.74"W	New Orleans	Fixed Bridge	Highway	Future	22					11369	341	Lake Pontchartrain Causeway, twin toll highway bridges, extends 20.9 miles across Lake Pontchartrain from Indian Beach on the S shore to Lewisburg on the N shore. Five bridge openings, four twin fixed and one twin bascule, are at intervals of about 3.5 miles along the causeway. The first three openings N from Indian Beach are crossed by twin fixed bridges with clearances of 22 feet, 50 feet, and 22 feet, respectively. The next opening is crossed by twin bascule spans with clearances of 42 feet, and the northernmost opening is crossed by a twin fixed bridge with a clearance of 22 feet.
177	Lake Pontchartrain	Lake Pontchartrain	30°12'3.66"N	90°10'52.48"W	New Orleans	Local Regulations		Future							341	NOTICE TO COMMERCIAL MARITIME INTEREST IN LAKE PONTCHARTRAIN (389) Local Regulations. (390) Effective July 14, 1988, the Louisiana Legislature passed and Governor Roemer signed into law La. Acts (1988) No. 552, regulating navigational safety near the Lake Pontchartrain Causeway Bridges. Key features of this Act: (391) (1) Require all tugs, towboats, self-propelled dredges, jack-up barges, jack-up rigs and all self-propelled vessels of one hundred net tons or greater, or one hundred feet in overall length or greater, and all vessel flotillas of one hundred aggregate net tons or greater operating on Lake Pontchartrain to be equipped with Loran C Equipment suitable for use with the Lake Pontchartrain Collision Avoidance Warning System (CAWS); (392) (2) Establish a “prohibited zone” paralleling each side of the entire length of the Lake Pontchartrain Causeway Bridge and extending outward for a distance of one mile from the easterly and westerly outboard sides of the causeway bridge twin spans; (393) (3) Prohibit all privately-owned vessels within the classes listed in

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178	Bayou Bonfouca	Lake Pontchartrain	30°15'11.89"N	89°51'44.92"W	Slidell	Controlling Depth		Future			6			11369	342	A dredged channel leads for about 6 miles from deep water in Lake Pontchartrain to Slidell. In August 1994, the controlling depth was 6 feet across the bar, thence 7 feet to the State Route 433 highway bridge at Slidell.
179	Bayou Bonfouca	Lake Pontchartrain	30°16'17.59"N	89°47'37.33"W	Slidell	Bascule Bridge	Highway	Future	6					11369	342	The bridge at Slidell has a swing span with a clearance of 6 feet.
180	Bayou Liberty	Lake Pontchartrain	30°15'47.21"N	89°51'29.43"W	Slidell	Controlling Depth		Future			3.5			11369	342	In August 1994, the controlling depth was 3½ feet for about 5.2 miles to Camp Salmen, thence 4 feet to the railroad bridge at the head of the channel.
181	Bayou Liberty	Lake Pontchartrain	30°16'5.64"N	89°50'40.69"W	Slidell	Bascule Bridge	Highway	Future						11369	342	A temporary pontoon bridge crosses the bayou about 1.5 miles above its junction with Bayou Bonfouca. The bridge is operated by cables that are suspended near the water surface when the bridge is being opened or closed and dropped to the bottom when the bridge is not in motion. Caution is advised in the vicinity of the bridge. Do not attempt to pass through the bridge until it is fully opened and the cables are dropped to the bottom.
182	Lacombe Bayou	Lake Pontchartrain	30°15'51.04"N	89°57'1.98"W	Lacombe	Controlling Depth		Future			5.5			11369	342	In August 1994, the controlling depth was 5½ across the bar, thence 7½ feet for 5.9 to the highway bridge, thence in December 1984, 4 feet to Mile 7.8.
183	Lacombe Bayou	Lake Pontchartrain	30°18'18.80"N	89°55'33.05"W	Lacombe	Swing Bridge	Rail	Future	5					11369	342	The Gulf, Mobile, and Ohio Railroad bridge about 4.5 miles above the mouth and U.S. Route 190 highway bridge at Lacombe have swing spans with a minimum channel width of 45 feet and clearances of 5 feet.
184	Lacombe Bayou	Lake Pontchartrain	30°18'49.90"N	89°56'8.23"W	Lacombe	Swing Bridge	Highway	Future	5					11369	342	The Gulf, Mobile, and Ohio Railroad bridge about 4.5 miles above the mouth and U.S. Route 190 highway bridge at Lacombe have swing spans with a minimum channel width of 45 feet and clearances of 5 feet.
185	Lacombe Bayou	Lake Pontchartrain	30°18'49.90"N	89°56'8.23"W	Lacombe	Overhead Cables		Future	60					11369	342	Overhead power cables crossing at the bridges have a minimum clearance of 60 feet.
186	Bayou Castine	Lake Pontchartrain	30°20'57.69"N	90° 3'32.80"W	Mandeville	Controlling Depth		Future			5			11369	343	In August 1994, the controlling depth was 5 feet across the bar and in the bayou.
187	Bayou Castine	Lake Pontchartrain	30°21'0.23"N	90° 3'21.30"W	Mandeville	Overhead Cables		Future	60					11369	343	An overhead power cable with a clearance of 60 feet crosses the bayou.
188	Tchefuncta River	Lake Pontchartrain	30°23'7.09"N	90° 9'25.28"W	Madisonville	Controlling Depth		Future			6			11369	343	A dredged channel leads from the 10-foot depth in Lake Pontchartrain for about 12.2 miles up Tchefuncta River and its tributary, Bogue Falaya, to the town of Covington, LA. In March 2001, the controlling depth was 6 feet across the bar, through the entrance; thence in 1994, 10 feet for about 1.7 miles to Madisonville, thence 4 feet to Abita River, thence 3 feet for about 1.1 miles.
189	Tchefuncta River	Lake Pontchartrain	30°24'15.60"N	90° 9'16.75"W	Madisonville	Swing Bridge	Highway	Future	1					11369	343	State Route 22 highway bridge crossing the river at Madisonville has a swing span with a clearance of 1 foot.
190	Tchefuncta River	Lake Pontchartrain	30°25'44.46"N	90° 6'38.70"W	Madisonville	Overhead Cables		Future	65					11369	343	An overhead power cable with a clearance of 85 feet crosses the river about 6 miles above the bridge at Madisonville.
191	Tchefuncta River	Lake Pontchartrain	30°26'20.37"N	90° 7'0.88"W	Madisonville	Fixed Bridge	Highway	Future	30					11369	343	The twin fixed spans of Interstate Route 12 highway bridge with a clearance of 30 feet cross the river about 9.4 miles above the mouth.
192	Lake Pontchartrain	Lake Pontchartrain	30°21'57.13"N	90°13'11.02"W	New Orleans	Overhead Cables		Future	40					11369	343	An overhead power cable extends generally around the perimeter of the W and SW part of Lake Pontchartrain, from the shore near Madisonville to a point about 6.4 miles W of New Orleans. Clearance is 40 feet throughout except for 60 feet where the cable crosses over the entrance to the bar channel to Tangipahoa River, and 90 feet over the entrance to Pass Manchac. Private lights partly mark the cable.
193	Pass Manchac	Lake Pontchartrain	30°17'38.33"N	90°18'10.29"W	Manchac	Controlling Depth		Future			6			11369	343	Both lead to Pass Manchac Light on the N point at the E end of the pass. In August 1994, the controlling depth was 6 feet across the bar in North Channel, thence 6 feet across the bar in South Channel, thence 23 feet to the pass.
194	Pass Manchac	Lake Pontchartrain	30°17'43.12"N	90°18'34.90"W	Manchac	Overhead Cables		Future	90					11369	344	Overhead power cables crossing over the pass about 0.3 mile and 2 miles from the E entrance have clearances of 90 feet and 76 feet, respectively.
195	Pass Manchac	Lake Pontchartrain	30°17'43.45"N	90°20'16.14"W	Manchac	Overhead Cables		Future	76					11369	344	Overhead power cables crossing over the pass about 0.3 mile and 2 miles from the E entrance have clearances of 90 feet and 76 feet, respectively.
196	Pass Manchac	Lake Pontchartrain	30°17'28.13"N	90°21'37.75"W	Manchac	Controlling Depth		Future			23			11369	343	Both lead to Pass Manchac Light on the N point at the E end of the pass. In August 1994, the controlling depth was 6 feet across the bar in North Channel, thence 6 feet across the bar in South Channel, thence 23 feet to the pass.

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ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
197	Pass Manchac	Lake Pontchartrain	30°17'8.49"N	90°23'59.70"W	Manchac	Bascule Bridge	Rail	Future						11369	344	The easternmost bridge, the Illinois Central Railroad bridge, has a bascule span with a clearance of 56 feet and is equipped with a radiotelephone
198	Pass Manchac	Lake Pontchartrain	30°17'8.74"N	90°24'1.30"W	Manchac	Overhead Cables		Future	64					11369	344	An overhead power cable at the bridge has a clearance of 64 feet.
199	Pass Manchac	Lake Pontchartrain	30°17'9.06"N	90°24'7.28"W	Manchac	Fixed Bridge	Highway	Future	51					11369	344	U.S. Interstate Route 55 fixed highway bridge with a clearance of 51 feet.
200	Tickfaw River	Lake Pontchartrain	30°21'3.11"N	90°28'33.45"W	Ponchatoula	Controlling Depth		Future			5.5				344	In January 1996, the controlling depth was 5½ feet across the bar, thence 12 feet to Blood River, thence 6 feet to Horse Bluff Landing.
201	Tickfaw River	Lake Pontchartrain	30°22'35.36"N	90°33'4.51"W	Ponchatoula	Fixed Bridge	Highway	Future	50						344	State Route 22 highway bridge crossing the river about 6.2 miles above the mouth, just below the junction with Blood River, has a fixed span with a vertical clearance of 50 feet.
202	Tickfaw River	Lake Pontchartrain	30°22'35.39"N	90°33'5.43"W	Ponchatoula	Overhead Cables		Future	70						344	Two overhead power cables, just W and parallel to the swing bridge and about 2 miles W of the bridge, have clearances of 70 feet.
203	Natalbany River	Lake Pontchartrain	30°21'36.36"N	90°29'21.44"W	Ponchatoula	Controlling Depth		Future			7.5				344	Natalbany River, a tributary of Tickfaw River, in January 1996, had a controlling depth of 7½ feet for about 4.5 miles, thence 2 feet for 3.5 miles to the head of the Federal project, about 1.3 miles above the highway bridge at Springfield.
204	Ponchatoula River	Lake Pontchartrain	30°23'43.27"N	90°29'59.22"W	Ponchatoula	Controlling Depth		Future			2				344	Ponchatoula River, a tributary of Natalbany River, joins that river about 3.3 miles above the mouth. In August 1994, the controlling depth was 2 feet for 3.3 miles; the river is blocked by fallen trees at this point.
205	Ponchatoula River	Lake Pontchartrain	30°26'21.72"N	90°28'57.55"W	Ponchatoula	Fixed Bridge	Highway	Future	4						344	State Route 22 highway bridge at Wadesboro has an 18-foot fixed span with a clearance of 4 feet.
206	Amite River	Lake Pontchartrain	30°18'14.79"N	90°33'42.15"W	Clio	Controlling Depth		O&M			5.5				344	In August 1994, the controlling depth was 5½ feet across the bar, thence 6½ feet to Port Vincent, and thence 4½ feet to the junction with its tributary Bayou Manchac about 31 miles above the mouth.
207	Amite River	Lake Pontchartrain	30°18'15.94"N	90°33'47.58"W	Clio	Overhead Cables		Future	70						345	Overhead power cables crossing Amite River about 0.1 mile, 2.6 miles, 3.0 miles, and about 13.9 miles above the mouth have clearances of 70 feet, 60 feet, 60 feet, and 42 feet, respectively.
208	Amite River	Lake Pontchartrain	30°18'27.32"N	90°35'18.19"W	Clio	Overhead Cables		Future	60						345	Overhead power cables crossing Amite River about 0.1 mile, 2.6 miles, 3.0 miles, and about 13.9 miles above the mouth have clearances of 70 feet, 60 feet, 60 feet, and 42 feet, respectively.
209	Amite River	Lake Pontchartrain	30°18'17.59"N	90°35'15.35"W	Clio	Overhead Cables		Future	60						345	Overhead power cables crossing Amite River about 0.1 mile, 2.6 miles, 3.0 miles, and about 13.9 miles above the mouth have clearances of 70 feet, 60 feet, 60 feet, and 42 feet, respectively.
210	Amite River	Lake Pontchartrain	30°17'30.43"N	90°42'36.30"W	French Settlement	Overhead Cables		Future	42						345	Overhead power cables crossing Amite River about 0.1 mile, 2.6 miles, 3.0 miles, and about 13.9 miles above the mouth have clearances of 70 feet, 60 feet, 60 feet, and 42 feet, respectively.
211	Amite River	Lake Pontchartrain	30°18'26.89"N	90°36'31.26"W	Clio	Fixed Bridge	Highway	Future	4.5						345	The bridge at Clio, about 5 miles above the mouth, has a swing span with a clearance of 4½ feet.
212	Amite River	Lake Pontchartrain	30°16'30.85"N	90°46'44.59"W	French Settlement	Swing Bridge	Highway	Future	15						345	The bridge at French Settlement, about 19 miles above the mouth, has a swing span with a clearance of 15 feet.
213	Amite River	Lake Pontchartrain	30°19'54.66"N	90°51'6.74"W	Port Vincent	Swing Bridge	Highway	Future	7						345	The bridge at Port Vincent has a swing span with a clearance of 7 feet.
214	Blind River	Lake Pontchartrain	30°12'48.92"N	90°35'44.01"W	Denson	Controlling Depth		O&M			5				345	In August 1994, the controlling depth was 5 feet across the bar, thence 10 feet to the Airline Highway, the head of navigation.
215	Mississippi River-Gulf Outlet	Lake Pontchartrain	29°41'19.93"N	89°24'16.85"W	Yscloskey	Congestion		Critical						11360	348	Use of the outlet canal by ships and other commercial and pleasure craft is continuing to increase. The hazards existing to a small-boat operator on this waterway cannot be over emphasized.
216	Mississippi River-Gulf Outlet	Lake Pontchartrain	29°40'26.09"N	89°22'52.87"W	Yscloskey	Controlling Depth		O&M			36				349	The Federal project provides for an entrance channel 38 feet deep for 8.3 miles to the entrance to Breton Sound between Grand Gosier Islans and Breton Islans, thence 36 feet deep across Breton Sound NW for 20.3 miles where it enters a landcut, thence 36 feet through the landcut for 32.2 miles where it joins the Gulf Intracoasta Waterway at Mile 13.6E, thence through the waterway for about 5 miles to a turning basin at its junction wiht the Inner Harbor Navigation Canal at New Orleans.
217	Mississippi River-Gulf Outlet	Lake Pontchartrain	29°42'3.56"N	89°25'18.97"W	Yscloskey	Caution		Critical							349	In 1991, the Associated Branch Pilots, Port of New Orleans, advised that vessels with a fresh water draft greater than 33 feet should not use the Mississippi River-Gulf Outlet Canal due to shoaling in various parts of the channel. Unpredictable tidal currents may be encountered at places along the Mississippi River-Gulf Outlet Canal.
218	Mississippi River-Gulf Outlet	Lake Pontchartrain	30° 0'19.28"N	89°56'19.82"W	Michoud	Fixed Bridge	Highway	Future	138					11364	349	The Paris Road Bridge (State Route 47),about 4.4 miles E of the junction with Inner Harbor Navigation Cana, is a fixed bridge, with a clearance of 138 feet at mean high water (140 feet at mean sea level) for a 500-foot midwidth.

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219	Mississippi River-Gulf Outlet	Lake Pontchartrain	30° 0'20.62"N	89°55'54.93"W	Michoud	Overhead Cables		Future	170					11364	349	The overhead power cables across the canal, near the Paris Road Bridge, have a minimum clearance of 170 feet.
220	GIWW	Mermentau	29°47'9.75"N	92°12'25.01"W	Intracoastal City	Lock	Water	Immediate			15	110	1140	11350		
221	Mermentau River Navigation Channel	Mermentau	29°44'22.16"N	93° 0'36.92"W	Grand Chenier	Controlling Depth		O&M			7			11344	404	In February 2005, the controlling depths were 7 feet from sea through the jettied entrance channel, thence 7 feet through the marked channel in Lower Mud Lake, thence 7 feet to the State Route 82 highway bridge; thence in March 2003–February 2005, 4 feet to the control structure at Catfish Point; thence in 1997, 3½ feet to and through Grand Lake, to the Intracoastal Waterway, thence 9½ feet through Lake Arthur to the junction of Bayous Nezpique and des Cannes.
222	Mermentau River	Mermentau	29°51'45.81"N	92°50'54.26"W	Grand Chenier	Lock	Water	Future			15	56		11345	405	The control structure across Mermentau River at Catfish Point, just below Grand Lake, has dikes and three gates to prevent the inflow of saltwater. The gates are opened for passing boats. Each gate opening is 56 feet wide; the depths over the sills are 15 feet for the two SE gates and 10 feet for the NW gate.
223	Mermentau River	Mermentau	30° 4'19.46"N	92°39'30.04"W	Lake Arthur	Fixed Bridge	Highway	Future	50			200		11348	405	State Route 14 highway bridge at Lake Arthur has a fixed span with a clearance of 50 feet.
224	Mermentau River	Mermentau	29°46'13.37"N	93° 0'47.79"W	Grand Chenier	Swing Bridge	Highway	Future	13			70		11348	405	State Route 82 highway bridge has a swing span with a clearance of 13 feet
225	Mermentau River	Mermentau	30° 4'21.48"N	92°39'29.10"W	Lake Arthur	Overhead Cables		Future	68					11348		
226	Mermentau River	Mermentau	30°11'21.01"N	92°35'26.40"W	Mermentau	Swing Bridge	Rail	Future	10			52		11348	405	At Mermentau, the Southern Pacific railroad bridge with a swing span has a clearance of 10 feet and the U.S. Route 90 fixed highway bridge has a clearance of 44 feet.
227	Mermentau River	Mermentau	30°11'23.95"N	92°35'25.38"W	Mermentau	Fixed Bridge	Highway	Future	44			125		11348	405	At Mermentau, the Southern Pacific railroad bridge with a swing span has a clearance of 10 feet and the U.S. Route 90 fixed highway bridge has a clearance of 44 feet.
228	Mermentau River	Mermentau	30°11'21.50"N	92°35'27.14"W	Mermentau	Overhead Cables		Future	54					11348		
229	Mermentau River	Mermentau	30°11'24.58"N	92°35'24.73"W	Mermentau	Overhead Cables		Future	50					11348		
230	Bayou Nezpique	Mermentau	30°14'25.17"N	92°37'20.87"W	Jennings	Fixed Bridge	Highway	Future	28			40		11348	405	Crossing Bayou Nezpique NE of Jennings are Interstate Route 10 twin fixed highway bridges with channel widths of 40 feet and clearances of 28 feet and State Route 97 highway bridge, which has a swing span with a channel width of 40 feet and a clearance of 8 feet.
231	Bayou Nezpique	Mermentau	30°14'42.99"N	92°37'33.03"W	Jennings	Fixed Bridge	Highway	Future	26			50		11348	405	Crossing Bayou Nezpique NE of Jennings are Interstate Route 10 twin fixed highway bridges with channel widths of 40 feet and clearances of 28 feet and State Route 97 highway bridge, which has a swing span with a channel width of 40 feet and a clearance of 8 feet.
232	Bayou des Cannes	Mermentau	30°14'10.47"N	92°33'47.08"W	Jennings	Fixed Bridge	Highway	Future	14			35		11348	405	Bayou des Cannes is crossed at Evangeline by the twin fixed spans of Interstate Route 10, about 4 miles above the mouth with a 35-foot span and a clearance of 14 feet, and about 7.4 miles above the mouth by State Route 97 highway bridge with a 45-foot span with a clearance of 1 foot.
233	GIWW	Mermentau	29°54'6.28"N	92°30'49.86"W	Forked Island	Overhead Cables		Future	93					11348		
234	GIWW	Mermentau	29°53'13.55"N	92°24'54.16"W	Forked Island	Cable Ferry		Future						11348		Cable across the river may be at or near the waters surface. Mariners should use caution
235	GIWW	Mermentau	29°50'15.68"N	92°18'20.39"W	Forked Island	Overhead Cables		Future	97					11348		
236	GIWW	Mermentau	29°50'12.21"N	92°18'10.62"W	Forked Island	Fixed Bridge	Highway	Future	73			250		11348		
237	Bayou Des Glaises	Mississippi River	30°17'35.11"N	91°14'18.88"W	Plaquemine	Swing Bridge	Rail	Future								
238	South Pass	Mississippi Delta	29° 0'13.06"N	89° 3'51.00"W	Venice	Anchorage		Future						11361	347	
239	Southwest Pass	Mississippi Delta	29° 1'32.68"N	89°20'0.50"W	Venice	Controlling Depth		O&M			45			11361	348	A Federal project provides for a 45-foot channel over the bar and through Southwest Pass, to Head of Passes.
240	South Pass	Mississippi Delta	29° 0'7.43"N	89° 9'1.79"W	Venice	Controlling Depth		O&M			15			11361	349	The Associated Branch Pilots, Port of New Orleans, advise that South Pass has a recommended draft limt of 15 feet. The pilots further advised that a recommended deadweight tonnage limit of 21,000 d.w.t. and/or 15 feet is in effect for ships using South Pass.
241	Southwest Pass	Mississippi Delta	28°52'45.25"N	89°20'46.65"W	Venice	Anchorage		Future						11361	349	Vessels should anchor in Southwest Pass Anchorage SE of the entrance to Southwest Pass,
242	Head of Passes	Mississippi Delta	29°10'25.14"N	89°16'10.27"W	Venice	Anchorage		Future								
243	North Pass	Mississippi Delta	29°12'22.62"N	89° 1'38.37"W	Venice	Controlling Depth		Future			7			11361	355	Pass a Loutre and North Pass have depths of about 7 feet over the bars; the others are much shallower
244	Pass a Loutre	Mississippi Delta	29°11'0.12"N	89° 5'28.71"W	Venice	Controlling Depth		Future			7			11361	355	Pass a Loutre and North Pass have depths of about 7 feet over the bars; the others are much shallower
245	Main Pass	Mississippi Delta	29°16'23.59"N	89°13'5.47"W	Venice	Controlling Depth		Future			4			11361	356	Main Pass, in May 1984, had a controlling depth of 4 feet from the Mississippi River for about 2.1 miles,
246	Empire Waterway	Mississippi Delta	29°23'20.85"N	89°35'48.33"W	Empire	Lock	Water	Future			10	40	197	11364	382	The State-owned Empire Waterway Lock through the Mississippi River levee at Empire is 197 feet long and 40 feet wide, and has a depth of 10 feet over the sill.

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247	Empire Waterway	Mississippi Delta	29°23'19.48"N	89°35'50.05"W	Empire	Overhead Cables		Future	80					11364	382	Overhead power cables at either end of the lock have reported clearances of about 80 feet.
248	Empire Waterway	Mississippi Delta	29°23'3.62"N	89°36'10.09"W	Empire	Fixed Bridge	Highway	Future	53			192		11364	383	A fixed highway bridge with a clearance of 53 feet (55 feet for a midwidth of 100 feet) crosses the canal about 0.4 mile W of the highway bascule bridge.
249	Empire Waterway	Mississippi Delta	29°22'27.17"N	89°36'4.90"W	Empire	Controlling Depth		O&M			5.5			11364	383	In April 1997, the controlling depths in the Empire Waterway were 5½ feet from the Mississippi River to the Gulf, thence 9 feet across the bar at the Gulf entrance.
250	Empire Waterway	Mississippi Delta	29°23'17.45"N	89°35'52.98"W	Empire	Bascule Bridge	Highway	Future	3					11364	383	Doullut Canal is crossed by a railroad swing bridge with a 41-foot span and a clearance of 1 foot about 0.1 mile W of its E entrance, and by a highway bascule bridge with a clearance of 3 feet immediately W of the railroad bridge.
251	Mississippi River	Mississippi River	29°33'30.40"N	89°46'29.48"W	Port Sulfur	Controlling Depth		O&M			45			11364	348	The project further provides for a 45-foot channel from Head of Passes to New Orleans, thence, 45 feet to Mile 181 above New Orleans, thence 40 feet to Baton Rouge.
252	Mississippi River	Mississippi River	30° 2'3.60"N	90°37'24.46"W	Wallace	Controlling Depth		O&M			45			11370	348	The project further provides for a 45-foot channel from Head of Passes to New Orleans, thence, 45 feet to Mile 181 above New Orleans, thence 40 feet to Baton Rouge.
253	Mississippi River	Mississippi River	30°15'42.47"N	91° 6'56.62"W	Sunshine	Controlling Depth		O&M			40			11370	348	The project further provides for a 45-foot channel from Head of Passes to New Orleans, thence, 45 feet to Mile 181 above New Orleans, thence 40 feet to Baton Rouge.
254	Mississippi River	Mississippi River	29° 8'39.12"N	89°15'28.86"W	Venice	Dredging		O&M						11361	348	The Project is under constant maintenance dredging.
255	Mississippi River	Mississippi River	30°27'11.53"N	91°11'47.06"W	Baton Rouge	Caution		Future							350	At Baton Rouge the etreme difference between high and low stages of the river is 40 feet, the mean difference is about 21 feet.
256	Mississippi River	Mississippi River	29°57'26.59"N	90° 3'26.61"W	New Orleans	Caution		Future							350	At New Orleans the etreme difference between high and low stages of the river is 17 feet, the mean difference is about 8 feet.
257	The Jump	Mississippi River	29°15'55.40"N	89°21'5.28"W	Venice	Controlling Depth		Future			15				356	The Jump is an opening on the W side 10.6 miles AHP, where Grand Pass, Tiger Pass, and several smaller passes connect with the river. There is a sill across the entrance at a depth of about 15 feet and a depth of about 4 feet can be carried through Grand Pass into the Gulf.
258	Grand Pass	Mississippi River	29°15'8.95"N	89°20'50.69"W	Venice	Controlling Depth		Future			4			11361	356	The Jump is an opening on the W side 10.6 miles AHP, where Grand Pass, Tiger Pass, and several smaller passes connect with the river. There is a sill across the entrance at a depth of about 15 feet and a depth of about 4 feet can be carried through Grand Pass into the Gulf.
259	Tiger Pass	Mississippi River	29°13'50.60"N	89°21'6.86"W	Venice	Controlling Depth		Future			3			11361	356	In September 2005-February 2006, the midchannel controlling depths were 3 feet to Buoy 58, thence 15 feet to the junction with the Mississippi River.
260	Baptiste Collette Bayou	Mississippi River	29°18'34.65"N	89°19'18.05"W	Venice	Controlling Depth		Future			10			11361	356	Baptiste Collette Bayou (see charts 11353, 11361, and 11363), on the E side of the river 11.5 miles AHP, connects the Mississippi River with Breton Sound. The entrance from Breton Sound is protected by jetties. In September 2005, the controlling depth was 4 feet in the right half of the channel and 10 feet in the left half of the channel to Light 7, thence 11 feet through the jetties; thence in 1997-September 2005, 9 feet to the Mississippi River.
261	Mississippi River	Mississippi River	29°55'42.15"N	89°58'50.91"W	Chalmette	Overhead Cables		Future	217					11364	358	An overhead power cable with a clearance of 213 feet crosses the river at Chalmette about 89.0 miles AHP.
262	Mississippi River	Mississippi River	29°56'9.48"N	90° 0'3.58"W	New Orleans	Anchorage		Future						11364	358	The New Orleans General Anchorage, about 2 miles long, is off the W bank of the river opposite Chalmette Slip, the Quarantine Anchorage, about 0.7 mile long, is just above it and the Emergency Anchorage is just below the General Anchorage.
263	Mississippi River	Mississippi River	29°56'37.36"N	90°10'7.03"W	New Orleans	Fixed Bridge	Highway	Future	133			750		11370	361	The Huey P. Long Bridge, a combined highway (U.S. 90) and railroad bridge crossing the river 11 miles above Canal Street, has a clearance of 133 feet through the W span for a channel span width of 750 feet.
264	Mississippi River	Mississippi River	29°56'18.60"N	90° 3'25.76"W	New Orleans	Fixed Bridge	Highway	Future	150			750		11367	361	Crescent City Connection Bridge (Business Route 90), a high-level fixed highway bridge connecting Algiers and New Orleans, about 0.7 mile above Canal Street, has a clearance of 150 feet over a central 750-foot width.
265	Mississippi River	Mississippi River	29°57'5.80"N	90° 8'30.43"W	Jefferson	Overhead Cables		Future	176					11370	361	Overhead power cables with clearances of 155 feet and 176 feet cross the river just below Nine Mile Point, about 103.6 and 104.1 miles AHP, respectively.
266	Mississippi River	Mississippi River	29°56'56.35"N	90° 8'25.47"W	Jefferson	Overhead Cables		Future	155					11370	361	Overhead power cables with clearances of 155 feet and 176 feet cross the river just below Nine Mile Point, about 103.6 and 104.1 miles AHP, respectively.

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267	Mississippi River	Mississippi River	29°56'30.44"N	90°22'26.94"W	Luling	Fixed Bridge	Highway	Future	133			1200		11370	371	High-level highway bridges with a minimum clearance of 125 feet cross the river above New Orleans at Luling, 121.8 miles AHP; Wallace, 146.1 miles AHP; Union, 167.4 miles AHP; and Baton Rouge, 229 mile AHP.
268	Mississippi River	Mississippi River	30° 2'43.19"N	90°40'20.70"W	Wallace	Fixed Bridge	Highway	Future	139			750		11370	371	High-level highway bridges with a minimum clearance of 125 feet cross the river above New Orleans at Luling, 121.8 miles AHP; Wallace, 146.1 miles AHP; Union, 167.4 miles AHP; and Baton Rouge, 229 mile AHP.
269	Mississippi River	Mississippi River	30° 5'52.66"N	90°54'46.86"W	Sunshine	Fixed Bridge	Highway	Future	133			750		11370	371	High-level highway bridges with a minimum clearance of 125 feet cross the river above New Orleans at Luling, 121.8 miles AHP; Wallace, 146.1 miles AHP; Union, 167.4 miles AHP; and Baton Rouge, 229 mile AHP.
270	Mississippi River	Mississippi River	30°26'22.03"N	91°11'49.55"W	Baton Rouge	Fixed Bridge	Highway	Future	125			1120		11370	371	High-level highway bridges with a minimum clearance of 125 feet cross the river above New Orleans at Luling, 121.8 miles AHP; Wallace, 146.1 miles AHP; Union, 167.4 miles AHP; and Baton Rouge, 229 mile AHP.
271	Mississippi River	Mississippi River	29°55'55.07"N	90°11'2.67"W	River Ridge	Overhead Cables		Future	149					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
272	Mississippi River	Mississippi River	29°59'52.81"N	90°27'41.09"W	Waterford	Overhead Cables		Future	160					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
273	Mississippi River	Mississippi River	30° 0'4.67"N	90°28'12.43"W	Waterford	Overhead Cables		Future	160					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
274	Mississippi River	Mississippi River	30°15'56.50"N	91° 7'9.49"W	Saint Gabriel	Overhead Cables		Future	166					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
275	Mississippi River	Mississippi River	30°22'27.65"N	91°14'1.26"W	Brusly	Overhead Cables		Future	150					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
276	Mississippi River	Mississippi River	30°29'29.79"N	91°11'49.39"W	Baton Rouge	Overhead Cables		Future	150					11370	371	Overhead power cables with a minimum clearance of 149 feet cross the river at Nine Mile Point, 103.6 miles AHP; 1 mile above the Huey P. Long Bridge at Bridge City, 107.2 miles AHP; Montz, 129.1 and 129.6 miles AHP; Point Pleasant, 201.5 miles AHP; Lukeville, 224 miles AHP; and Baton Rouge, 232.8 miles AHP.
277	GIWW MP	Mississippi River	30°25'51.36"N	91°12'30.33"W	Port Allen	Lock		Immediate			14	84	1188	11370	375	
278	Mississippi River	Mississippi River	30°30'24.85"N	91°11'54.59"W	Baton Rouge	Fixed Bridge	Rail	Future	65			748		11370	376	The bridge, known as the Baton Rouge Railroad and Highway Bridge, has a 748-foot fixed span over the channel with a clearance of 65 feet.
279	Mississippi River	Mississippi River	30°26'4.86"N	91°11'44.54"W	Baton Rouge	Anchorage		Future						11370	375	Anchorages are at Baton Rouge on the W bank of the river below the Port Allen Locks and in midriver immediately below and above the Interstate 10 bridge.
280	Mississippi River	Mississippi River	30°26'52.36"N	91°11'47.42"W	Baton Rouge	Anchorage		Future						11370	375	Anchorages are at Baton Rouge on the W bank of the river below the Port Allen Locks and in midriver immediately below and above the Interstate 10 bridge.
281	Old River Navigation Canal	Mississippi River	31° 0'7.35"N	91°40'18.19"W	Point Breeze	Lock		Immediate						11354	379	The lock is 1,200 feet long (1,190 feet usable), 75 feet wide, and 11 feet over the sill.
282	GIWW	Mississippi River	29°54'32.94"N	90° 5'1.73"W	Harvey	Lock		Immediate			Depth over sill - 12'	75'	415'	11367		
283	Mississippi River	Mississippi River	32°18'55.04"N	90°54'22.30"W	Vicksburg	Bridge	Highway	Future	116.3				1200			
284	Mississippi River	Mississippi River	32°18'52.14"N	90°54'24.73"W	Vicksburg	Bridge	Highway	Future	116.2				1245			
285	Mississippi River	Mississippi River	32°20'28.10"N	90°56'4.15"W	Vicksburg	Dike		O&M								
286	Mississippi River	Mississippi River	32° 4'10.92"N	91° 4'34.03"W	St. Joseph	Island		Future								
287	Mississippi River	Mississippi River	31°59'34.47"N	91° 6'35.94"W	St. Joseph	Dike		O&M								
288	Mississippi River	Mississippi River	31°54'32.51"N	91°12'19.54"W	St. Joseph	Dike		O&M								
289	Mississippi River	Mississippi River	31°51'37.45"N	91°16'6.01"W	Goldman	Dike		O&M								

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290	Mississippi River	Mississippi River	31°51'3.98"N	91°19'39.34"W	Goldman	Dike		O&M								
291	Mississippi River	Mississippi River	31°46'30.09"N	91°21'53.15"W	Waterproof	Dike		O&M								
292	Mississippi River	Mississippi River	31°33'31.30"N	91°25'9.87"W	Natchez	Bridge	Highway	Future	125				1696			
293	Mississippi River	Mississippi River	31°31'3.14"N	91°29'46.11"W	Natchez	Dike		O&M								
294	Mississippi River	Mississippi River	31°31'38.13"N	91°30'47.72"W	Natchez	Island		Future								
295	Mississippi River	Mississippi River	31°26'10.01"N	91°30'29.08"W	Ellis Cliffs	Dike		O&M								
296	Mississippi River	Mississippi River	31°22'55.24"N	91°28'21.10"W	Ellis Cliffs	Dike		O&M								
297	Mississippi River	Mississippi River	31°16'7.15"N	91°32'11.18"W	Bougere	Dike		O&M								
298	Ouachita	Ouachita	32°41'46.26"N	92° 5'12.33"W	Sterlington	Swing Bridge	Highway	Future	47.6			130				
299	Ouachita	Ouachita	32°41'21.79"N	92° 5'21.70"W	Sterlington	Swing Bridge	Rail	Future	42.1			137				
300	Ouachita	Ouachita	32°30'20.51"N	92° 7'30.33"W	Monroe	Bascule Bridge	Highway	Future	41			130				
301	Ouachita	Ouachita	32°30'5.11"N	92° 7'11.56"W	Monroe	Swing Bridge	Rail	Future	36			130				
302	Ouachita	Ouachita	32°30'1.42"N	92° 7'9.80"W	Monroe	Fixed Bridge	Highway	Future	79.7			180				
303	Ouachita	Ouachita	32°30'1.63"N	92° 7'9.38"W	Monroe	Caution		Future								
304	Ouachita	Ouachita	32° 8'4.95"N	92° 5'35.77"W	Riverton	Lift Bridge	Rail	Future	56.5			156				
305	Ouachita	Ouachita	32° 6'28.03"N	92° 4'26.24"W	Columbia	Lift Bridge	Highway	Future	62.7							
306	Ouachita	Ouachita	31°46'13.97"N	91°49'4.87"W	Harrisonburg	Swing Bridge	Highway	Future	68.5			130				
307	Ouachita	Ouachita	31°37'22.32"N	91°48'41.23"W	Jonesville	Swing Bridge	Highway	Future	66.1			130				
308	Ouachita	Ouachita	31°37'5.86"N	91°48'54.77"W	Jonesville	Lift Bridge	Rail	Future	57.3			150				
309	Ouachita	Ouachita	31°28'57.27"N	91°51'33.25"W	Jonesville	Lock	Water	Future								
310	Pearl River	Pearl River	30°11'40.68"N	89°32'4.28"W	Pearlington	Swing Bridge	Rail	Future	14					11371	338	The CSX swing bridge, with a clearance of 14 feet, crosses Pearl River at Baldwin Lodge, about a mile above the mouth; the channel is through the E draw.
311	Little Lake	Pearl River	30°10'21.26"N	89°36'3.86"W	Slidell	Controlling Depth		Future			7			11371	338	In 1972, the controlling depth from East Pass to Pearl River was 7 feet except for shoaling along the edges, thence in 1976, 3 feet in Pearl River.
312	Pearl River	Pearl River	30°14'20.67"N	89°36'53.49"W	Pearlington	Swing Bridge	Highway	Future	10					11371	338	U.S. Route 90 highway bridge across the Pearl River at Pearlington, 4 miles above the mouth, has a swing span with a clearance of 10 feet through the E draw.
313	Pearl River	Pearl River	30°18'12.45"N	89°38'29.18"W	Slidell	Fixed Bridge	Highway	Future	73					11371	338	Interstate Route 10 fixed bridge with a clearance of 73 feet crosses the river. An overhead power cable just S of the fixed bridge has a clearance of 99 feet.
314	West Pearl River	Pearl River	30°27'22.52"N	89°46'44.66"W	Hickory	Lock	Water	Future			10	65	310	11371	339	A dredged channel leads from the mouth of West Pearl River to Bogalusa, La., a distance of about 50 miles; three locks are each 65 feet wide and 310 feet long, with 10 feet over the sill.
315	West Pearl River	Pearl River	30°35'34.79"N	89°51'52.64"W	Bush	Lock	Water	Future			10	65	310	11371	339	A dredged channel leads from the mouth of West Pearl River to Bogalusa, La., a distance of about 50 miles; three locks are each 65 feet wide and 310 feet long, with 10 feet over the sill.
316	West Pearl River	Pearl River	30°38'15.80"N	89°52'6.03"W	Bush	Lock	Water	Future			10	65	310	11371	339	A dredged channel leads from the mouth of West Pearl River to Bogalusa, La., a distance of about 50 miles; three locks are each 65 feet wide and 310 feet long, with 10 feet over the sill.
317	West Pearl River	Pearl River	30°13'51.99"N	89°40'7.04"W	Slidell	Lift Bridge	Highway	Future	10	50				11371	339	About 5 miles above the junction of East Mouth and West Mouth there is a vertical lift bridge (U.S. Route 90) with a clearance of 10 feet down and 50 feet up.
318	West Pearl River	Pearl River	30°17'51.98"N	89°42'9.40"W	Slidell	Fixed Bridge	Highway	Future	35					11371	339	At Gauss Bluff, about 11 miles above the mouth, the twin fixed spans of Interstate Route 10 highway bridges with clearances of 35 feet cross the river.
319	West Pearl River	Pearl River	30°23'2.56"N	89°44'8.29"W	Pearl River	Fixed Bridge	Highway	Future	35					11371	339	Near the town of Pearl River, 19 miles above the mouth, there are three bridges; the first two are the twin fixed spans of the Interstate Route 59 highway bridge with clearance of 35 feet.
320	West Pearl River	Pearl River	30°23'7.98"N	89°44'13.79"W	Pearl River	Swing Bridge	Rail	Future	7						339	About 200 yards farther upstream, the Southern Railroad bridge has a swing span with a clearance of 7 feet.
321	Red River	Red River	32°33'23.69"N	93°45'58.35"W	Shreveport	Fixed Bridge	Highway	Future	68.9			230				
322	Red River	Red River	32°31'8.51"N	93°44'36.94"W	Shreveport	Overhead Cables		Future								
323	Red River	Red River	32°30'54.85"N	93°44'25.90"W	Shreveport	Swing Bridge	Rail	Future	37			120				
324	Red River	Red River	32°30'44.82"N	93°44'17.81"W	Shreveport	Fixed Bridge	Highway	Future	76.6			320				
325	Red River	Red River	32°30'34.13"N	93°43'27.84"W	Shreveport	Swing Bridge	Rail	Future	37			120				
326	Red River	Red River	32°30'8.93"N	93°42'36.94"W	Shreveport	Overhead Cables		Future								
327	Red River	Red River	32°29'35.10"N	93°41'53.24"W	Shreveport	Fixed Bridge	Highway	Future	67			200				
328	Red River	Red River	32°27'31.39"N	93°40'49.45"W	Shreveport	Fixed Bridge	Highway	Future	66			200				
329	Red River	Red River	32°27'22.18"N	93°40'48.00"W	Shreveport	Overhead Cables		Future								
330	Red River	Red River	32°16'54.93"N	93°30'31.78"W	McDade	Dike		O&M								
331	Red River	Red River	32°16'54.12"N	93°30'54.92"W	McDade	Revetment		O&M								
332	Red River	Red River	32°26'38.05"N	93°40'53.86"W	Shreveport	Dike		O&M								
333	Red River	Red River	32°21'10.96"N	93°35'34.60"W	Elm Groove	Revetment		O&M								
334	Red River	Red River	32°20'29.93"N	93°34'22.21"W	Elm Groove	Dike		O&M								
335	Red River	Red River	32°19'11.64"N	93°33'8.34"W	Elm Groove	Revetment		O&M								

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336	Red River	Red River	32°14'56.46"N	93°29'43.83"W	Howard	Lock		Future				82'	705'			
337	Red River	Red River	32°11'31.16"N	93°27'43.23"W	Williams	Overhead Pipeline	Pipeline	Future								
338	Red River	Red River	32°11'3.91"N	93°27'1.62"W	Williams	Revetment		O&M								
339	Red River	Red River	32°10'33.06"N	93°26'37.26"W	East Point	Dike		O&M								
340	Red River	Red River	32° 9'51.66"N	93°26'27.60"W	East Point	Revetment		O&M								
341	Red River	Red River	32° 9'36.43"N	93°26'29.86"W	Westdale	Revetment		O&M								
342	Red River	Red River	32° 4'27.01"N	93°24'9.49"W	Hammel	Revetment		O&M								
343	Red River	Red River	32° 0'49.62"N	93°21'13.55"W	Coushatta	Fixed Bridge	Highway	Future	61.3			296.9				
344	Red River	Red River	32° 0'6.65"N	93°21'10.32"W	Coushatta	Revetment		O&M								
345	Red River	Red River	31°58'51.98"N	93°20'59.69"W	Nicholas	Revetment		O&M								
346	Red River	Red River	31°58'43.67"N	93°20'58.55"W	Hollingsworth	Revetment		O&M								
347	Red River	Red River	31°56'41.65"N	93°17'43.01"W	Piermont	Revetment		O&M								
349	Red River	Red River	31°56'20.45"N	93°16'10.63"W	Redoak	Lock	Water	O&M				82'	705'			
350	Red River	Red River	31°54'54.32"N	93°14'53.09"W	Redoak	Revetment		O&M								
351	Red River	Red River	31°54'8.22"N	93°14'17.39"W	Grappes Bluff	Overhead Cables		Future								
352	Red River	Red River	31°53'37.92"N	93°12'55.80"W	Powhatan	Revetment		O&M								
353	Red River	Red River	31°53'22.62"N	93°12'14.58"W	Powhatan	Revetment		O&M								
354	Red River	Red River	31°53'11.55"N	93° 8'48.54"W	Smith Island	Revetment		O&M								
355	Red River	Red River	31°53'2.42"N	93° 7'13.15"W	Campti	Revetment		O&M								
356	Red River	Red River	31°52'37.00"N	93° 7'3.03"W	Campti	Dike		O&M								
357	Red River	Red River	31°51'43.12"N	93° 7'4.72"W	Socot	Revetment		O&M								
358	Red River	Red River	31°49'8.05"N	93° 5'4.88"W	Grand Ecore	Fixed Bridge	Highway	Future	71			368				
359	Red River	Red River	31°49'4.66"N	93° 4'52.99"W	Grand Ecore	Overhead Pipeline		Future	81.5							
360	Red River	Red River	31°49'3.89"N	93° 4'41.62"W	Grand Ecore	Overhead Cables		Future								
361	Red River	Red River	31°49'3.35"N	93° 4'36.89"W	Grand Ecore	Overhead Pipeline	Pipeline	Future	70.3							
362	Red River	Red River	31°49'4.56"N	93° 4'8.20"W	Grand Ecore	Dike		O&M								
363	Red River	Red River	31°48'56.40"N	93° 3'45.20"W	Grand Ecore	Revetment		O&M								
364	Red River	Red River	31°31'14.67"N	92°43'36.56"W	Colfax	Lock	Water	Future				82'	705'			
365	Red River	Red River	31°23'22.23"N	92°39'40.55"W	Boyce	Fixed Bridge	Highway	Future	74.5			300				
366	Red River	Red River	31°20'2.05"N	92°27'13.80"W	Alexandria	Lift Bridge	Rail	Future	27.3	65.5		285.3				
367	Red River	Red River	31°19'37.65"N	92°27'6.88"W	Alexandria	Fixed Bridge	Highway	Future	73			450				
368	Red River	Red River	31°18'51.91"N	92°26'37.34"W	Alexandria	Lift Bridge	Highway	Future	40	64.5		282.9				
369	Red River	Red River	31°18'38.58"N	92°26'19.12"W	Alexandria	Fixed Bridge	Highway	Future	64.5			294				
370	Red River	Red River	31°18'37.43"N	92°26'17.22"W	Alexandria	Fixed Bridge	Highway	Future	64			294				
371	Red River	Red River	31°16'14.93"N	92°23'26.86"W	Alexandria	Fixed Bridge	Rail	Future	61.5			305				
372	Red River	Red River	31°11'13.78"N	92°17'29.63"W	Poland	Lock	Water	Future				82	705			
373	Red River	Red River	31°15'18.05"N	91°57'29.94"W	Acme	Lock	Water	Future				82	705			
374	Red River	Red River	31°12'1.65"N	92° 8'36.04"W	Moncla	Fixed Bridge	Highway	Future	75			270				
375	Red River	Red River	31°47'37.67"N	93° 2'13.33"W	Clarence	Revetment		O&M								
376	Red River	Red River	31°47'14.76"N	93° 1'24.54"W	Irma	Revetment		O&M								
377	Red River	Red River	31°46'48.60"N	93° 1'2.45"W	Natchitoches	Revetment		O&M								
378	Red River	Red River	31°45'20.12"N	93° 1'5.89"W	St. Maurice	Unknown		Future								
379	Red River	Red River	31°43'6.52"N	92°58'23.44"W	St. Maurice	Revetment		O&M								
380	Red River	Red River	31°40'51.27"N	92°57'50.83"W	Bermuda	Unknown		Future								
381	Red River	Red River	31°40'03.42"N	92°55'30.50"W	Montgomery	Revetment		O&M								
382	Red River	Red River	31°32'43.83"N	92°45'20.19"W	Aloha	Revetment and Dikes		O&M								
383	Red River	Red River	31°29'49.10"N	92°42'15.16"W	Colfax	Lock		Future								
384	Red River	Red River	31°28'16.52"N	92°42'18.94"W	Kateland	Revetment		O&M								
385	Red River	Red River	31°27'26.47"N	92°42'30.55"W	Kateland	Dike		O&M								
386	Red River	Red River	31°26'30.58"N	92°41'58.15"W	Kateland	Revetment		O&M								
387	Red River	Red River	31°25'36.20"N	92°41'40.30"W	Kateland	Revetment		O&M								
388	Red River	Red River	31°22'23.12"N	92°37'16.74"W	Alfalfa	Revetment and Dikes		O&M								
389	Red River	Red River	31°22'34.02"N	92°35'57.04"W	Rapides	Revetment		O&M								
390	Red River	Red River	31°22'57.21"N	92°34'51.05"W	Rapides	Revetment		O&M								
391	Red River	Red River	31°21'32.41"N	92°31'24.19"W	Barrett	Revetment and Dikes		O&M								
392	Red River	Red River	31°21'35.88"N	92°31'6.83"W	Barrett	Revetment		O&M								
393	Red River	Red River	31°20'27.79"N	92°29'49.45"W	Alexandria	Revetment		O&M								
394	Red River	Red River	31°20'4.55"N	92°28'30.83"W	Alexandria	Revetment		O&M								
395	Red River	Red River	31°20'11.05"N	92°27'16.16"W	Alexandria	Revetment		O&M								
396	Red River	Red River	31°18'57.79"N	92°26'51.11"W	Alexandria	Revetment and Dikes		O&M								
397	Red River	Red River	31°17'35.97"N	92°24'46.73"W	Alexandria	Revetment		O&M								

Appendix C: Initial List of Constraints from Coast Pilot

ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
398	Red River	Red River	31°17'7.71"N	92°24'1.92"W	Alexandria	Revetment		O&M								
399	Red River	Red River	31°15'20.25"N	92°22'39.55"W	Alexandria	Revetment		O&M								
400	Red River	Red River	31°14'40.59"N	92°21'35.94"W	Latanier	Revetment		O&M								
401	Red River	Red River	31°12'53.33"N	92°21'53.53"W	Latanier	Revetment		O&M								
402	Red River	Red River	31°12'36.33"N	92°20'33.61"W	Latanier	Revetment		O&M								
403	Red River	Red River	31°11'53.18"N	92°20'8.50"W	Whittington	Revetment		O&M								
404	Red River	Red River	31°11'51.07"N	92°19'22.59"W	Whittington	Revetment		O&M								
405	Red River	Red River	31°11'30.40"N	92°18'33.17"W	Whittington	Revetment and Dikes		O&M								
406	Red River	Red River	31°10'50.46"N	92°16'38.38"W	Poland	ACS		Future								
407	Red River	Red River	31° 9'18.75"N	92°15'54.74"W	Poland	Revetment		O&M								
408	Red River	Red River	31° 9'34.97"N	92°11'21.81"W	Egg Bend	Revetment		O&M								
409	Red River	Red River	31°11'43.74"N	92° 8'59.70"W	Moncla	Revetment		O&M								
410	Red River	Red River	31°12'12.08"N	92° 8'32.11"W	Moncla	Revetment		O&M								
411	Red River	Red River	31°12'25.36"N	92° 7'48.60"W	Vick	Revetment		O&M								
412	Red River	Red River	31°13'47.86"N	92° 6'42.82"W	Vick	Revetment		O&M								
413	Red River	Red River	31°12'31.64"N	92° 5'3.98"W	Vick	Revetment		O&M								
414	Red River	Red River	31°12'1.61"N	92° 3'44.42"W	Vick	Revetment and Dikes		O&M								
415	Red River	Red River	31°12'10.19"N	92° 3'8.01"W	Vick	Revetment and Dikes		O&M								
416	Red River	Red River	31°11'45.06"N	92° 2'33.07"W	Vick	Revetment		O&M								
417	Red River	Red River	31°12'24.10"N	92° 2'4.71"W	Bouillette	Revetment		O&M								
418	Red River	Red River	31°12'57.02"N	92° 1'13.87"W	Bouillette	Revetment		O&M								
419	Red River	Red River	31°13'46.84"N	92° 0'2.16"W	Bouillette	Dike		O&M								
420	Red River	Red River	31°14'3.14"N	91°57'52.66"W	Acme	Revetment		O&M								
422	Red River	Red River	31°16'58.92"N	91°56'23.53"W	Delhoste	Revetment		O&M								
423	Red River	Red River	31°17'28.21"N	91°55'58.78"W	Delhoste	Dike		O&M								
424	Red River	Red River	31°17'49.57"N	91°55'26.79"W	Delhoste	Revetment		O&M								
425	Red River	Red River	31°17'22.50"N	91°52'59.18"W	Delhoste	Revetment and Dikes		O&M								
426	Red River	Red River	31°16'55.31"N	91°52'17.58"W	Delhoste	Dike		O&M								
427	Red River	Red River	31°15'49.91"N	91°49'54.64"W	Delhoste	Dike		O&M								
428	Red River	Red River	31°15'20.32"N	91°49'37.79"W	Delhoste	Revetment		O&M								
429	Red River	Red River	31°14'43.44"N	91°48'44.18"W	Delhoste	Revetment		O&M								
430	Red River	Red River	31°14'11.89"N	91°48'45.92"W	Delhoste	Revetment		O&M								
431	Red River	Red River	31°13'57.60"N	91°47'50.76"W	Delhoste	Revetment		O&M								
432	Red River	Red River	31°13'25.86"N	91°47'12.59"W	Delhoste	Revetment		O&M								
433	Red River	Red River	31°13'24.48"N	91°45'31.80"W	Delhoste	Revetment		O&M								
434	Red River	Red River	31°12'48.93"N	91°44'37.37"W	Delhoste	Revetment		O&M								
435	Red River	Red River	31°12'15.65"N	91°44'9.78"W	Delhoste	Revetment		O&M								
436	Red River	Red River	31°11'59.51"N	91°43'20.79"W	Delhoste	Revetment		O&M								
437	Red River	Red River	31°12'28.16"N	91°42'4.03"W	Union Point	Revetment and Dikes		O&M								
438	Red River	Red River	31°11'1.68"N	91°40'36.73"W	Union Point	Revetment and Dikes		O&M								
439	Red River	Red River	31°10'31.32"N	91°41'5.93"W	Union Point	Revetment		O&M								
440	Red River	Red River	31° 9'40.35"N	91°41'4.41"W	Union Point	Revetment		O&M								
441	Red River	Red River	31° 9'47.14"N	91°42'10.69"W	Union Point	Revetment		O&M								
442	Red River	Red River	31° 7'24.73"N	91°43'12.90"W	Black Hawk	Revetment		O&M								
443	Red River	Red River	31° 6'54.19"N	91°42'21.53"W	Black Hawk	Revetment		O&M								
444	Red River	Red River	31° 5'35.45"N	91°43'8.01"W	Black Hawk	Revetment		O&M								
445	Red River	Red River	31° 4'28.94"N	91°42'32.04"W	Black Hawk	Revetment		O&M								
446	Red River	Red River	31° 3'43.40"N	91°42'59.81"W	Black Hawk	Revetment		O&M								
447	Red River	Red River	31° 2'1.05"N	91°43'47.91"W	Black Hawk	Revetment		O&M								
448	Red River	Red River	31° 1'43.05"N	91°44'40.43"W	Black Hawk	Revetment		O&M								
449	Sabine Pass	Sabine	29°39'56.10"N	93°49'49.00"W	Port Arthur	Controlling Depth		O&M			40			11342	418	Federal project depths are 42 feet in the outer bar channel, thence 40 feet through the jetty channel to and through Port Arthur Canal, with 40 feet in the E and W turning basins and Taylor Bayou turning basin at Port Arthur.
450	Sabine-Neches Waterway	Sabine	29°53'53.07"N	93°54'17.43"W	Port Arthur	Controlling Depth		O&M			40			11342	418	The project depth of the Sabine-Neches Waterway is 40 feet. This depth coupled with tidal fluctuations and weather conditions will govern policy on maximum draft limitations.
451	Sabine Pass	Sabine	29°44'7.77"N	93°52'0.31"W	Port Arthur	Anchorage		Future						11342	419	
452	Sabine Pass	Sabine	29°45'57.73"N	93°53'43.31"W	Port Arthur	Swing Bridge	Highway	Future	9			80		11342	420	A highway bridge over the S end has a swing span with a clearance of 9 feet.

Appendix C: Initial List of Constraints from Coast Pilot

ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
453	Sabine Pass	Sabine	29°45'59.21"N	93°53'44.99"W	Port Arthur	Overhead Cables		Future	75					11342	420	An overhead power cable close NW of the bridge has a clearance of 75 feet.
454	Sabine-Neches Canal	Sabine	29°51'13.01"N	93°56'41.12"W	Port Arthur	Fixed Bridge	Highway	Future	136			400		11331	422	A fixed highway bridge with a clearance of 136 feet crosses the Sabine-Neches Canal at Port Arthur 1.8 miles above the entrance to Taylor Bayou.
455	Sabine River	Sabine	30° 0'24.71"N	93°45'52.76"W	Bridge City	Controlling Depth		O&M			30			11343	427	The Federal project depths are 30 feet from the end of the Sabine-Neches Canal, at the mouth of the river, to the site of the old highway bridge (30°05.6'N., 93°43.4'W.) at Orange, thence 25 feet in the channel around Orange Harbor Island to Orange.
456	Sabine River	Sabine	30° 2'10.97"N	93°44'15.29"W	Bridge City	Overhead Cables		Future	172					11331	427	An overhead power cable with a clearance of 172 feet crosses the river about 3 miles below Orange.
457	Sabine River	Sabine	30° 7'38.49"N	93°42'5.53"W	Orange	Fixed Bridge	Highway	Future	47						427	Between Orange and Echo, an overhead power cable, a fixed highway bridge (I-10/U.S. 90), and a swing bridge cross the river; clearances are 146 feet, 47 feet, and 6 feet, respectively.
458	Sabine River	Sabine	30° 9'10.21"N	93°42'23.34"W	Orange	Swing Bridge	Highway	Future	6						427	Between Orange and Echo, an overhead power cable, a fixed highway bridge (I-10/U.S. 90), and a swing bridge cross the river; clearances are 146 feet, 47 feet, and 6 feet, respectively.
459	Sabine River	Sabine	30°17'23.31"N	93°42'16.58"W	Deweyville	Bridge	Rail	Future								
460	Sabine River	Sabine	30°18'13.52"N	93°44'37.23"W	Deweyville	Bridge	Highway	Future								
461	Sabine River	Sabine	30°44'48.21"N	93°36'29.59"W	Bon Wier	Bridge	Highway	Future								
462	Sabine River	Sabine	30°44'26.65"N	93°37'8.23"W	Bon Wier	Bridge	Rail	Future								
463	Sabine River	Sabine	31° 3'51.67"N	93°31'8.66"W	Burr Ferry	Bridge	Highway	Future								
464	Houma Navigation Canal	Terrebonne	29°21'33.00"N	90°44'0.46"W	Dulac	Controlling Depth		O&M			9			11352	390	In January 2006, the controlling depth was 9 feet. The channel is well marked with aids.
465	Houma Navigation Canal	Terrebonne	29°23'4.58"N	90°43'47.70"W	Dulac	Pontoon Bridge	Highway	Future				150		11355	390	A pontoon bridge crosses the canal about 20 miles above the entrance. The bridge is operated by cables that are suspended just above the water when the bridge is being opened or closed. The cables are dropped to the bottom when the bridge is in the fully open position, but remain suspended while the bridge is fully closed. Extreme caution is advised in the area of the bridge.
466	Houma Navigation Canal	Terrebonne	29°34'4.72"N	90°42'55.80"W	Houma	Swing Bridge	Highway	Future	1			127		11355	390	State Route 661 highway bridge crossing the canal about 0.2 mile below the Intracoastal Waterway has a swing span with a clearance of 1 foot.
467	Houma Navigation Canal	Terrebonne	29°34'52.29"N	90°43'0.34"W	Houma	Lift Bridge	Rail	Future	4	70		212		11355	390	Southern Pacific Railroad bridge over the Intracoastal Waterway at the junction with Bayou la Carpe has a vertical lift span with clearances of 70 feet up and 4 feet down.
468	Houma Navigation Canal	Terrebonne	29°34'51.68"N	90°43'0.68"W	Houma	Overhead Cables		Future	90					11355	390	An overhead power cable with a clearance of 90 feet is close S of the bridge.
469	GIWW	Terrebonne	29°40'29.47"N	91° 8'16.94"W	Morgan City	Overhead Cables		Future	138					11355		
470	GIWW	Terrebonne	29°34'4.74"N	90°43'15.68"W	Houma	Bascule Bridge	Highway	Future	40			125		11355		
471	GIWW	Terrebonne	29°34'9.03"N	90°43'11.29"W	Houma	Overhead Cables		Future	108					11355		
472	GIWW	Terrebonne	29°35'21.23"N	90°42'43.78"W	Houma	Tunnel	Water	Future						11355		
473	GIWW	Terrebonne	29°35'53.51"N	90°42'37.06"W	Houma	Fixed Bridge	Highway	Future	73			125		11355		
474	GIWW	Terrebonne	29°35'53.14"N	90°42'36.84"W	Houma	Overhead Cables		Future	93					11355		
475	GIWW	Terrebonne	29°35'55.72"N	90°42'36.65"W	Houma	Fixed Bridge	Highway	Future	73			125		11355		
476	GIWW	Terrebonne	29°35'56.20"N	90°42'36.54"W	Houma	Overhead Cables		Future	88					11355		
477	GIWW	Terrebonne	29°36'36.47"N	90°41'29.62"W	Houma	Overhead Cables		Future	120					11355		
478	GIWW	Terrebonne	29°36'11.03"N	90°40'43.24"W	Houma	Overhead Cables		Future	90					11355		
479	GIWW	Terrebonne	29°36'3.21"N	90°40'19.89"W	Houma	Fixed Bridge	Highway	Future	73			125		11355		
480	GIWW	Terrebonne	29°35'55.13"N	90°39'53.96"W	Houma	Overhead Cables		Future	90					11355		
481	GIWW	Terrebonne	29°34'33.81"N	90°36'12.67"W	Bourg	Pontoon Bridge	Highway	Future				125		11355		
482	GIWW	Terrebonne	29°34'33.24"N	90°36'18.40"W	Bourg	Overhead Cables		Future	90					11355		
483	GIWW	Terrebonne	29°33'28.17"N	90°27'12.74"W	Valentine	Overhead Cables		Future	100					11356		
484	GIWW	Terrebonne	29°34'4.33"N	90°23'9.40"W	Larose	Overhead Cables		Future	90					11355		
485	GIWW	Terrebonne	29°34'8.62"N	90°23'7.39"W	Larose	Lift Bridge	Highway	Future	35	73		125		11355		
486	Bayou Lafourche	Terrebonne	29°45'59.66"N	90°45'53.51"W	Lafourche	Swing Bridge	Rail	Future								
487	Bayou Teche	Vermilion - Teche	29°42'25.44"N	91°17'56.17"W	Patterson	Swing Bridge	Highway	Future	6			60		11355	397	The St. Mary Parish highway bridge about 7 miles above Berwick Lock at Patterson has a swing span with a clearance of 6 feet.
488	Bayou Teche	Vermilion - Teche	29°42'30.49"N	91°21'3.70"W	Calumet	Swing Bridge	Highway	Future	5			60		11355	397	A highway swing bridge with a clearance of 5 feet is at Avalon about 10.6 miles above the lock.
489	Bayou Teche	Vermilion - Teche	30° 4'14.80"N	91°49'44.75"W	New Iberia	Lock	Water	Future			9	36	160	11350	399	Keystone Lock, 160 feet long and 36 feet wide with a depth of 9 feet over the sill, is 17 miles above New Iberia and 70.7 miles above Berwick Lock, and halfway, by highway, between New Iberia and St. Martinville.
490	Franklin Canal	Vermilion - Teche	29°47'7.83"N	91°31'13.86"W	Franklin	Controlling Depth		O&M			4			11350	398	In April 1997, the controlling depth through Franklin Canal and Bayou Portage to Bayou Bartholomew was 4 feet.

Appendix C: Initial List of Constraints from Coast Pilot

ID	Location	Basin	Latitude	Longitude	Local Reference	Constraint Type	Mode	Rating	Down-Closed	Up-Open	Depth	Width	Length	Primary Chart	Coast Pilot Page	Coast Pilot Text
491	Acadiana Navigational Channel	Vermilion - Teche	29°50'4.15"N	91°50'49.21"W	New Iberia	Controlling Depth		O&M			6			11350	398	In August 2000, the reported depth was 6 feet across the bar to the Intracoastal Waterway; thence in October 2002, 10 feet to the head of the canal at the Port of Iberia.
492	Acadiana Navigational Channel	Vermilion - Teche	29°52'12.34"N	91°50'20.26"W	New Iberia	Controlling Depth		O&M			10			11350	398	In August 2000, the reported depth was 6 feet across the bar to the Intracoastal Waterway; thence in October 2002, 10 feet to the head of the canal at the Port of Iberia.
493	Ivanhoe Canal	Vermilion - Teche	29°45'12.67"N	91°44'20.45"W	Louisa	Controlling Depth		O&M			4.5			11350	400	Ivanhoe Canal, W of the island, connects West Cote Blanche Bay with the Intracoastal Waterway. In 1983, the canal had a reported controlling depth of 4½ feet.
494	Southwest Pass	Vermilion - Teche	29°34'47.40"N	92° 2'24.15"W	Intracoastal City	Controlling Depth		O&M			6.5			11349	400	In September 1994, the controlling depth across the bar and through the pass was 6½ feet. Although not difficult to enter, the pass may be difficult to recognize and local assistance is advised.
495	Charenton Drainage & Navigation Canal (The Jaws)	Vermilion - Teche	29°44'54.44"N	91°37'7.84"W	Franklin	Controlling Depth		O&M			4			11350	400	The Jaws, at the NE corner of West Cote Blanche Bay is a passage connecting the bay with the Intracoastal Waterway and with Charenton Drainage and Navigation Canal. In April 1997, the controlling depth was 4 feet through the passage; knowledge of local existing conditions is advised.
496	Avery Canal	Vermilion - Teche	29°50'11.11"N	91°55'17.07"W	Avery Island	Controlling Depth		O&M			6.9			11350	401	Avery Canal leads NW from Vermilion Bay to a junction with Bayou Petite Anse at the Intracoastal Waterway. A dredged approach channel leads from Vermilion Bay to the canal. In August 2000, the reported controlling depths were 6.9 feet in the entrance and 14.1 feet in Avery Canal.
497	Bayou Petite Anse	Vermilion - Teche	29°51'35.91"N	91°56'18.50"W	Avery Island	Controlling Depth		O&M			11			11345	401	In April 1997, the controlling depth was 11 feet to the junction with Bayou Carlin, thence 4 feet to the highway bridge.
498	Four Mile Cutoff	Vermilion - Teche	29°45'42.32"N	92° 7'36.23"W	Intracoastal City	Controlling Depth		O&M			9			11350	401	In April 1997, the controlling depths were 7 feet across the bar in Vermilion Bay, thence 9 feet through Four Mile Cutoff; thence in March 1997, 9 feet to Woodlawn Bridge, thence 7½ feet to Broussard Highway Bridge, thence 4½ feet to Ambassador Caffery Bridge; thence in February 1995, the river was bare for about 2 miles below Lafayette to the Pinhook Highway Bridge.
499	Freshwater Bayou Canal	Vermilion - Teche	29°39'3.48"N	92°15'39.14"W	Intracoastal City	Controlling Depth		O&M			6			11350	403	In January 2006, the controlling depth was 11 feet in the entrance channel, thence 6 feet through the canal to Light 20, thence 9 feet to the canal junction with the Intracoastal Waterway
500	Freshwater Bayou Canal	Vermilion - Teche	29°33'13.28"N	92°18'16.91"W	Intracoastal City	Lock	Water	O&M			16	94	600	11350	403	The lock is 600 feet long and 84 feet wide, and has depths of 16 feet over the sills. Each end of the lock on the W side of the channel has 300-foot-long timber guidewall approaches.
501	Freshwater Bayou Bypass Canal	Vermilion - Teche	29°33'9.73"N	92°18'4.53"W	Intracoastal City	Lock	Water	Immediate						11350		
502	Schooner Bayou	Vermilion - Teche	29°45'0.34"N	92°14'19.03"W	Intracoastal City	Controlling Depth		O&M			5.5			11350	403	In September 2000, the controlling depth was 10 feet in Freshwater Bayou Canal from the Intracoastal Waterway to Schooner Bayou, thence in March 1996, 5½ feet in Schooner Bayou to Schooner Bayou Control Structure.
503	Schooner Bayou	Vermilion - Teche	29°45'29.03"N	92°15'50.36"W	Intracoastal City	Lock	Water	Future			12	75		11350	403	Schooner Bayou Control Structure, 4 miles inside the bayou, prevents saltwater from flowing through Schooner Bayou Canal into White Lake; the floodgates are 75 feet wide and 12 feet deep over the sill at mean low water.
504	GIWW	Vermilion - Teche	29°46'15.86"N	91°47'0.26"W	Larose	Overhead Cables		Future	90					11350		
505	GIWW	Vermilion - Teche	29°46'18.94"N	91°47'5.90"W	Louisa	Bascule Bridge	Highway	Future	73			200		11350		[Federal Register: February 22, 2005 (Volume 70, Number 34)] [Rules and Regulations] [Page 8515-8516] From the Federal Register Online via GPO Access [wais.access.gpo.gov] [DOCID:fr22fe05-9]
506	GIWW	Vermilion - Teche	29°45'59.23"N	91°42'57.21"W	Louisa	Cable Ferry	Water	Future								Cable across the river may be at or near the waters surface. Mariners should use caution
507	Bayou Carlin	Vermilion - Teche	29°57'2.32"N	91°59'0.04"W	Delcambre	Lift Bridge	Rail	Future								
508	Bayou Teche	Vermilion - Teche	29°45'43.91"N	91°26'0.53"W	Centerville	Swing Bridge	Highway	Future	5			60				
509	Bayou Teche	Vermilion - Teche	29°47'30.01"N	91°29'56.10"W	Franklin	Swing Bridge	Highway	Future	2			60				
510	Bayou Teche	Vermilion - Teche	29°48'7.73"N	91°29'23.33"W	Franklin	Swing Bridge	Highway	Future	4			60				
							207									

Appendix D
Initial Project Inventory

APPENDIX D: INITIAL PROJECT INVENTORY

No.	Waterway System	Waterway	Project/Study Name	Project Type	Status	Impact to Waterways	Functional Agent
1	**General**	Gulf of Mexico	Artificial Reef Sites in Gulf of Mexico, several Parishes	Environmental	Design	No Impact	LDWF
2	**Mississippi River**	All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	N/A
3		Mississippi River	New Floodgate at Bohemia	Environmental	Planning	No Impact	N/A
4		Mississippi River	Diversion at Bonne Carre Spillway	Environmental	Planning	No Impact	N/A
5		Mississippi River	Diversion at Whites' Ditch	Environmental	Planning	No Impact	LCA
6		Mississippi River	Diversion at American/California Bay	Environmental	Planning	No Impact	LCA
7		Mississippi River	Diversion at Fort St. Phillip	Environmental	Planning	No Impact	LCA
8		Mississippi River	Sediment Delivery by Pipeline at Quarantine Bay	Environmental	Planning	No Impact	LCA
9		Pass-a-Loutre Crevasse	Pass-a-Loutre Crevasse	Environmental	Planning	No Impact	CWPPRA
10		Mississippi River	Mississippi River Sediment Trap	Environmental	Planning	No Impact	CWPPRA
11		Mississippi River	Diversion at Benneys Bay	Environmental	Planning	No Impact	CWPPRA
12		Mississippi River	Mississippi River Delta Management Study	Environmental	Planning	No Impact	LCA
13		Mississippi River	Mississippi River Hydrologic Study	Environmental	Planning	No Impact	LCA
14		Mississippi River	Caernarvon Project	Operation & Maintenance	Planning	No Impact	LCA
15		Mississippi River	Mississippi Delta - Caernarvon	Operation & Maintenance	Planning	No Impact	USACE
16		Mississippi River	Baptist Collette Channel Deepening	Navigational	Planning	Direct	Plaquemines Parish
17		Mississippi River	Roadway System	Port	Design	Indirect	Port of Greater Baton Rouge
18		Mississippi River	Land Acquisition ICWW	Port	Design	Indirect	Port of Greater Baton Rouge
19		Mississippi River	Baton Rouge Harbor Access Road	Port	Design	Indirect	Port of Greater Baton Rouge
20		Mississippi River	Dredging - Docks 1 & 2	Port	Design	No Impact	Port of Greater Baton Rouge
21		Mississippi River	Ethanol Plant	Port	Design	Indirect	Port of Lake Providence
22		Mississippi River	Purchase & Rehabilitate Rail	Port	Design	Indirect	Port of Lake Providence
23		Mississippi River	Entrance Flood Gate	Port	Design	Indirect	Port of Lake Providence
24		Mississippi River	Poland Ave. Cruise Terminal - Construction	Port	Design	Indirect	Port of New Orleans
25		Mississippi River	Napoleon Terminal Phase 2 - Cranes	Port	Design	Indirect	Port of New Orleans
26		Mississippi River	JRT - relocation (includes refrigerated warehouse)	Port	Design	Indirect	Port of New Orleans
27		Mississippi River	FRT relocation to Nap. Phase 2 Site	Port	Design	Indirect	Port of New Orleans
28		Mississippi River	LA Terminal Paving Rehab	Port	Design	No Impact	Port of New Orleans
29		Mississippi River	Port Security Projects	Port	Design	Indirect	Port of New Orleans
30		Mississippi River	Nashville Shed "A" Roof Replacement	Port	Design	No Impact	Port of New Orleans
31		Mississippi River	LA Ave. Shed Sprinkler System Rehab	Port	Design	No Impact	Port of New Orleans
32		Mississippi River	Port Security Improvements	Port	Design	Indirect	Port of New Orleans
33		Mississippi River	Seabrook Bridge Weight Reduction	Port	Design	No Impact	Port of New Orleans
34		Mississippi River	FRT North Floodwall Relocation	Port	Design	No Impact	Port of New Orleans
35		Mississippi River	Riverfront Wharves Substructure Rehab	Port	Design	No Impact	Port of New Orleans
36		Mississippi River	Paving Misc. Port Roadways	Port	Design	No Impact	Port of New Orleans
37		Mississippi River	Nashville Wharf "C" Dredging	Port	Design	Indirect	Port of New Orleans
38		Mississippi River	Replace Dredge Bleakley	Port	Design	Indirect	Port of New Orleans
39		Mississippi River	Seapoint (Venice)	Port	Design	Direct	Port of Plaquemines Parish
40		Mississippi River	Globalplex Finger Pier	Port	Design	Indirect	Port of South Louisiana
41		Mississippi River	Angelina Tank Farm Dock	Port	Design	Indirect	Port of South Louisiana
42		Mississippi River	St. James Tank Farm Dock	Port	Design	Indirect	Port of South Louisiana
43		Mississippi River	Ship Lift	Port	Design	Indirect	Port of South Louisiana
44		Mississippi River	100,000-SF Multipurpose Warehouse Facility-Globalplex	Port	Planning	Indirect	Port of South Louisiana
45		Mississippi River	KCS/CN Rail Connection and CN Extension - Phase II	Port	Design	Indirect	Port of South Louisiana
46		Mississippi River	Globalplex Pond Closure/Land Reclamation	Port	Design	Indirect	Port of South Louisiana
47		Mississippi River	Kinder Morgan Dock Repair	Port	Design	No Impact	Port of South Louisiana
48		Mississippi River / MRGO/GIWW	Arabi Terminal Sea Wall Improvements	Port	Design	No Impact	Port of St. Bernard
49		Mississippi River / MRGO/GIWW	Chalmette Terminal Pot Line 9 build out 86,000 sq ft	Port	Design	Indirect	Port of St. Bernard
50		Mississippi River / MRGO/GIWW	Chalmette Terminal Smoke stack rehab	Port	Design	No Impact	Port of St. Bernard
51		Mississippi River / MRGO/GIWW	Chalmette Terminal Drainage Pond Improvements (dredging)	Port	Design	No Impact	Port of St. Bernard
52		Mississippi River / MRGO/GIWW	Chalmette Terminal Sewer improvements (Parish tie in)	Port	Design	No Impact	Port of St. Bernard
53		Mississippi River / MRGO/GIWW	Chalmette Terminal Warehouse improvements	Port	Design	No Impact	Port of St. Bernard
54		Mississippi River / MRGO/GIWW	Chalmette Terminal River Road improvements	Port	Design	Indirect	Port of St. Bernard
55		Mississippi River / MRGO/GIWW	Chalmette Terminal Dock improvements	Port	Design	Indirect	Port of St. Bernard

APPENDIX D: INITIAL PROJECT INVENTORY

No.	Waterway System	Waterway	Project/Study Name	Project Type	Status	Impact to Waterways	Functional Agent
56	**Mississippi River (continued)**	Mississippi River / MRGO/GIWW	Improvements to barge fleeting and mid stream buoys	Port	Design	Indirect	Port of St. Bernard
57		Mississippi River / MRGO/GIWW	Purchase Violet Dock Property	Port	Design	No Impact	Port of St. Bernard
58		Mississippi River / MRGO/GIWW	Improvements to Dock facilities Violet	Port	Design	No Impact	Port of St. Bernard
59		Mississippi River / MRGO/GIWW	Arabi Terminal General Cargo Transit Shed (expansion of dock 2)	Port	Design	Indirect	Port of St. Bernard
60		Mississippi River / MRGO/GIWW	Arabi Terminal Slip Toe Improvements (bulk head and RO/RO)	Port	Design	No Impact	Port of St. Bernard
61		Mississippi River / MRGO/GIWW	Arabi Terminal Dock 2 Improvements Lay Down (section F)	Port	Design	No Impact	Port of St. Bernard
62		Mississippi River / MRGO/GIWW	Arabi Terminal Sewer Improvements (Parish tie in)	Port	Design	No Impact	Port of St. Bernard
63		Mississippi River / MRGO/GIWW	Arabi Terminal Cargo Lay Down Area Improvements	Port	Design	Indirect	Port of St. Bernard
64		Mississippi River / MRGO/GIWW	Arabi Terminal Fendering	Port	Design	No Impact	Port of St. Bernard
65		Jefferson Canal	Kerner Bridge	Operation & Maintenance	Design	Indirect	JEDCO
66		Jefferson Canal	Peter's Road Rail	Port	Design	No Impact	JEDCO
67		Jefferson Canal	Barataria Waterway Dredging	Operation & Maintenance	Design	Indirect	JEDCO
68	**Calcasieu River**	Calcasieu River	Study for channel widening and addition of anchorage areas	Operation & Maintenance	Design	Direct	USACE
69		All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE
70		Black Lake Bayou	Salinity Control on Black Lake Bayou near Hackberry	Environmental	Planning	No Impact	CWPPRA
71		Lake Calcasieu	Stabilize eastern Shore of Lake Calcasieu	Environmental	Planning	Indirect	CWPPRA
72		Mud Lake	Improve Hydrology of the Old Mermentau Channel between Mud Lake and the Gulf	Environmental	Planning	Indirect	CWPPRA
73		Calcasieu River	Dredge disposal management plan	Environmental	Planning	Direct	USACE
74		Calcasieu River/GIWW	Dredging, bulkhead (rip/rap) & additional mooring berth	Port	Design	Indirect	Port of West Calcasieu
75		Calcasieu River	Forest Products Warehouse	Port	Construction	Indirect	Port of Lake Charles
76		Calcasieu River	Bulk Terminal No. 1 Roll Over	Port	Design	No Impact	Port of Lake Charles
77		Calcasieu River	Bulk Terminal No. 1 Unloader	Port	Design	No Impact	Port of Lake Charles
78		Calcasieu River	Container / Berth 8	Port	Design	Indirect	Port of Lake Charles
79		Calcasieu River	City Docks Rail	Port	Design	Indirect	Port of Lake Charles
80		Calcasieu River	Bulk Terminal No. 1 Rail	Port	Design	No Impact	Port of Lake Charles
81		Calcasieu River	Berth 7 Expansion Joints	Port	Design	No Impact	Port of Lake Charles
82		Calcasieu River	Bulk Terminal No. 1 Maintenance Shop	Port	Design	No Impact	Port of Lake Charles
83		Calcasieu River	Minor Capital Projects	Port	Design	No Impact	Port of Lake Charles
84		Calcasieu River	Transit Shed 8 - 14 Road	Port	Design	No Impact	Port of Lake Charles
85		Calcasieu River	City Docks Rail	Port	Design	No Impact	Port of Lake Charles
86		Calcasieu River	Administration Building	Port	Design	No Impact	Port of Lake Charles
87		Calcasieu River	City Docks Shop	Port	Design	No Impact	Port of Lake Charles
88		Calcasieu River	Contraband Bayou Bridge	Port	Design	Indirect	Port of Lake Charles
89		Brown Lake	Brown Lake Hydrologic Restoration	Operation & Maintenance	Design	No Impact	LaDNR
90	**Red River**	All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE
91		Red River	Study	Environmental	Design	No Impact	Joint Effort, RRVA, NRCS, USACE
92		Red River	Extend navigation north from Shreveport into Arkansas	Operation & Maintenance	Design	Direct	USACE
93		Red River	General Warehouse - 100K sf	Port	Design	No Impact	Port of Shreveport-Bossier
94		Red River	Lift Station & 10,000 LF forced main	Port	Design	Indirect	Port of Shreveport-Bossier
95		Red River	Slack Water dock - 1 EA	Port	Finished	Indirect	Port of Shreveport-Bossier
97	**Ouachita River**	Ouachita River	Water Side Storage	Port	Design	Indirect	Port of Ouachita
98		Ouachita River	Rail Spur Extension	Port	Design	Indirect	Port of Ouachita
99		Ouachita River	Container/Chassis Inspection & Repair Facility	Port	Design	Indirect	Port of Ouachita
100		Ouachita River	Fencing & Security	Port	Design	No Impact	Port of Ouachita
101		Ouachita River	Harbor Work Boat	Port	Design	No Impact	Port of Ouachita
102		Tensas River, Sicily Island Area	Flood Protection	Flood Control	Design	No Impact	USACE
103	**Atchafalaya River**	All	Flood Control/Hurricane Protection Levees	Flood Control	Design	No Impact	USACE
104		Atchafalaya	St. Mary Parish Storm Surge Protection Study	Flood Control	Planning	No Impact	St. Mary Parish

APPENDIX D: INITIAL PROJECT INVENTORY

No.	Waterway System	Waterway	Project/Study Name	Project Type	Status	Impact to Waterways	Functional Agent
105	**Atchafalaya River (continued)**	Atchafalaya-East	East Atchafalaya Restoration Spillway	Environmental	Planning	No Impact	Environmental Defense and Coalition to Restore Coastal Louisiana
106		Atchafalaya-East	Convey Atchafalaya River water to Northern Terrebonne Marshes	Environmental	Planning	No Impact	LCA
107		Atchafalaya Basin	Upper Atchafalaya Basin Study	Environmental	Planning	No Impact	LCA
108		Atchafalaya	Simmesport Railroad Bridge Alteration	Operation & Maintenance	Planning	Direct	USCG
109		Atchafalaya	Channel Deepening Study and Construct	Operation & Maintenance	Planning	Direct	USACE
110		Atchafalaya River	Land Acquisition	Port	Design	Indirect	Port of Krotz Springs
111		Atchafalaya River	Boat Launch Repairs	Port	Design	Indirect	Port of Krotz Springs
112		Atchafalaya River/ Berwick Bay	Atchafalaya River channel deepening construction	Port	Design	Direct	Port of Morgan City
113		Atchafalaya River	Develop Aggregate Handling Area	Port	Design	Indirect	Port of Simmesport
114		Freshwater Bayou/GIWW	Port of Iberia, LA	Operation & Maintenance	Planning	Direct	USACE
115	**Vermilion-Teche**	All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE
116		Vermilion Bay and East & West Cote Bays	Restore Vermilion Bay and East & West Cote Bays shorelines	Environmental	Planning	No Impact	CWPPRA
117		East Cote Branch Bay	Maintain Northern Shore of East Cote Branche Bay at Point Marone	Environmental	Planning	No Impact	CWPPRA
118		Wax Lake Outlet	Increase Sediment Transport Down Wax Lake Outlet	Environmental	Planning	Indirect	LCA
119		Point Au Fer	Rebuild Historic Reefs at Point Au Fer	Environmental	Planning	No Impact	CWPPRA
120		Point Au Fer	Stabilize Gulf Shoreline of Point Au Fer Island	Environmental	Planning	No Impact	CWPPRA
121		Southwest Pass	Stabilize Banks of Southwest Pass of Marsh Island and Rainey Marsh	Environmental	Planning	No Impact	CWPPRA
122		Vermilion Bay, GIWW	Optimize GIWW flow to Marshes and Eliminate GIWW Direct Flows into Vermilion Bay	Environmental	Planning	Indirect	CWPPRA
123		Freshwater Bayou, Southwest Pass	Stabilize Shorelines of Freshwater Bayou to Southwest Pass	Environmental	Planning	Indirect	N/A
124		Freshwater Bayou, GIWW	Stabilize Shorelines of Freshwater Bayou and GIWW	Environmental	Planning	Indirect	LCA
125			Widen and deepen access channel	Port	Planning	Direct	Port of Iberia
126			Bulkhead, Loadout Slab and utilities at Tract "F-2"	Port	Design	Indirect	Port of Iberia
127		vermilion River	Master Plan Update	Port	Design	No Impact	Port of vermilion
128		vermilion River	Install & Finish Interior Bulkhead (approx. 2,500 feet) - POV	Port	Design	Indirect	Port of vermilion
129		vermilion River	Dredging North & South Slips - POV	Port	Design	Indirect	Port of vermilion
130	**Pearl River**	Pearl River	De-authorization	Operation & Maintenance	Planning	Direct	USACE
131	**Sabine River**	Sabine	Increase Freshwater Flow from the Sabine River	Environmental	Planning	No Impact	N/A
132		Sabine	Salinity Control Structure at Sabine Pass near Hwy 82 Causeway	Environmental	Planning	Indirect	N/A
133	**Mermentau River**	All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE
134		Mermentau River	Maximize Freshwater Inflow to Tributaries of the Mermentau from Outside Sources	Environmental	Planning	No Impact	N/A
135		Grand Lake	Stabilize Grand Lake Shoreline and Land Bridge	Environmental	Planning	No Impact	CWPPRA
136		White Lake	Stabilize White Lake Shoreline and Land Bridge	Environmental	Planning	No Impact	CWPPRA
137	**Lake Pontchartrain and Breton Sound**	MRGO	Closure Study - USACE	Operation & Maintenance	Planning	Direct	USACE
138		MRGO	Construct New Lock and Extend Eastbank Levee	Operation & Maintenance	Planning	Direct	USACE
139		North Pass	Paving and road improvements	Port	Design	No Impact	Port Manchac
140		North Pass	Manchac Marine	Port	Design	No Impact	Port Manchac
141		Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Construct a Sill at Seabrook (Industrial Canal at Lake Pontchartrain)	Environmental	Planning	No Impact	N/A
142		Restore Bayou LaLoutre Ridge (includes construction of MRGO to GIWW dimensions)	N/A	Environmental	Planning	Direct	CWPPRA
143		Diversion at Convent Blind River	N/A	Environmental	Planning	No Impact	LCA
144		Diversion at Hope Canal	N/A	Environmental	Planning	No Impact	LCA
145		Diversion at Reserve Relief Canal	N/A	Environmental	Planning	No Impact	LCA
146		Increase Amite River Influence by Gapping Banks	N/A	Environmental		No Impact	LCA
147		Sediment Delivery by Pipeline to Central Wetlands	N/A	Environmental	Planning	No Impact	LCA

APPENDIX D: INITIAL PROJECT INVENTORY

No.	Waterway System	Waterway	Project/Study Name	Project Type	Status	Impact to Waterways	Functional Agent
148	**Lake Pontchartrain and Breton Sound (continued)**	Sediment Delivery by Pipeline to Golden Triangle	N/A	Environmental	Planning	No Impact	LCA
149		Remove the Gates from Existing Bayou Lamoque Diversion Structure	N/A	Environmental	Planning	No Impact	N/A
150		Bayou Bienvenue Pump Station Diversion and Terracing	N/A	Environmental	Planning	No Impact	CWPPRA
151		Edem Isles East Marsh Restoration	N/A	Environmental	Planning	No Impact	CWPPRA
152		Diversion from Jefferson Parish Drainage District into LaBranche Wetlands	N/A	Environmental	Planning	No Impact	Jefferson Parish
153		Dedicated Delivery of Sediment for Marsh Building (Tchefuncte, Tangipahoa, Eloi Bay)	N/A	Environmental	Planning	No Impact	CWPPRA
154		Improve St. Tammany Parish Drainage	N/A	Operation & Maintenance		No Impact	ESF-14
155	**Barataria and Terrebonne Basins**	Bayou Lafourche	Determine advisability of floodgate conversion to navigation lock	Operation & Maintenance	Planning	Direct	USACE
156		Bayou Lafourche	Channel deepening 50 feet to the Gulf	Operation & Maintenance	Planning	Direct	USACE
157		Houma Navigation Canal	Houma Navigation Canal Lock, part of Morganza to the Gulf Hurricane Protection	Flood Control	Design	Direct	USACE
158		Houma Navigation Canal	Channel deepening	Flood Control	Design	Direct	USACE
159		Bayou Terrebonne, Houma	Bulkhead, Fill, and Walkway	Operation & Maintenance	Design	Indirect	Terrebonne Parish
160		Bayou Grand Caillou	Bayou Grand Caillou Enlargement	Operation & Maintenance	Planning	Indirect	USACE
161		All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE
162		Bayou Lafourche Reintroduction	N/A	Environmental	Design	No Impact	LCA
163		Third Delta Study	Pase II Completed by CH2MHill	Environmental	Design	No Impact	LCA/LWFD
164		Mississippi River Reintroduction into Northwest Barataria Basin	N/A	Environmental	Planning	No Impact	N/A
165		Dedicated Dredging on Barataria Basin Landbridge	N/A	Environmental	Planning	No Impact	N/A
166		Lake Hermitage Marsh Creation	N/A	Environmental	Planning	No Impact	CWPPRA
167		Spanish Pass Diversion	N/A	Environmental	Planning	No Impact	CWPPRA
168		Dupre Cut/Barataria Waterway Channel Management	N/A	Environmental	Planning	Indirect	CWPPRA
169		Grande Isle Oil and Gas Field Restoration	N/A	Environmental	Planning	Indirect	CWPPRA
170		Elmers Island Acquisition and Restoration	N/A	Environmental	Design	No Impact	CWPPRA
171		North Barataria Bay Shoreline Wave breaks	N/A	Environmental	Planning	No Impact	CWPPRA
172		Lake Salvador Shoreline Protection	N/A	Environmental	Planning	No Impact	LCA
173		Backfill Oil and Gas Pipeline Canals	N/A	Environmental	Planning	No Impact	LCA
174		Convey Atchafalaya River Water Flow to Terrebonne Marshes	N/A	Environmental	Planning	No Impact	LCA
175		Freshwater Reintroduction to South of Lake Decade	N/A	Environmental	Planning	No Impact	LCA
176		Multipurpose Use of the Houma Navigation Lock	N/A	Environmental	Planning	No Impact	LCA
177		Alternative Operation Schemes of the Old River Control Structure	N/A	Environmental	Planning	Indirect	LCA
178		Lower Water Levels in the Upper Penchant Basin	N/A	Environmental	Planning	No Impact	DNR
179		Improve Hydrology and Drainage in the Verret Sub basin	N/A	Environmental	Planning	No Impact	DNR
180		West Belle Pass Barrier Headland Restoration Project	N/A	Environmental	Planning	No Impact	DNR
181		Falgout Canal Freshwater Enhancement Project	N/A	Environmental	Planning	No Impact	DNR
182		Bayou LaFourche	Northern Expansion Phase 1 Part C	Port	Construction	Indirect	Greater Lafourche Port Commission
183		Bayou LaFourche	La-1 Elevated Hwy Mitigation	Port	Construction	Indirect	Greater Lafourche Port Commission
184		Bayou LaFourche	Maritime Forest Ridge	Port	N/A	No Impact	Port Fourchon
185	**GIWW**	Morgan City to Port Allen	Bayou Sorrel Lock Preconstruction/E&D	Operation & Maintenance	Planning, Design	Direct	USACE
186		Louisiana Portion	Calcasieu Lock Capacity Increase	Operation & Maintenance	Recon report certified Feb 1993	Direct	USACE
187		Inner Harbor Navigation Canal	IHNC Lock	Operation & Maintenance	Construction	Direct	USACE
188		All	Flood Control/Hurricane Protection Levees	Flood Control	Planning	No Impact	USACE

APPENDIX D: INITIAL PROJECT INVENTORY

No.	Waterway System	Waterway	Project/Study Name	Project Type	Status	Impact to Waterways	Functional Agent
189	**GIWW (continued)**	Leland-Bowman Lock-GIWW	Rock Bankline Placements at Leland Bowman Lock in Vermilion Parish	Flood Control	Design	No Impact	USACE
190		GIWW-Chacahoula Basin	Chacahoula Bain Watershed Environmental Management Plan	Environmental	Planning	No Impact	North Terrebonne Drainage & Conservation District, DOTD
191		GIWW	Dredging of 6,500' x 300' new slip	Port	Design	Indirect	Port of West St. Mary
192		GIWW	Access Road	Port		No Impact	Port of West St. Mary
193		New Iberia Drainage Canal & GIWW	Infrastructure Improvements - ME Phase I	Port	Design	Indirect	Port of Iberia
194		New Iberia Drainage Canal & GIWW	Infrastructure Improvements - ME Phase II	Navigation	Design	Indirect	Port of Iberia
195		New Iberia Drainage Canal & GIWW	Bulkhead Repairs/Replacement	Port	Design	Indirect	Port of Iberia
196		New Iberia Drainage Canal & GIWW	Channel Maintenance	Port	Design	Indirect	Port of Iberia
197		New Iberia Drainage Canal & GIWW	Railroad Improvements	Port	Design	Indirect	Port of Iberia
198		New Iberia Drainage Canal & GIWW	Four Lane Lewis Street	Port	Design	Indirect	Port of Iberia
199		GIWW	Gulf Intracoastal Waterway	Flood Control	Planning	No Impact	USACE/CPRA
200		Freshwater Bayou/GIWW/Commercial Canal	Acadiana to the Gulf of Mexico Access Channel (AGMAC)) Port of Iberia, LA	Navigation	Design	Direct	USACE