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16. Abstract

The implementation of the North American Free Trade Agreement (NAFTA) on January 1, 1994 created a trading region extending form the Yucatan Peninsula in Mexico to the Yukon region of Alaska with trade between the United States, Canada, and Mexico from 1993 to 1994 grew by over 50% to $753 million to rank 10th among all US states in exports by value to Mexico by the end of 1994. (See Statewide Intermodal Plan for Port Access information)

The primary objective of this research has been to identify NAFTA-induced market opportunities for Louisiana's maritime sector and to help define the strategies, maritime services, and port infrastructure requirements necessary to exploit these opportunities. Identification of current deficiencies also needed to be referenced.

Research methodology applied five types of maritime services currently operating or being considered for US Gulf-Mexican Gulf trade (conventional deep sea, coastal short sea, feeder, river/ocean, and specialized services such as refrigerated or trailer ferry operations) to existing regional and Louisiana based commodity movements to Mexico. Louisiana port facilities that could potentially satisfy maritime service requirements were segregated by port type (i.e. deep draft-over 25' of water alongside berth, medium draft-between 15' and 25', and shallow draft-less than 15' of water alongside berth) and port range (coastal, lower Mississippi River, inland river).

This research effort has identified specific maritime services, infrastructure requirements, and strategies required for the state's ports to play a role in capturing the impending growth of water transportation induced by NAFTA trade.

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# IDENTIFICATION OF NAFTA-INDUCED OPPORTUNITIES FOR LOUISIANA'S PORTS AND WATERWAYS

by

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November 1996

## ABSTRACT

The implementation of the North American Free Trade Agreement (NAFTA) on January 1, 1994, created a trading region extending from the Yucatan Peninsula in Mexico to the Yukon region of Alaska with trade between the United States, Canada, and Mexico totaling $341 billion by the end of the first year of the agreement. Louisiana's exports to Mexico from 1993 to 1994 grew by over 50 percent to $753 million to rank 10th among all U.S. states in exports by value to Mexico by the end of 1994.

NAFTA-induced restructuring for north-south movements of cargo is already contributing to meaningful expansion of the levels of trade between Louisiana and Mexico. This expanded trade volume should benefit Louisiana's ports and maritime sectors which have existing capacities able to absorb these increased trade activities. Land transportation, especially trucking, remains the dominant modal choice of shippers in the movement of general cargos between the U.S. and Mexico. Intermodal options utilizing a water transport component, however, are likely to develop in the Gulf because of the lower costs for some segments of the trade as well as existing congestion and delays at key land border crossing points across the U.S.-Mexican border that will most likely not be resolved in the near future. A wide and varied port structure already exists in both the U.S. and Mexican Gulf regions to accommodate such intermodal movements.

The primary objective of this research has been to identify NAFTA-induced market opportunities for Louisiana's maritime sector and to help define the strategies, maritime services, and port infrastructure requirements necessary to exploit these opportunities. Identification of current deficiencies affecting such opportunities also needed to be referenced.

Research tested five types of maritime services currently operating or being considered for U.S. Gulf-Mexican Gulf trade (conventional deep sea, coastal short sea, feeder, river/ocean, and specialized services such as refrigerated or trailer ferry operations) to existing regional and Louisiana based commodity movements to Mexico. Louisiana port facilities that could potentially satisfy maritime service requirements were segregated by port type (i.e. deep draft-over 25 feet of water alongside berth, medium draft-between 15 feet and 25 feet, and shallow draft-less than 15 feet of water alongside berth) and port range (coastal, lower Mississippi River, inland waterways). Market analyses and profiles for each type of potential maritime service were developed from national and regional data bases, shipper surveys and interviews, and

discussions with Louisiana port officials.

Analysis of transportation networks, logistics, and costs was performed utilizing market rat costs obtained from shippers, international freight forwarders/brokers, and transportation se providers as well as cost models for certain maritime services developed previously by the institute. The competitive position of Louisiana's port system, compared to other ports in s involved with U.S. Gulf/Mexican Gulf trade, was evaluated qualitatively and quantitatively site visits, discussions with shippers, freight forwarders, successful maritime operators, and previous work completed by the Institute for Louisiana's Statewide Intermodal Plan (July 1 Finally, this research effort has proceeded to identify specific maritime services, infrastruct requirements, and strategies required for the state's maritime community to play a role in capturing the impending growth of water transportation induced by NAFTA trade.

## ACKNOWLEDGMENTS

The identification of market opportunities for Louisiana's marit . . . . . 1
of the North American Free Trade Agreement (NAFTA) is th . . . . 1
efforts and feedback received from many interested groups. Our . . 2
and foremost, the shippers themselves who took time out from norma.
person, written, and telephone inquiries by the National Ports and Waterw. 5
market opportunities must begin with potentially interested customers. Feedba.
the state port managers and shippers on cost and service requirements was extreme.
defining the implementation potential of various maritime services utilizing Louisiana's p.
waterways system.

The institute is also appreciative of the time spent by the assembled Project Review Committee that included representatives of Louisiana's ports and waterways industry, the state Department of Transportation and Development (DOTD), and the Louisiana Transportation Research Center (LTRC). This group's professional involvement enhanced not only the practical assessment of the research findings but also provided valuable insights into existing and future port development plans, port users, and financing requirements.

Finally, the researchers wish to thank the Ports Association of Louisiana (PAL) for their financial support of this research and other members of the Louisiana maritime community including vessel operators, transportation service providers, and staff members of Louisiana's public port and waterway organizations for their participation in providing shipper contacts, port infrastructure details, tariff charges and costs, and a definition of future plans that were relevant to the study and its findings.

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# INTRODUCTION

## Objectives of Research

The primary objective of the research is to identify NAFTA-induced market opportunities for Louisiana's maritime sector and define the strategies and maritime services necessary to exploit these opportunities. Additionally, if deficiencies exist that could prevent or hinder Louisiana ports from pursuit of these opportunities (i.e. infrastructure deficiencies such as inadequate berthing space or water depth, lack of proper equipment, lack of storage area, etc.) such problems were to be clearly referenced. In meeting the above objectives, Louisiana's maritime interests should receive from this report sufficient information necessary to focus their marketing and development efforts on potential NAFTA region trade for their respective organizations. Such information includes:

- Identification of market opportunities by commodity type (bulk, breakbulk, container, etc.)
- Origin/destination locations between Louisiana (U.S.) and Mexico for existing/potential commodity flows
- Cost profiles by type of transportation service
- Specification of infrastructure, logistical, and institutional requirements

Louisiana's extensive port and inland waterway system linking the Gulf to the large central and eastern portions of the United States should continue to provide "gateway" routing opportunities created by NAFTA-induced north/south trade through Louisiana to and from Mexico. A significant trade base in Louisiana already exists that has averaged annually over 2.3 million metric tons of outbound cargo to Mexico during the early to mid 1990's and 13.8 million metric tons of cargo inbound from Mexico during the same period. Louisiana ports have been able to capture over 42 percent of both inbound and outbound trade from Mexico through the U.S. Gulf coast.

While Louisiana is poised to become a water transportation gateway leading to meaningful expansion of current levels of Louisiana-Mexico trade, other states such as Texas, Florida, Mississippi, Alabama, Tennessee, and Georgia are also attempting to benefit from NAFTA-induced trade by developing their own transportation strategies. Some states, such as Mississippi, have improved their port facilities (i.e. on-dock chiller warehouses) to handle

specific commodity segments such as frozen/perishable fruits, vegetables, and meats that account for large volumes of NAFTA- induced trade. Others, such as Florida and Georgia, have invested heavily in containerized facilities at their ports to respond to the growing trend to unitize and mechanize the cargo handling process both in the United States and Mexico. Still other states, such as Texas and California, have emphasized land-based improvements to roads and border crossing points to gain larger market shares of cargo moving between the U.S. and Mexico.

Louisiana must consider strategies that will emphasize its own comparative advantages in capturing the impending growth of NAFTA trade. These strategies must not only define the role of the state's ports in capturing cargos but also specify types of maritime services that can be offered (short sea, river/ocean, deep sea, specialized services such as ferry and refrigerated operations) to divert a share of the predominantly land-based trade to water transport via the state's ports.

**Approach and Methodology**

The institute's approach includes two distinct components :

> ***Component 1.*** Opportunities by port type and range: Port types are defined as deep-draft (greater than 25 feet of water at berth), medium-draft (between 15 feet and 25 feet of water at berth), and shallow-draft ports (less than 15 feet of water at berth). Market opportunities are defined in terms of these three categories as well as the port range and location- coastal, lower Mississippi river, and inland river ranges.
>
> ***Component 2.*** Opportunities for specific ports : The scope of this component will be defined in the future under a separate agreement if and when an individual port desires to use the findings of Component 1 for specific application to its marketing and facilities programs.

For each of these components the institute analyzed or will analyze opportunities in conjunction with the five types of maritime services currently operating or being considered for the U.S. Gulf coast/East Coast of Mexico trade. These services are defined as follows and are explained in more detail in Chapter II:

- Deep sea conventional service: regional segments or legs that are part of longer services between Mexico/U.S. and Europe, the Mediterranean, and South America

- Short sea coastal service: regional services between the U.S. Gulf and East Coast of Mexico ports, including smaller ocean vessels or ocean barges, reefer/refrigerated services, as well as container-on-barge services

- Feeder service: regional feeders of deep sea services, usually with smaller vessels of less than 300 TEU capacity, that do not call directly at Mexican ports

- River/ocean service: direct services between the lower Mississippi and Mexico utilizing shallow draft vessels that can navigate inland waterways as well as operate in open sea; such vessels are currently deployed in Europe and typically have capacities of 1500-3000 DWT or 250 TEU with operating drafts of 8'-12'

- Water bridge: direct railcar or truck trailer ferry (limited port-to-port) service across the Gulf of Mexico with market range inclusive of central and southern Mexico, the United States, and Canada east of the Mississippi River

Five basic tasks were identified for the completion of component 1. These tasks are highlighted below.

**Task 1 : Development of market profiles.**

The macroeconomic factors affecting trade between Louisiana and Mexico such as Mexico's current recession and the recent peso devaluation in December 1994 affected not only the volume and types of commodities traded but also the direction of trade flows. A complete reversal of the predominately 65 percent southbound/ 35 percent northbound flows of cargo by volume from the U.S. to and from Mexico shifted to 65 percent northbound/ 35 percent southbound volume flows as the peso devaluation made Mexican goods relatively cheaper than before the devaluation. Market profiles are distinguished between existing, emerging, and potential markets for water transportation and specific types of maritime services related to NAFTA trade. Chapter III provides an assessment of the capability of Louisiana ports' existing infrastructure to handle these types of maritime services. Regional market profiles utilizing macroeconomic NAFTA

trade data received from the U.S. Department of Commerce and U.S. Customs data bases are presented in aggregate form and discussed in Chapter IV, as well as maritime service requirements based upon Louisiana shipper surveys, interviews, and discussions with Louisiana public port officials.

**Task 2 : Analysis of transportation networks, logistics, and costs.**

The institute has previously developed cost models for various maritime service options that have been mentioned. Commodity specific scenarios were identified with existing shippers and origin/destination cost data via all-land movements (truck and rail) between Louisiana and Mexico which were then compared with potential intermodal service options utilizing a relevant port range(i.e. coastal, inland, lower Mississippi ports, etc.) within Louisiana. Travel times, frequency of service, and related equipment deployed were also included in the logistics analysis. Other factors such as inventory and storage costs, intermodal transfer costs, and previous negative experiences with water transportation services obtained from shipper surveys and interviews were also included in analyzing the choice of routes and transport modes. A discussion and analysis of the comparisons and findings is presented in Chapter V.

**Task 3: Evaluation of the competitive position of Louisiana ports in U.S. Gulf/Mexican Gulf coast trades.**

The institute evaluated, qualitatively, comparisons with other Gulf ports based upon on-site visits to other port facilities, discussions with shippers and freight forwarders, and interviews with successful vessel operators at ports involved in trade with Mexico. Quantitative assessments of competitive factors such as productivity in handling certain types of cargo and comparative port charges were taken from the recently completed work which the Institute performed for the Louisiana Statewide Intermodal Plan (July 1995). Results of both the qualitative and quantitative comparisons are presented in Chapter VI.

**Task 4: Recommendations for market opportunities, strategies, and infrastructure requirements.**

Chapter VII summarizes the institute's assessment of NAFTA-induced market opportunities and maritime transportation services having the greatest potential at the lowest cost and within the

shortest time frame for implementation and development by the Louisiana port and maritime community. Measures and strategies required to exploit these opportunities, particularly as they relate to vessel technologies, fleet availability, port access, potential routings, and marketing strategies, are also included. Infrastructure requirements at Louisiana ports necessary to attract and accommodate targeted maritime services as well as deficiencies uncovered are also highlighted. Financial and institutional requirements necessary for successful implementation (including resolution of deficiencies) are also presented including sources of investments if needed and suggested strategic alliances between involved parties, either public or private.

**Task 5: Organize and conduct follow-up workshop.**

The institute will assist in organizing and presenting the preliminary findings of the research at a workshop sponsored by the Ports Association of Louisiana and the National Ports and Waterways Institute. Targeted workshop participants will include Louisiana port and DOTD officials, shippers, terminal operators, representatives of water transportation service providers, international freight forwarders and brokers, and other parties impacted or interested in the research effort. Interested maritime operators from Mexico will also be invited. The workshop will present the results of Tasks 1 through 4 previously described and provide the forum for discussions related to the research findings and recommendations. Input received from workshop participants will be incorporated into the overall findings of the research effort.

*Component 2*

**Task 6: Port specific analysis.**

Tasks 1-4 completed as part of component 1 will have identified the most promising opportunities available to Louisiana's ports by port type and port range. Specific needs of individual ports can be addressed in accordance with the scope of work requested by these ports under a separate agreement.

**Significant Previous Research-Maritime System of the Americas Research Program**

The Maritime System of the Americas (MSA) refers to the waterway system that connects central and eastern portions of the United States and Canada to the central and eastern portions of

Mexico, the Caribbean countries, Central America, and the northern rim of South America. The waterway transportation system linking this multinational region encompasses the Gulf of Mexico, the Caribbean Sea, the Mississippi River, its navigable tributaries, and other rivers emptying into the Gulf (i.e. the Alabama/Tombigbee system), the Gulf Intracoastal Waterway, and, to the north, the St. Lawrence and Great Lakes water systems. Trade potential that could result from access to this extensive waterway system, particularly with the passage of the North American Free Trade Agreement (NAFTA), prompted the need for the MSA research program. An additional objective of the research was to identify ways to improve water transportation's relatively flat market share of NAFTA cargo movements over recent years.

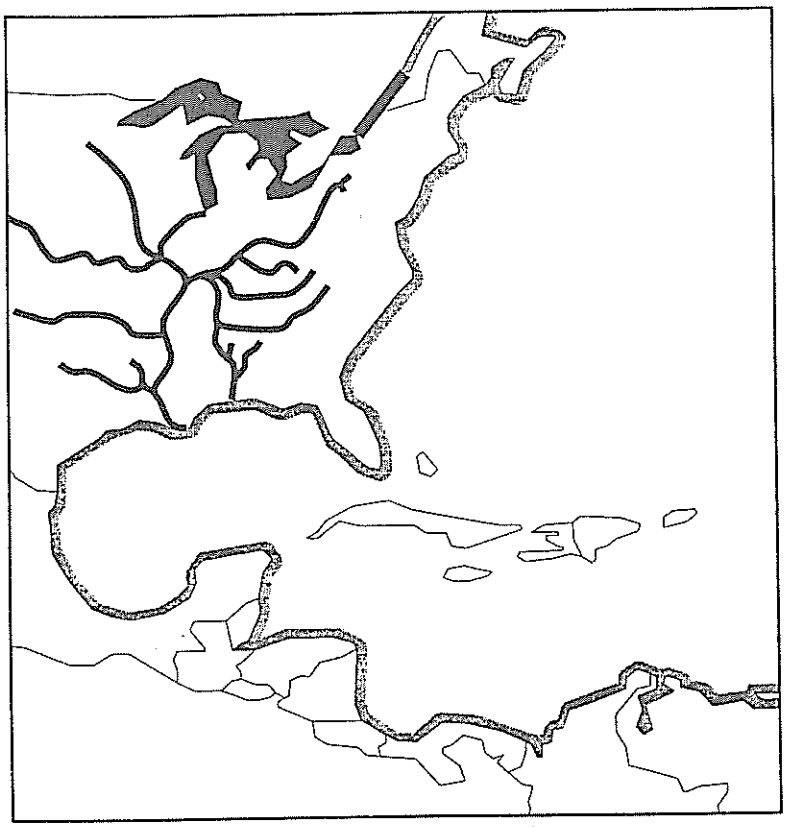


Figure 1. Maritime System of the Americas

The U.S. Department of Transportation-Maritime Administration has sponsored and funded this ongoing research through its National Maritime Enhancement Institute program. Louisiana State University's National Ports and Waterways Institute (NPWI) was selected to conduct the research effort in advance of the signing of the NAFTA agreement.

The focus of the research has been on operational, economic, and technological trends that can help to define the current and future market share potential for water transportation. Phase I of the research, completed in November 1993, examined the competitive use and introduction of river/ocean vessels and river barges that could safely navigate both inland waterways and ocean waters in direct service. Comparative transportation cost estimates supported by a computer based traffic allocation model were developed under phase I to evaluate market segments which could be captured by water transportation. Conclusions from phase I research indicated that a

specialized market exists for higher value general cargo and bulk cargo moving in small lots via river/ocean vessel and that this type of service offered the greatest potential savings for direct cargo movements between the lower to middle Mississippi River up to St. Louis and the central/southern Mexican Gulf coast ports.

Phases II and III, completed in October 1994, addressed the potential for conventional and short sea shipping as well as intermodal operations for the U.S. Gulf region. While the emphasis was primarily focused on cargo movements between the United States and Mexico, the general findings could be applied, with some modifications, to the entire NAFTA region. Conclusions from this portion of the research indicated that all-land transportation systems remained the dominant choice for general cargo movements between the U.S. and Mexico (i.e. water transportation was only able to record approximately a three percent market share of this volume). Trade growth within the NAFTA region, however, presents an opportunity for the increased use of water transportation in intermodal movements of cargos using short sea vessels/barges, conventional ocean vessels on transoceanic itineraries or in feeder operations, and for new types of services such as trailer ferry operations.

Phase IV of the research program, which is being finalized, looks at linkage to Canada with the Great Lakes, St. Lawrence Waterway, and implementation of new maritime systems in the Gulf and middle/southern portions of the MSA waterway system.

**Overview and Significance of NAFTA Trade for Louisiana**

The implementation of the North American Free Trade Agreement (NAFTA) on January 1, 1994, created a North American trading region extending from the Yukon in Canada to the Yucatan Peninsula of Mexico, thereby creating the largest common trade market on record. Following implementation, NAFTA trade in North America totaled $341 billion U.S. dollars during 1994.

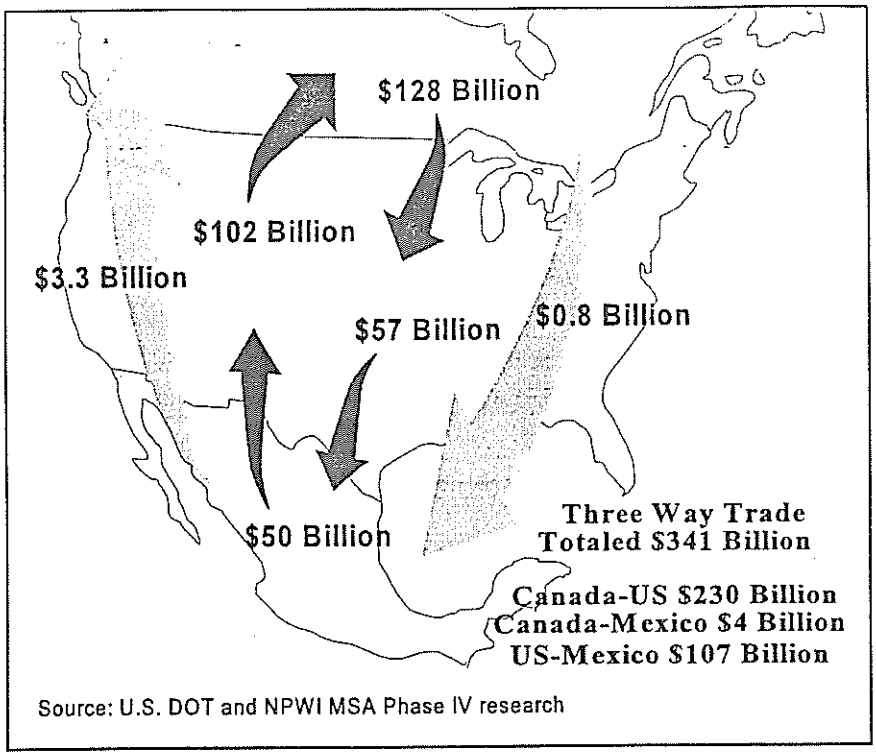
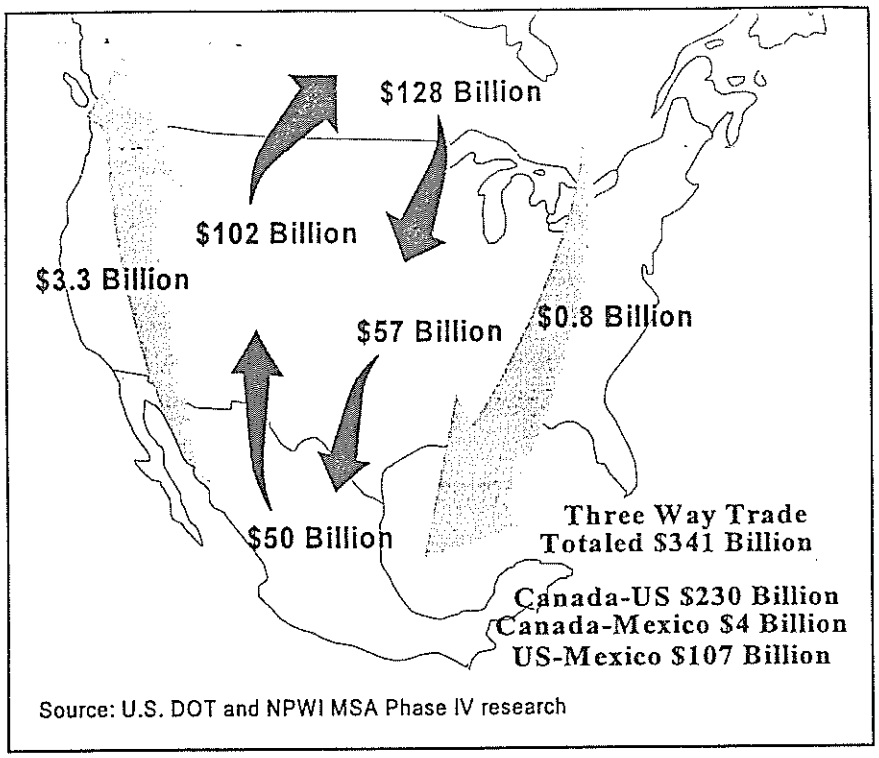



Figure 2. 1994 North American trade

In a recent U.S. state-by-state analysis of trade with Mexico during the period 1987-1994, forty-eight of the fifty U.S. states clearly benefited from the rapid growth of U.S.-Mexican trade during this period. Thirty-nine U.S. states more than doubled exports to Mexico between 1987 and 1994 and 25 states more than tripled shipments to the Mexican market during the same period.[1] In 1994, the state of Louisiana ranked 10th among all states in the value of exports to Mexico.

The U.S. states leading 1994 export activity with Mexico understandably included three of the four border states, Texas ($23.8 billion), California ($7.7 billion), and Arizona ($2.4 billion), with the rest of the top ten states located in the central and eastern portions of the U.S. : Illinois ($1.7 billion), Michigan ($1.5 billion), New York ($1.1 billion), Ohio ($983 million), Pennsylvania ($854 million), Florida ($844 million), and Louisiana ($753 million) during 1994.

[1]NAFTA Trade : Past, Present, and Future A Fifty State Analysis; Dean International Inc. (1996)

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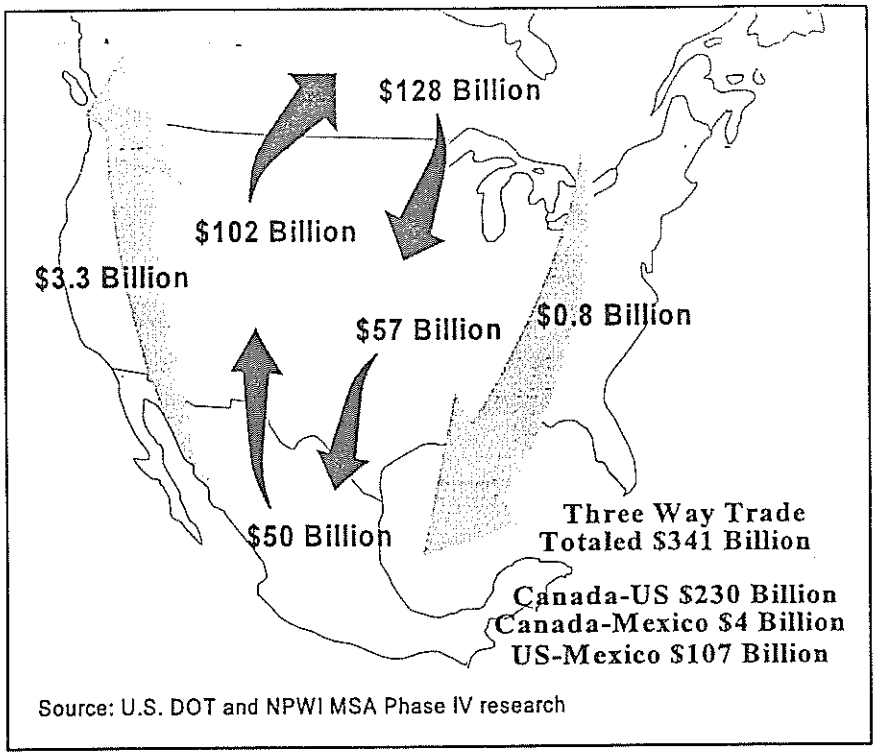


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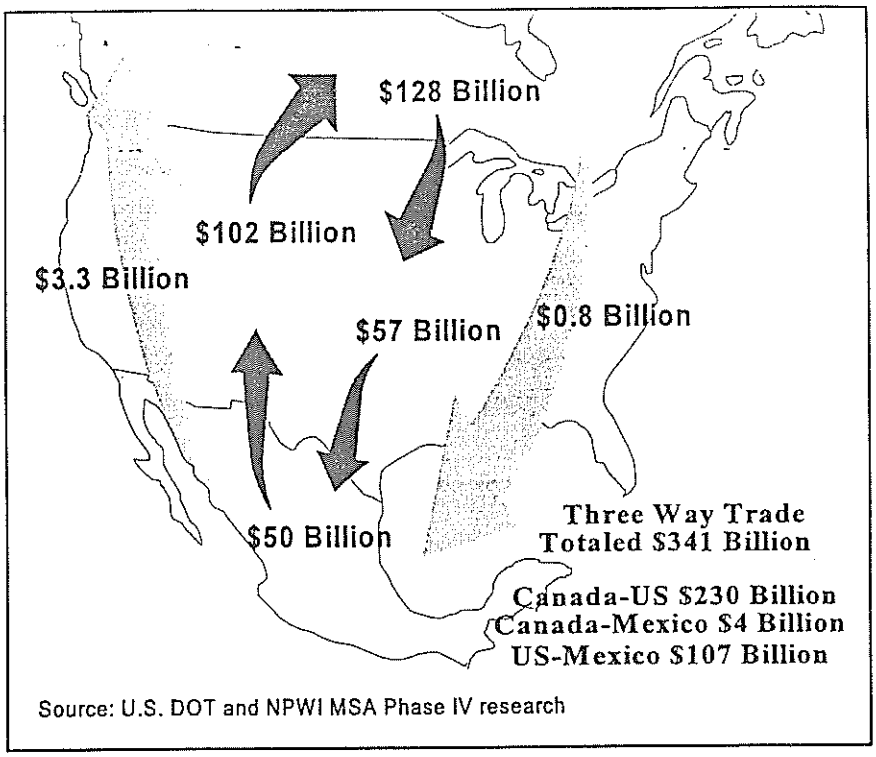


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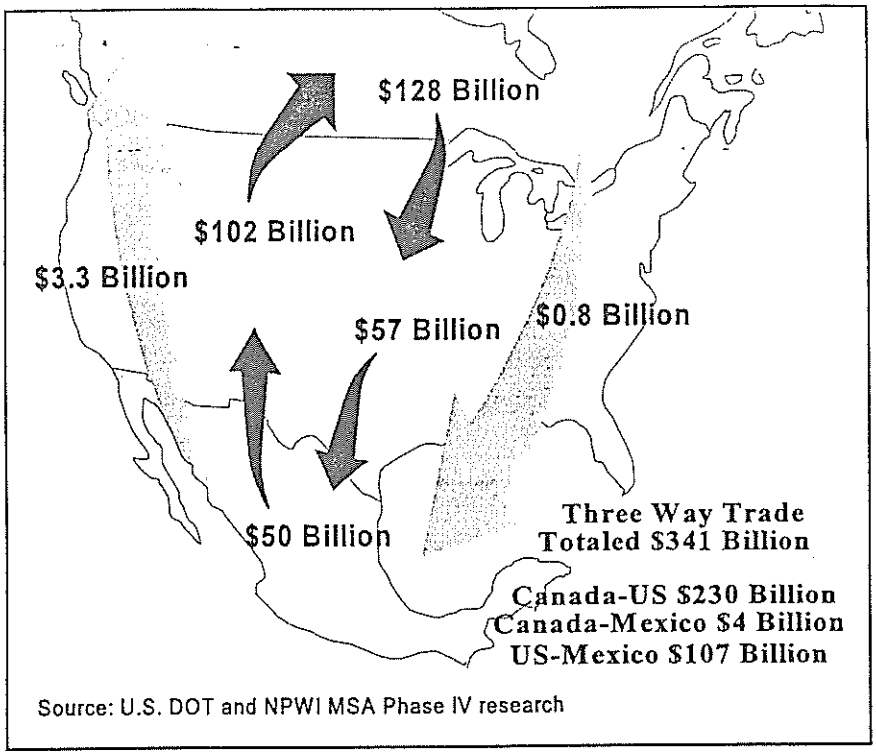


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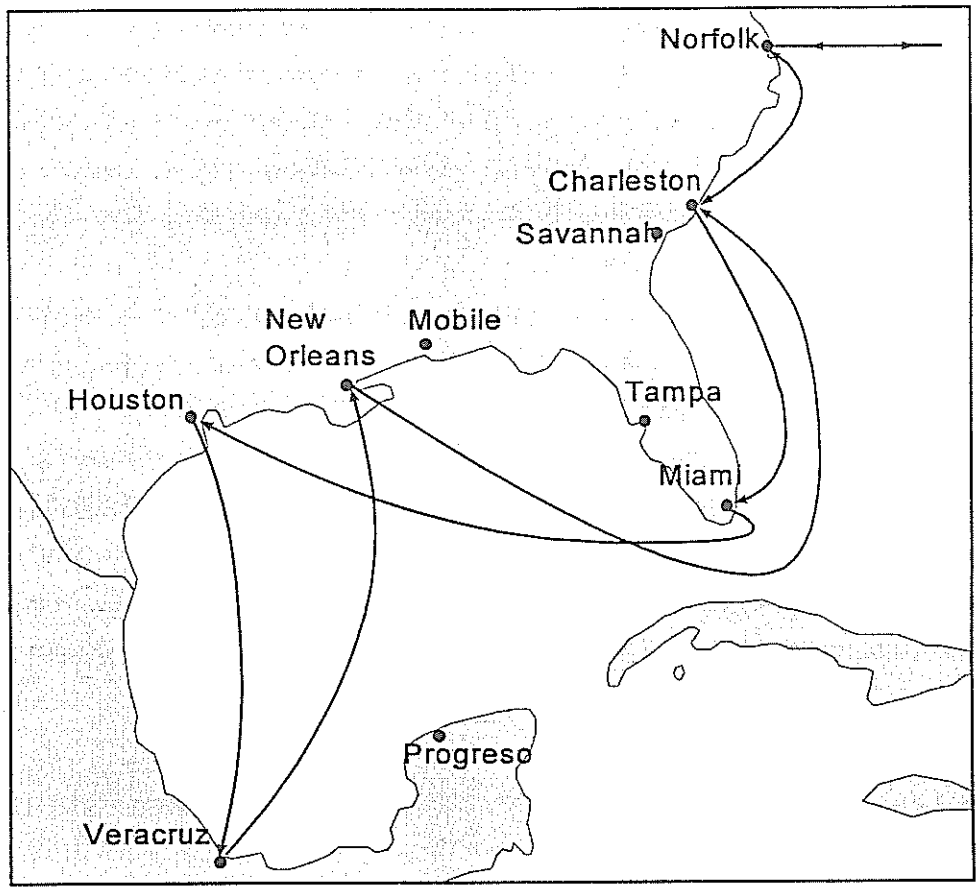


Figure 7. Lykes' North Atlantic service

Since deep sea vessels are large, they only call at major ports in the U.S. and Mexico where they are served by specialized container terminals and container gantry cranes. Typically, these services have a weekly or bi-monthly frequency; however, some of the South and Central American deep sea services call at Mexican ports monthly or only on inducement.

**Short Sea Coastal**

Short sea coastal services have relatively short port-to-port routes (generally less than 1,000 nautical miles) that may involve multi-port itineraries targeting smaller geographic regions such

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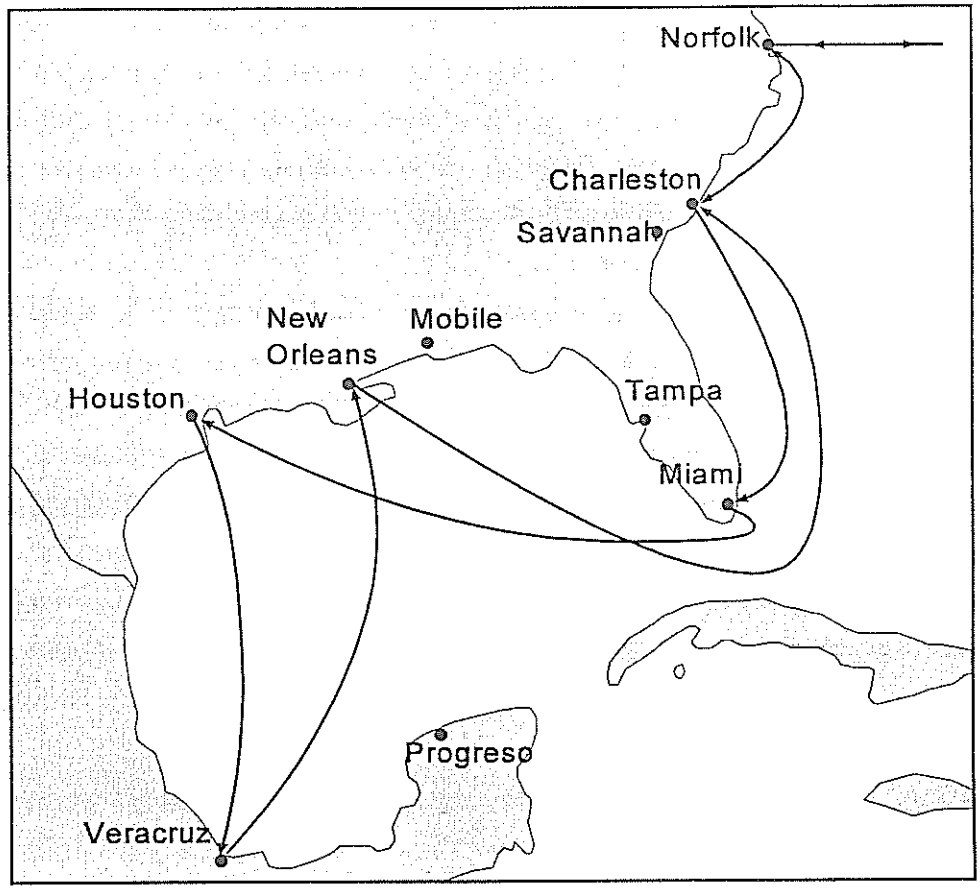

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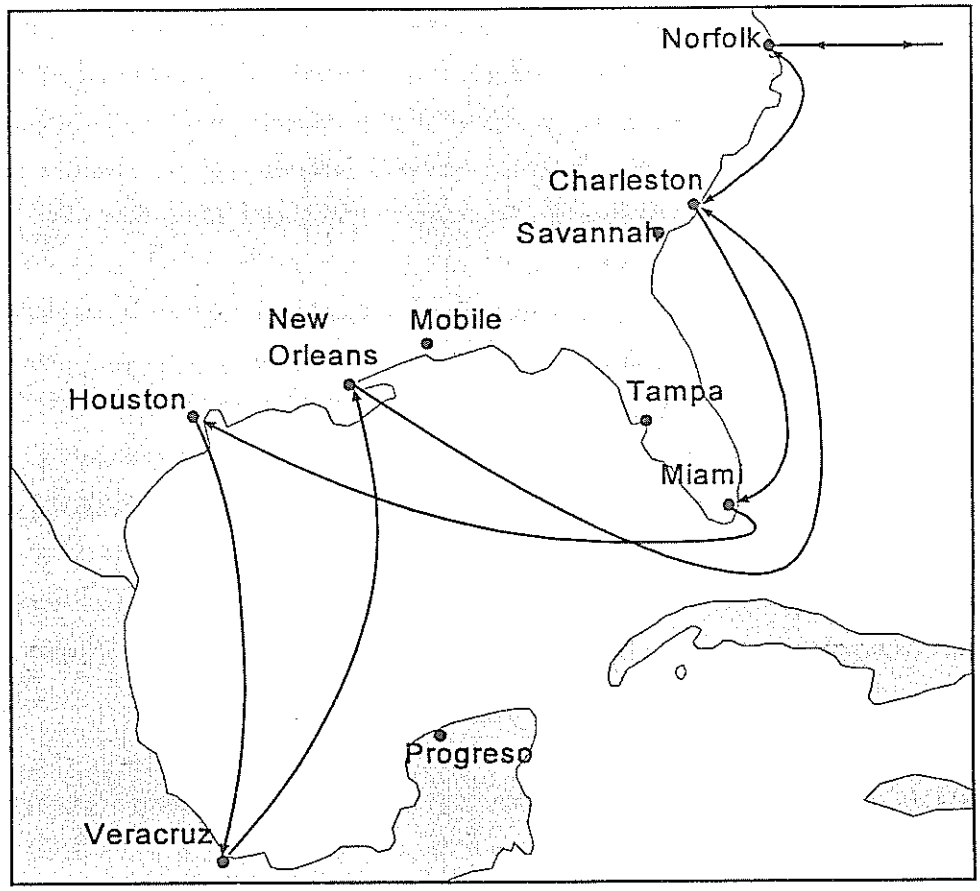

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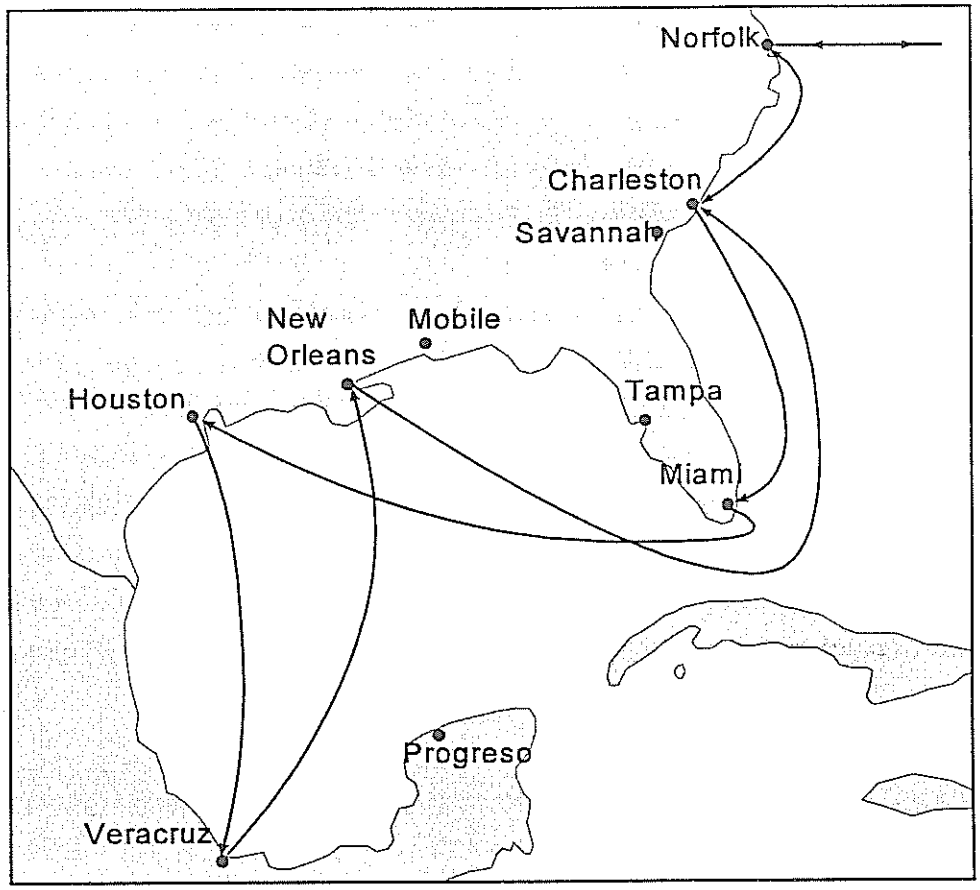


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The main drawback to most of these deep sea services is the multiport itineraries resulting in relatively long cargo travel and delivery times. *Figure 7* below presents a sample deep sea itinerary of Lykes Lines.

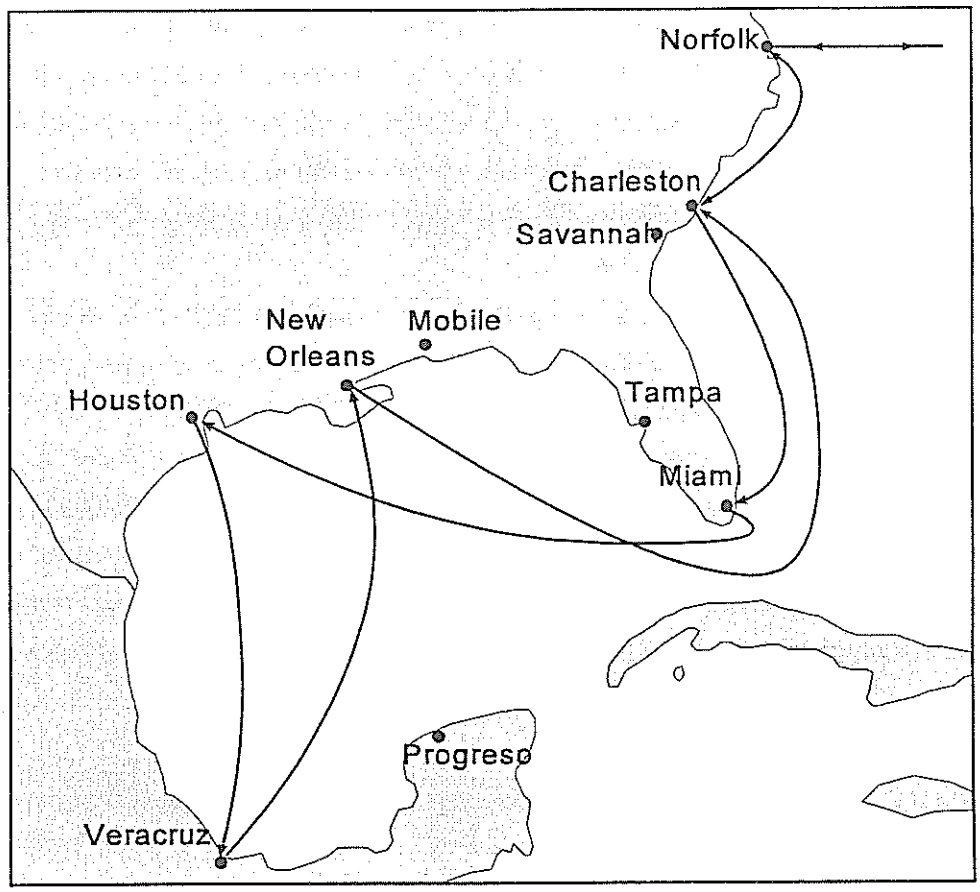


Figure 7. Lykes' North Atlantic service

Since deep sea vessels are large, they only call at major ports in the U.S. and Mexico where they are served by specialized container terminals and container gantry cranes. Typically, these services have a weekly or bi-monthly frequency; however, some of the South and Central American deep sea services call at Mexican ports monthly or only on inducement.

**Short Sea Coastal**

Short sea coastal services have relatively short port-to-port routes (generally less than 1,000 nautical miles) that may involve multi-port itineraries targeting smaller geographic regions such

as the Gulf Coast of Mexico. The amount of cargo generated at each port of call is relatively small, with hinterland markets limited to the port of call and generally a radius region of between 100-150 miles from the port of call. Coastal lines provide direct services that are not part of other longer voyages/itineraries. These carriers are common at smaller ports and typically utilize ships' gear for loading/unloading of cargos. Lines such as Linea Peninsular have targeted agricultural commodities, forest products, and containerized cargos going to growing regions of Mexico, such as the Yucatan Peninsula, that are not currently well served by land transportation. Other coastal services such as Thompson Shipping, Crowley/American Transport, and Transnave have added smaller Mexican ports such as Tampico and Tuxpan to their itineraries.

The limited size of most coastal operators generally prevents them from offering coordinated intermodal operations that would allow them to significantly expand their cargo and market base. Despite the limited market area potential for individual short-sea services, localized markets such as Houston, New Orleans, or Miami can be quite large as well as growing regions of Mexico like Veracruz. General cargos such as steel, forest and paper products, grains, chemicals (industrial and agricultural), fertilizers, plastic resins, vegetable oils, petroleum products, industrial machinery, and other dry bulk palletized cargos could all be potentially targeted short sea cargos currently moving between Mexico and Louisiana by rail or truck.[5] *Figure 8* highlights some typical short sea coastal routings.

[5]U.S. Department of Commerce NAFTA Transborder Surface Data tapes analyzed by NPWI August, 1994 through July, 1995

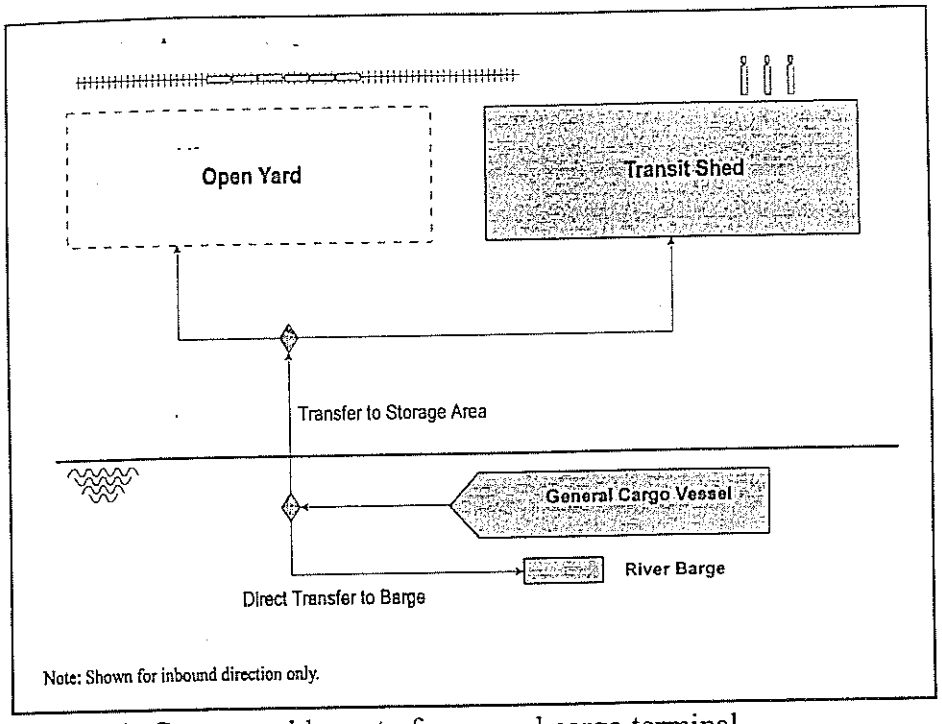


Figure 13. Conceptual layout of a general cargo terminal

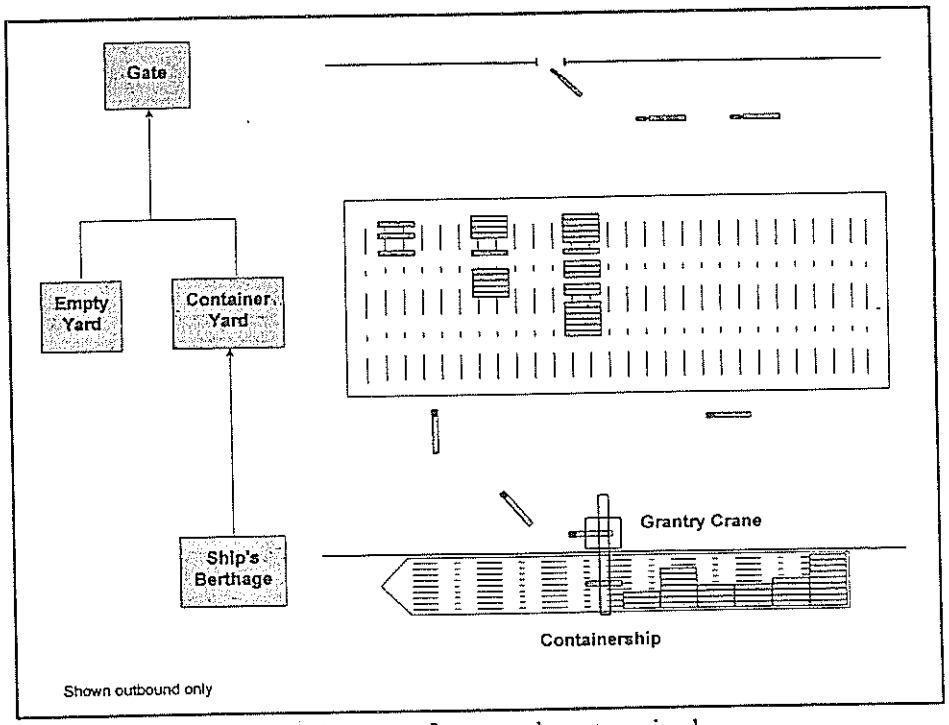


Figure 14. Conceptual layout of a container terminal

# TABLE 3. VARIOUS SHIPPING ACTIVITIES AND DOCUMENTATION FOR IMPORTS

## Steamship Company

1. Notifies consignees two days prior to ship's arrival.
2. Provides freight release to terminal operator.

## Broker

3. Obtains customs release, freight release, Department of Agriculture clearances, etc., before contacting motor carrier.
4. Forwards to motor carrier an original of the Domestic Bill of Lading and an Original Delivery Order, which authorizes pickup of import cargo.
5. Checks Bill of Lading for completeness: number of packages, description of cargo, marks and numbers, inland destination, gross weights of each commodity shipped, consignee's name, address contact, phone & fax number.
6. Checks Delivery Order for completeness: forwarder's name, shipper's name, ultimate consignee's name, motor carrier making pickup, vessel arrival date, voyage number, ocean bill of lading number, pier number and location, number of packages, description of goods, gross weights, legible signatures, container number.
7. Arranges payment to terminal operator for any outstanding charges.

## Motor Carrier

8. Secures an equipment interchange agreement with steamship company.
9. Ascertains expiration of free time and availability of cargo for pickup before dispatching drive to pier.
10. Provides driver with original and copy of delivery order before departure to pier.
11. Contacts terminal operator to make appointment, if required, at least 24 hours before pickup.
12. Checks Bill of Lading and Delivery Order for completeness, as above.
13. Dispatches truck to the pier.

## Terminal Operator

14. Issues pass to drivers at gatehouse.
15. Checks Delivery Order for completeness and legibility, as above.
16. Verifies motor carrier's credit rating for loading charges.
17. Makes arrangements for payment of any outstanding charges.
18. Directs driver to pier customs office.

## Customs

19. Verifies drive's papers against prelodged customs permits.
20. Releases Cargo.

## Terminal Operator

21. Calls driver for loading.
22. Assigns checker to verify loading at a designated location.

## Customs

23. Examines cargo and authorizes release of cargo.

## Terminal Operator

24. Loads cargo onto vehicle with pier personnel. Exceptions are noted by checker.
25. Retains Original Delivery Order.

## Driver

26. Supervises loading of vehicle.
27. Signs tally and loading ticket. Exceptions and shortages noted.
28. Reports back to delivery office, if required.
29. Retains copy of Delivery Order.
30. Surrenders gate pass at gatehouse.

## Motor Carrier

31. Advises broker of completion of cargo pickup.

Source: Gerhardt Muller, Intermodal Freight Transportation, 3rd Edition, Eno Transportation, Inc., 1995.

## TABLE 4. VARIOUS SHIPPING ACTIVITIES AND DOCUMENTATION FOR EXPORTS

### Shipper

1. Prepares Domestic Bill of Lading for movement of cargo to pier, and sends copy to his forwarder at the port of loading, along with packing list.
2. Checks Bills of Lading, number of packages marks, and description of the cargos' foreign destination.
3. Marks cargo plainly, to show: gross and net weights, cubic measurement, foreign destination, identification marks, country of origin.

### Motor Carrier

4. Secures an equipment interchange agreement with ocean carrier.
5. Accepts cargo for transit to the port of loading.
6. Advises freight forwarder or shipper's local representative of cargo's arrival in the port.
7. Obtains the following information from forwarder or representative: name of vessel, sailing date, pier number and location, location of any special permits needed to clear hazardous or oversize cargo for acceptance by ocean terminal, container number.
8. Obtains dock Receipt from forwarder or other representative to accompany cargo.
9. Contacts terminal operator to make appointment for special handling or equipment if required, at least 24 hours before delivery.

### Forwarder

10. Provides Dock receipt and special permits, if any, to delivering motor carrier.
11. Checks Dock Receipt for completeness: name of shipper, name of vessel, ports of loading and discharge, number and type of packages, description of cargo, gross weight, dimensions, and cubic measurement of each package marks and numbers shipper's export declaration number, if required, container number.

### Driver

12. Reports to terminal operator's receiving clerk.

### Terminal Operator

13. Issues pass to driver at gatehouse to enter the terminal.
14. Checks driver's papers: Dock Receipt, permits.
15. Calls driver for unloading.
16. Directs truck to unloading door and verifies cargo count and condition.

### Driver

17. Assists terminal personnel or unloads cargo.
18. Obtains signed copy of Dock Receipt.

### Terminal Operator

19. Retains original of Dock Receipt.

### Driver

20. Surrenders gate pass at gatehouse.

### Terminal Operator

21. Forwards Dock Receipt to steamship company.

### Steamship Company

22. Issues Ocean Bill of Lading to shipper or its agent.

Source: Gerhardt Muller, Intermodal Freight Transportation, 3rd Edition, Eno Transportation, Inc., 1995.

### Physical and Operational Parameters of Marine Terminals

Table 5 presents a broad framework for describing physical and operational parameters of marine terminals required for the operation of targeted vessel services. General cargo terminals capable of handling break-bulk and neo-bulk cargo, containerized cargo or refrigerated units, or combination of those commodities meet the requirements. Typically, each terminal is comprised of four basic elements: access channel, docking facility, storage yards and warehouses, and land transportation gates. Physical parameters and capacity requirements of these basic units are strictly dictated by the market potential in terms of cargo that could be generated at these terminals. For example, for intermodal transfer of cargo on dock, smaller terminals may rely on ships gear or hired mobile cranes. However, larger container terminals usually have aprons equipped with gantry cranes and open yards for container storage arranged on chassis or by stacking.

## Port Infrastructure Needs for Vessel Services

### Basic Port Models for Maritime Services

Previous research on distinct types of maritime services relevant to NAFTA trade for Louisiana ports has suggested that certain facilities would be required to accommodate these targeted services. There appear to be two broad types of terminal categories:

- Terminal facilities for specialized cargo handling, such as refrigerated vessel services for perishable cargos like fruits and vegetables, and "water bridge" trailer ferry service

- Terminal facilities for accommodation of short sea maritime services (both coastal and inland waterway or river/ocean).

TABLE 5. SELECTED PHYSICAL AND OPERATIONAL PARAMETERS FOR MARINE TERMINAL FACILITIES

| Facility Type | Physical/ Operational Parameters |
|---|---|
| Terminal - General | Terminal type (including its functional type); Total acres and number of berths. |
| Water and Land Access | Water: Length of access channel and turning basin radii; Average depth in access channel<br>Rail: Total length of working track; number of tracks; Maximum continuous single track length; Railway yard capacity (cars)<br>Highway: Highway access connections; Highway Classification (Interstate, State, and Local);<br>Congestion measures and proximity to metropolitan areas. |
| Vessels | Typical ship size (DWT, LOA, Draft); Typical ship load (tons); Number of ships served per year. |
| Docking | Water depth (maximum draft); total dock length; Number of ship/apron transfer units;<br>Type of ship/apron transfer unit (i.e. longshoremen gangs, ships gear, cranes, gantry cranes,<br>Conveyor belts, hose connections, loading arms, ship loaders/ unloaders, etc..);<br>Practical transfer rate per unit (tons/hour, lifts/hour) and time to load/unload ship;<br>Time to transfer shipload to/from storage, and to/from Truck/Rail; Annual throughput and estimated capacity |
| Storage Yard / Warehouses | Storage yard area and auxiliary area; Yard total storage capacity (tons); Number and type of apron to storage transfer units (i.e. conveyors, pipes, forklifts, yard tractors, straddle carriers, etc.).<br>Transfer rate of apron to storage transfer units; Typical storage duration of cargo (days); Throughput Density (tons/acre/year). |
| Intermodal Transfer (On-Dock) | Number and type of storage or inland transport transfer units (i.e. Truck loading dock spaces, transtainer, car loader, dump truck, etc..); Transfer rate of storage/ inland transport transfer units; Number of inland transport unit processors; Processing rate for inland transport units. |
| Inland Transport | Number& Type of transportation units (i.e. trucks, trailer chassis, rail cars, tank trucks); Transfer rate per unit (tons/hour)<br>Time to Load/ Unload a transport unit (hours, min); Transportation unit maximum load and typical daily cargo (tons). |
| Inland Transfer Processing | Peak Units per day; Gate processing time (min.); Gate processing capability (units/hr);<br>Number of processors or lanes and transport queue space. |
| Land Egress, Terminal Expansion, and Impediments | Current Expansion projects and completion date; Available land and impediments for future expansion;<br>Planned expansions and expected dates. |

Source: Based on U.S. Border Crossings with Canada and Mexico Port Facilities Inventory and Constraints, U.S. DOT, MARAD, September 1993.

The proposed port models present, in general, minimum requirements for physical and operational parameters although, in some cases, the model includes desirable components as well as a range of acceptable physical/infrastructural criteria for future planning purposes. Each maritime service with related physical/operational parameters is described below, and a summary matrix is included in a separate table.

**Specialized Cargo Facilities**

Two specialized types of NAFTA related cargo movements have been identified as potential opportunities for Louisiana. These include: (1) a water bridge point-to-point type of maritime service concentrating on the handling of truck trailers and general merchandise moving between the United States and Mexico from geographic locations generally east of the Mississippi river, and (2) a refrigerated/reefer vessel service for the handling of fruits, vegetables, and other perishable commodities that would supply not only localized markets, but also would use Louisiana as an intermodal distribution point for supply to southeastern and midwestern U.S. consumption centers/markets northbound and Mexican and Latin American markets southbound.

*Water Bridge Trailer Ferry*- Previous NAFTA cargo movement research by NPWI has suggested that existing maritime systems serving U.S./Mexican trade including conventional deep sea, feeder, and existing coastal systems will grow as the general level of NAFTA trade expands, but these maritime services will not significantly advance water transportation's market share of the general cargo moved between the U.S. and Mexico. Existing maritime systems are competitive with all-land systems only in the coastal zone for cargo originating/terminating at the ports of call of these services. In order to expand water transportation's market share of NAFTA trade, a more "land-like" maritime service was proposed utilizing Roll-on/Roll-off (RoRo) type vessels with fast travel speeds (i.e. 22-24 knots) and high frequency of departure (minimum of every two days). Each vessel should be able to handle approximately 120-150 trailers per trip or more. Annual volumes of between 45,000-50,000 trailer trips per year were projected for the service to remain financially viable[9].

[9]Maritime System of the Americas Study : Intermodal Operation of Ocean Going Vessels and the Feasibility of Short Sea Vessel Operation (October, 1994). Research conducted by NPWI for U.S. DOT, Maritime Administration.

The following requirements have been identified for the implementation of such a service:

- Facility type--general cargo
- Location--deep water marginal wharf with relatively quick access to open sea
- Channel depth--25'-30' with minimum depth alongside berth of 25'
- Storage/covered--five acres (mainly for customs inspection)
- Storage/open--10 acres minimum beyond berth apron area
- Approximate docking/berth length--450' marginal berth
- Land access--intermodal yard on-dock preferable, within two-five miles from port otherwise
- Shore-side equipment--top loader/unloader, yard cranes
- Other land-side improvements--roll-on/roll-off ramp at selected berth facility, maintenance shed of approximately 1500 sq.ft., lighting and utilities
- Inland transport--good highway and direct inland rail connections
- Intermodal transfer rate-- approximately 140-150 trailers on/off within four/five hours
- Throughput rate-- 50/60 trailers per hour on/off

*Refrigerated Vessel / Reefer Service-* The passage of NAFTA and the sharp devaluation of the peso since 1994 has opened up new export opportunities for Mexican producers of perishable foods (fruits and vegetables). Additionally, the fresh poultry industry and other agricultural produces in Louisiana could also benefit from such a regular maritime service to/from Mexico and Latin America. Currently, most of the Mexican perishable goods exported to the U.S. move

via truck and to the European markets via air or ocean container services. The cost of these transport services is very high, particularly for distances greater than 1200 miles.[10]

Countries with relatively large perishable exports to the United States, such as Chile, have developed a refrigerated and perishable product distribution system based on the use of refrigerated vessels and the use of pallets as the principle unit of transport. This type of maritime system has been more cost effective in terms of much lower costs per ton mile than all land distribution systems or other refrigerated container intermodal systems. A similar type of specialized maritime service would be recommended for Louisiana in order to capture the growing NAFTA perishables market.

The Port of New Orleans has proposed a new "Harvest Cargo" facility that could handle melons and citrus fruit imported from the central and southeastern states of Mexico (Tamaulipas, Veracruz, Hidalgo Tobasco, Oaxaca, Campeche, Chiapas, Quintana Roo, and the Yucatan), shipped by vessel directly to the Port of New Orleans for further distribution to the major North American markets. This facility would also handle frozen beef and fish. Southbound movements of fresh poultry and other agricultural products from Louisiana to Mexico and Latin America that currently move through other states (i.e. Mississippi) because of superior handling and distribution facilities might also be captured.

The following requirements have been identified as basic components to handle palletized vessel systems:

- Facility type-- refrigerated and perishable cargos (palletized)
- Location-- deep water marginal wharf with on-dock cold storage facilities
- Channel depth-- 25'-30' with minimum depth along side berth of 25'

[10]Fruit Import Markets, An Assessment of Trends and Competitive Advantages for the Ports of Philadelphia, R.A. Lawler, Delaware River Port Authority, 1995.

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- Shore-side equipment-- mobile cranes five-ten ton lifting capacity minimum with 50' boom and outreach, forklifts, conveyor systems (fixed or mobile) for bulk handling

- Other land side improvements-- utilities, lighting, water, and sewage disposal systems

- Inland transport-- contiguous highway and rail connections

- Intermodal transfer rate-- varies by commodity but realistic range of between 30-60 tons per hour per crane for general and palletized cargos, 200-300 tons per hour for bulk (conveyor systems)

- Throughput rate-- generally with two crane facility 60-120 tons per hour for general and palletized cargos, as high as 350-400 tons per hour for bulk (spout/unbagged)

**River/Ocean Service**

The terminal requirements for river/ocean vessel services are typically less than those required for the larger coastal short sea services. Summarized below are the identified requirements necessary for the processing and handling of such services:

- Facility type-- general cargo and minor bulk cargo movements (i.e. less than 3,000 tons)

- Location-- shallow draft inland river port facility generally less than 100 miles from targeted shippers or plant locations

- Channel depth-- 9' to 15' controlling channel depth with minimum depth alongside berth of 9' to load 200-400 tons of cargo; depths lower than 15' require partial loading in back haul direction

- Storage/covered-- 10,000 sq.ft., includes customs inspection area

- Storage/open-- two-three acres beyond berth apron area

- Shore-side equipment-- mobile cranes five-ten ton lifting capacity minimum with 50' boom and outreach, forklifts, conveyor systems (fixed or mobile) for bulk handling

- Other land side improvements-- utilities, lighting, water, and sewage disposal systems

- Inland transport-- contiguous highway and rail connections

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- Storage/covered-- 10,000 sq.ft., includes customs inspection area

- Storage/open-- two-three acres beyond berth apron area

- Approximate docking/berth length-- 250' with 300' preferred to handle most R/O type vessels

- Land access-- intermodal rail connections desirable, highway access necessary within ten miles

- Shore-side equipment-- mobile cranes (five-ten ton lifting capacity), forklifts, conveyor or clamshell systems for bulk commodities

- Other land side improvements-- utilities, lighting, water, and sewage disposal systems

- Inland transport-- local highway and inland rail connections

- Intermodal transfer rate-- 30-50 tons per hour for general cargos, 100-150 tons per hour for bulk

- Throughput rate-- typical vessel call of 400 tons on/off vessel can be handled in eight hours with ship's gear or the use of shore side mobile crane equipment

**Summary of Requirements for Targeted NAFTA Maritime Services**

The summary matrix of minimum port requirements (both shore side and waterside) for the handling of each type of potential maritime service and expected intermodal transfer and throughput rates for each type of service is presented in Table 6.

**Louisiana Port Profile Descriptions**

The feasibility of operating a vessel service at any port is subject to physical, operational, and institutional constraints. In the previous two sections, basic port activities were examined that were associated with operating vessel services and further discussed physical and operational parameters required to support individual vessel services. This section will examine and develop port profiles for public ports in the state and identify what vessel services are feasible at individual ports.

- Approximate docking/berth length-- 250' with 300' preferred to handle most R/O type vessels

- Land access-- intermodal rail connections desirable, highway access necessary within ten miles

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- Other land side improvements-- utilities, lighting, water, and sewage disposal systems

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# TABLE 6. PORT REQUIREMENTS FOR TARGETED NAFTA MARITIME SERVICES

| REQUIREMENTS | MARITIME SERVICE | | | |
|---|---|---|---|---|
| | WaterBridge Trailer Ferry | Refrigerated Vessel / Reefer | Coastal Short Sea | River / Ocean |
| 1. Facility Type | General cargo terminal | Refrigerated/ Facility (palletized) | General and bulk cargos terminal | Gen. cargo and minor bulk terminal (less than 3,000 tons per vessel) |
| 2. Location | Deep water marginal wharf with quick access to open sea | Deep water marginal wharf with on-dock cold storage | Marginal/finger pier, 100-200 miles from shipment O/D | Shallow draft inland port, 100 mi. from shipment O/D |
| 3. Channel Depth | 25'-30' with minimum depth alongside berth of 25' | 25'-30' with minimum depth alongside berth of 25' | 15'-28', depending on vessel type | 9'-15' channel depth, 9' alongside for 200-400 tons of cargo |
| 4. Covered Storage | 0.5 acres (mainly for customs) | 20,000 sq ft minimum (including inspection areas) | 10,000 sq ft min., preferable 20,000 sq ft for typical oper. | 10,000 sq ft (including customs inspection area) |
| 5. Open Storage | 10 acres minimum beyond berth apron area | 3-5 acres for trucks and handling equipment | 4-5 acres | 2-3 acres beyond berth apron area |
| 6. Docking/Berth Length | 450' marginal berth | 400' for side-ramp unloading (less if stern ramp unloaded) | 300'-350' (marginal wharf most desirable) | 250' min, 300' preferred to handle most R/O vessels |
| 7. Land Access | Intermodal yard on-dock preferable, or within 2-5 miles | Good highway connections within 10 mi Interstate system | Intermodal yard (rail) desirable; Hwy. access mandatory | Hwy. access within 10 miles, intermodal connect. desirable |
| 8. Shore-side Equipment | Top loader/unloader Yard cranes | Heavy-duty forklifts | Mobile cranes, forklifts, conveyor systems | Mobile cranes, forklifts, conveyor/clamshell systems |
| 9. Landside Improvements | Ro/Ro ramp, maintenance shed (1500 sq ft), utilities | Maintenance and fumigation facilities (2,000-,2500 sq ft) | Utilities, lighting, water and sewage disposal systems | Utilities, lighting, water and sewage disposal systems |
| 10. Inland Transport | Good highway and direct inland rail connections | See 7. | Contiguous highway and rail connections | Local Hwy. and inland rail connections |
| 11. Intermodal Transfer Rate | 140-150 trailers on/off within 4/5 hours | 50-80 tons per hour (1pallet weights approx. 1 ton) | 30-60 tph-crane gen./pallet. cargos; 200-300 tph for bulk | 30-50 tph for gen. cargo, 100-150 tph for bulk |
| 12. Throughput Rate | 50/60 trailers per hour on/off | 100-160 tons per hour (two cranes per vessel, ship's gear) | 60-120 tph (2 cranes) gen./ pallet.cargo;350-400 tph bulk | Typical vessel call: 400 tons on/off handled in 8 hours |

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| 12. Throughput Rate | 50/60 trailers per hour on/off | 100-160 tons per hour (two cranes per vessel, ship's gear) | 60-120 tph (2 cranes) gen./ pallet.cargo;350-400 tph bulk | Typical vessel call: 400 tons on/off handled in 8 hours |

In terms of channel access and other physical infrastructure, most of the state's ports -- deep and shallow draft -- can accommodate River/Ocean vessels. However, operational constraints such as longer voyage times, lack of regular cargo supply, or smaller shipment sizes may result in these services being economically infeasible at some locations. For short sea coastal vessel services some shallow draft ports may not qualify because of physical constraints such as channel depth, remote and deep inland locations, or lack of a cargo base to serve such vessels. Based on these assumptions, port profiles were developed for all public ports in the state with a ship dock suitable for handling general cargo. The main ship channel for all the ports considered is maintained by the U.S. Army Corps of Engineers at minimum guaranteed depths. These include ports located on the Mississippi River, Atchafalaya River, Intracoastal Waterway, Red River, Lake Charles on the Calcasieu Ship Channel and Greater Lafourche Port on the Gulf. The ports on the Red River are in the initial stages of development and it may take a longer period to establish port facilities and vessel services.

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Figure 15. Shallow- and deep-draft public ports in Louisiana selected for this study

has handled petroleum products, chemicals, steel, pipe, forest products, grain, food products, machinery and miscellaneous general commodities.

To accommodate midstream operations, the port has positioned four anchor buoys located opposite its docks in the Mississippi River for anchoring vessels engaged in midstream transfer of cargo between barges and ships. While export coal is the principal commodity at handled midstream, other dry bulk commodities such as salt, coke, steel, ores, etc., have also found this an economical way to do business.

The general cargo docks are all equipped with double marginal tracks and wide aprons to facilitate direct transfer between ships, railcars, and trucks. The Port operates 17 miles of railroad track serving docks, elevator, warehouses, and bulk terminals. Shipside capacity is a total of 96 cars down from a 250-car yard storage capacity. Four mobile cranes of up to 150 tons and one mobile crane with a 250-ton capacity are available for the handling of every type of cargo.

In addition to covered shipside shed space, the port has approximately 50,000 square feet of open shipside storage area on the wharves and 50 acres or more of off-dock areas which can be utilized for open-storage and project cargo. A domestic barge terminal with a planned 21,600 square foot warehouse located on a slack water canal off the Gulf Intracoastal Waterway can accommodate the loading and unloading of barges.

The Port of Greater Baton Rouge is served by three major truckline railroads including the Illinois Central Railroad, Kansas City Southern Lines, and the Union Pacific System. While all of these railroads effectively serve the port, only the Union Pacific System actually switches railcars to and from the port itself. This is accommodated at no extra cost to the shipping public under terms of established reciprocal switching agreements. From the standpoint of port rail capabilities, the following facilities are available for use by shippers: 17 miles of rail track within the port, shipside capacity of 96 cars, 40-foot apron and double marginal tracks at all docks, double depressed tracks on all docks for loading and unloading cars at door height, and a 250-car storage capacity. The Union Pacific switches cars once a day at the port and interchanges port cars once a day with the ICR/KCS. The major highways which serve the port are interstate Highways 10 (approximately one mile from the port), 12, and 55.

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rail docks, scheduled for completion in mid-1996. Additional warehouse storage is scheduled for construction over the next several years.

Auxiliary equipment available at the terminal includes cranes, dozers, front-end loaders and all other equipment as needed. The facility is under the continuous support of the port's 24-hour waterborne emergency response unit, which operates a 1200 horsepower fire boat, an 800-horse-power fast response/ rescue boat, and two 600-horsepower patrol vessels.

The Bulk Handling Dock at Globalplex measures 570-by-44 feet and is also equipped with upstream and downstream mooring buoys which allow for dockage of Panamax-class vessels. Bulk handling equipment at the terminal includes a 1,200 tons/hour ship loader, a Manitowoc 4600 swing crane with hopper, an upgraded bulk commodities conveyor system capable of running up to 2500 tons/hour, and an 800 tons per hour screw-type unloader scheduled for completion in early 1997.

*Potential Vessel Services and Constraints* - The layout of the dock, separated from the terminal by the levee, will impose constraints on transfer of cargo between the dock and terminal. However, the terminal is strategically located on the Mississippi River and well placed with regard to rail access and highway connections. Market development remains a major challenge.

**Port of New Orleans**

*Physical and Operational Parameters* - The Port of New Orleans has historically been one of the primary load-center ports in the country. The port's strategically advantageous position near the mouth of the Mississippi River, at the river's junction with the GIWW, has enabled New Orleans to serve as the connecting point for deep-sea and inland system traffic.

The Port of New Orleans is located approximately between miles 81.5 AHP and 114.9 AHP on the Mississippi River. It has 334 piers, wharves, and docks located within its jurisdiction (an area of 22 miles spread along the Mississippi River, the Industrial Canal and the Mississippi River Gulf Outlet). The port offers 22 million square feet of cargo handling area within its various facilities.

Primary import commodities at the Port in order of tonnage are iron and steel, coffee, forest products, natural rubber, cordage and twine, refrigerated cargo, synthetic rubber, and construction and building equipment. Major export commodities in order of tonnage are forest products, iron and steel, bagged grains and flour products, sugar, soybeans and soybean products, vegetable oils, fabric (includes raw cotton), polyethylene, melamine, urea resins, and synthetic rubber.

The Port of New Orleans has upgraded its infrastructure by investing $215 million during the last five years. Such projects provide for the construction of modern, specialized port facilities and the modification of existing facilities to provide expanded berthing and cargo storage capacity. The projects are divided into six sections:

**Mississippi River Facilities** - includes the construction of 3,170 linear feet of heavy duty bulkhead and 13 acres of marshaling areas between the Nashville Avenue and Napoleon Avenue wharves (resulting in 10,000 continuous linear feet of bulkhead along the river); replacement of the front apron of Napoleon Avenue Wharf "C"; construction of a 767 linear foot open wharf, in front of the Milan Street Wharf; construction of approximately 30,000 square feet of wharf deck upstream of the Milan Street Wharf; a 50-foot wide connection between the Harmony Street and Louisiana Avenue wharves; a study of the Tchoupitoulas Corridor; the demolition of the existing transit shed on Louisiana Avenue Wharf "F" and construction of a larger shed; concrete paving of 2.8 acres of upland area connected to Louisiana Avenue Wharf "F"; and railroad track improvements.

**France Road Terminal** - includes the construction of a flood wall to protect against terminal flooding; modifications and refurbishing to meet tenant requirements at Berths one and four; paving to those areas at Berths five & six that have not been surfaced due to settlement in the area; site preparations at port property adjacent to the France Road Terminal; construction of an intermodal terminal for transfer of container carrying rail cars to the France Road Terminal; and the construction of a guarded entrance to the terminal.

**Jourdan Road Terminal** - includes the installation of steel sheet pile breasting dolphins to permit berthing for Ro/Ro vessels; and modifications at the terminal to meet tenant requirements.

**Maintenance** - includes general facility maintenance and bridge maintenance for the St.Claude Avenue, Florida Avenue, L&N, and Sea Brook bridges.

**Equipment** - includes the purchase of a container crane installed at France Road Terminal Berth six and the purchase of cranes for Berths four and five at the France Road Terminal.
**Miscellaneous Projects** - includes Rivergate asbestos abatement, port security, generic terminal improvements, joint ventures, commerce park (a proposed commercial industrial park in Jefferson Parish), planning for a new office building, warehouse storage, and land acquisition.

*Potential Vessel Services and Constraints* - The Port of New Orleans is an ideal location in terms of physical, operational and institutional infrastructure for the four targeted vessel services: River/Ocean vessel services, short sea coastal vessel service, fast-ferry trailer service and refrigerated vessel services. Impediments include the lack of the following: "on terminal" cold storage facilities, established "service infrastructure" in terms of specialized cargo brokers, quality inspectors and technicians, and strong networking with Mexican importers and exporters.

**St. Bernard Port**

*Physical and Operational Parameters* - The Chalmette Slip owned by the St. Bernard Port is located on the Mississippi River, 90.5 miles from the Gulf of Mexico. The draft in the main channel is 45 feet and alongside the docks the draft is 36 feet. The site is located on St.Bernard Highway (LA Hwy.46), with connections to Interstate-510 two miles to the east and Interstate-10 East/West five miles from the terminal.

The Chalmette Slip is a 1,700-foot long channel, 300 feet wide and 36 feet deep, protruding at an acute angle into the left descending bank of the Mississippi River. As deep draft, calm water harbor on the Mississippi River, the slip is a unique facility. The slip provides safe harbor to vessels loading or discharging cargos.

Dock No.1 occupies the upstream side of the slip. It is 1,300 feet long by 150 feet wide and is divided into three berths. The rear of the dock is served by three rail spur lines. Dock No.1 is currently used primarily for the transhipment of dry bulk materials. Dock No.2 is 1,680 feet long by 150 feet wide and primarily handles break-bulk, neo-bulk, and containers. The rear of the dock is also served by rail and has an additional 150-foot wide marshaling area adjacent to the tracks.

The port has 100,000 square feet of covered space with rail tracks and truck bays. The port has 136.5 acres of yard storage. There are approximately 12 acres of water frontage, 124.5 acres for leasing and one acre of concrete pad. The port does not own any stevedoring equipment. Independent contractors can supply mobile floating cranes as needed.

*Potential Vessel Services and Constraints* - Present port activities are limited to handling dry-bulk and container cargo and direct transfer of break bulk cargo from vessels to barge, rail cars, and trucks. With improvements, additional cargoes could be developed. The location of the port near the Gulf and major industrial areas is advantageous for market development.

**Shallow-Draft Ports on the Mississippi River**

**Port of Lake Providence**

*Physical and Operational Parameters* - The Port of Lake Providence is located on the Mississippi River at mile 484 A.H.P. in the northeast corner of Louisiana in East Carroll Parish. Major facilities available at the port and selected operational parameters are shown in Table III.10. The port has four berths: (1) General Cargo Dock, 50 by 250 feet with an eight inch pipeline; (2) General Cargo Ramp, 30 by 360 feet with an eight inch pipeline; (3) Grain Dock; and (4) Dry Fertilizer Dock.

The access channel to the port is 8,200 feet long and 150 feet wide and is maintained by the Corps of Engineers at 9 feet depth. The water depth is normally 12 feet-plus, with 44 days in the last seven years having less than 12 feet draft in September and October 1991. The turning basin radius of the channel is 400 by 800 feet. The port has a total of 6,600 feet of rail track with the longest continuous track being 4,350 feet. Delta Southern Railway Company of Tallulah provides rail service to the port. The main access road to the port is a hard surfaced blacktop road 1/3 mile long and connected to U.S. 65, a major north-south highway. Interstate-20 is located 30 miles south at Tallulah, LA. Louisiana Highway 2 lies 8.5 miles north of the port and provides a direct east-west connection at Bastrop, 50 miles to the west. Louisiana Highway 134 lies five miles west of the port and provides access to Monroe via Interstate 20, 70 miles to the southwest. Greenville, Mississippi, is 50 miles to the north and Vicksburg, Mississippi is 50 miles to the south.

Major commodities handled at the port are dry-bulk and liquid bulk fertilizer, bulk grain, and cotton seed. General cargo service is provided by open and covered hopper barges 35 by 195 feet with nine feet of draft carrying 1,500 tons. Liquid fertilizer barges are usually 50 by 290 feet with nine feet of draft and carrying 3,000 tons. Approximately 234 barges are served at the port with an annual average of 530,000 tons. General cargo service is provided by open and covered hopper barges typically 35 by 195 feet with nine feet of draft and carrying 1,500 tons. Liquid fertilizer barges are usually 50 by 290 feet with 9 feet of draft and carrying 3,000 tons. Approximately 234 barges are served in an average year. Eight to ten hours are needed to unload a barge at the dock or ramp. It takes approximately five minutes to load a truck from the storage pad and 15-20 minutes to load a rail car.

The general cargo dock and ramp have a 75-ton crawler crane with a four cubic yard clamshell bucket for loading and unloading. The dock has a conveyor belt, 36" by 690 feet, with radial stacker connection to a 72,000 square-foot concrete storage pad. Rail tracks extend to the end of the dock for direct river to rail service. In addition an 8" liquid fertilizer pipeline extends to the end of the dock and ramp.

Adjacent to the dock, connected by a radial stacker, is a 72,000 square foot concrete storage pad. Three acres of flood free auxiliary area are nearby. Three acres of flood prone land lie adjacent to the fertilizer warehouse and are used to store lime and rock. Another three acres of flood prone land lie 1/4 mile south of the dock and are used to store rock.

The port owns three general cargo warehouses: Two 20,000 square foot capacity warehouses and one 4,800 square foot warehouse. The two 20,000 square foot warehouses have aprons to the rail tracks with a total of four truck bays. The 4,800 square foot warehouse has three truck bays and is adjacent to the tracks. The port also has a 21,000 square foot Muskogee warehouse with a hydraulic truck dumper for cottonseed storage with rail and truck access. Construction will soon begin on a new 21,000 square foot Muskogee warehouse for additional cottonseed storage with an expected completion date of August 31, 1996. A Bulk Fertilizer and Landfill project for another port tenant is still in the design phase, with an expected completion date of summer 1997.

*Potential Vessel Services and Constraints* -The port is located on the Mississippi River with good rail and highway access. Its strategic location provides opportunities to attract cargo from

Arkansas, Mississippi and North Louisiana. The port is centrally located as a convenient port of call for any ocean/river service on the Mississippi. As the port has not traditionally handled general cargo, working out initial operational details, market research and development remain major challenges. Another impediment to the port's growth is the lack of flood-free land. Past and current inquiries suggest that any flood free land would be quickly utilized.

**Madison Parish Port**

*Physical and Operational Parameters* - The Madison Parish Port is located on the Mississippi River south of Lake Providence. The port offers a barge dock, 30,000 square feet of warehouse, and a truck weighing scale. The port is served by Delta Southern Rail lines and has 3,718 linear feet of rail spur. The port access road connects to U.S. Highway 65.

*Potential Vessel Services and Constraints* - Cargo handling operations at the Port are limited to dry-bulk and liquid-bulk cargo. Institutional capabilities of the Port at present are limited. Market development and other arrangements for handling general cargo vessels remain challenges. The potential exists for development of River/Ocean vessel services.

**Ports on the Atchafalaya River**

**Port of Morgan City**

*Operational and Physical Parameters* -The Port of Morgan City is located on the bank of Bayou Boeuf (Gulf Intracoastal Waterway) approximately one half mile east of its intersection with the Lower Atchafalaya River in St. Mary Parish. It is 18 miles from the open waters of the Gulf of Mexico. The nearest ports capable of handling 20-foot draft vessels are Lake Charles to the west and New Orleans to the east.

Waterway access south to the Gulf of Mexico is through the Lower Atchafalaya River, which has a 20-foot deep and 400-foot wide channel. Other accessible navigable waterways include the Gulf Intracoastal Waterway, with access north to Baton Rouge, and the Mississippi River. Planned development of rail facilities at the Port of Morgan City will include construction of rail access to Southern Pacific Transportation Company's main east-west route. This main line is located approximately 600 feet north of the port site. The rail spur extending from the Southern

Pacific main line will include 2,000 linear feet of rail spur, and 1,500 linear feet of sidings, and a reinforced concrete loading/unloading dock approximately 20 feet wide and 200 feet long. The rail spur and the loading/unloading dock will provide rail access to the transit shed under construction as well as a proposed transit shed.

Louisiana Delta Railroad will pick up and deliver rail cars at the port site with daily rail service. The design criteria indicate that up to six boxcars may be loaded or unloaded without moving a car string. This will be accomplished by passing through three boxcars adjacent to the dock to reach three outside boxcars. Furthermore, the port expects to acquire a trackmobile through the Surplus Military Properties Program that will be used to switch the rail cars and position them for loading/unloading within the port's facilities. The project should take approximately two years to complete, and rail services may be available to the port in late 1998 or early 1999.

Highway access includes U.S. Highway 90 East to New Orleans with connections to Interstate 10 East and West and Interstate 55 North and 59 North. U.S. Highway 90 West to Lafayette connects with to Interstate 10 East and West and Interstate 49 North. The port is located 1.1 miles from a stretch of U.S. Highway 90 that is designed to handle heavy industrial traffic. Interstate 10 can be accessed via U.S. Highway 90 to traveling 71 miles west to Lafayette or 90 miles east to New Orleans.

Waterfront footage of the dock on Bayou Boeuf totals 839 feet, and the concrete dock is 80 feet wide and 500 feet long. The terminal is designed to handle break-bulk and/or container cargo.

The port site has a total area of 16.14 acres, with 12.39 acres located inside the Corps of Engineers flood wall and 3.75 acres located between the flood wall and Bayou Boeuf. According to the Port Master Plan, future yard expansion includes construction of a paved six-acre truck marshaling yard.

*Potential Vessel Services and Constraints* - The layout of port facilities will impose major operational constraints for rapid vessel turnover. Forklits can transfer cargo between the ship and the transit open yard adjacent to the dock; however, tractor/trailer units must move cargo to other areas of the port site including transfer from the transit shed to the vessels. The port's proximity to the Gulf of Mexico is advantageous for short sea and river/ocean vessel services, the port's distance from major metropolitan areas puts it at a disadvantage.

## Port of Krotz Springs

*Physical and Operational Parameters* - The Port of Krotz Springs is located at mile 47.5 below the juncture of the Atchafalaya River with the Mississippi River near Simmesport and 76 miles above the confluence of the Atchafalaya River with the Gulf Intracoastal Waterway at Morgan City. The Atchafalaya River is maintained at a depth of 12 feet by the U.S. Army Corps of Engineers. At the port, the channel is approximately 1,000 feet wide, providing ample clearances for anchorage and fleeting.

The Port of Krotz Springs is located approximately one-quarter mile from U.S. Highway 190, which is a four lane highway connecting with interstates 10 and 49. The port is located on the Union Pacific Railroad line running from New Orleans and Baton Rouge to Houston. The railroad is joined at Livonia, located seven miles east of Krotz Springs, by the Union Pacific line running north through Alexandria and Shreveport. Connections can be made with the Illinois Central Railroad and Kansas City Southern Railroad main line at Lafayette via a branch from Opelousas.

The port is located on 134 acres, about half of which are occupied, and has six terminals in operation at the present time -- five for handling oil and one for handling grain. Future plans include a general cargo dock with a 75-ton crane. The dock is in the final stages of engineering and construction is expected to be complete in 1997. The next phase of this project, which has already been approved and funded, will include warehousing, parking and liquid storage to complement the dock. The port handled 2.9 million tons in 1995, mainly consisting of liquid-bulk (petroleum) and dry-bulk (grain).

*Constraints and Impediments* - Most of the necessary infrastructure for targeting vessel services will not be available for about two years. Improvements to the port's access road are necessary to accommodate additional traffic. Market research and development to attract general cargo and shippers remain major challenges. However, the port's location in terms of transportation facilities makes it an ideal port for exporting and importing goods generated by local industries.

## Ports on the Red River.

### The Port of Caddo-Bossier

*Physical and Operational Parameters* -The Port of Caddo-Bossier is located at the head of the Red River in Northwest Louisiana four miles south of the city of Shreveport. The Red River navigation channel is nine feet deep by 200 feet wide, allowing six-barge tows on the river. The port owns 2,000 acres of land and approximately 125 of which are earmarked for development of port-related infrastructure. The port has a general cargo wharf and a liquids wharf, both of which can service two standard river barges simultaneously. Two concrete access roads connect the docks to Louisiana Highway 1 and 22,500 linear feet of rail spur is also under construction. A general cargo transit shed, two and one half acre paved yard storage, one-acre coal pile/open storage area, truck/rail certified weigh scales, and 30- and 50-ton bridge cranes are all to be completed in 1996. The port is expected to be fully operational by 1997.

The port is served by a Union Pacific main line rail with access to the Kansas City Southern and Southern Pacific, and has access to Interstate 20 and Interstate 49, allowing extensive north-south and east-west access. The multimodal transportation system at the port is enhanced by the Ark-La-Tex Intermodal Center, a $3,000,000 container freight handling facility, boasting the only double stack capability in the area. Designated a United States Customs port of entry and Foreign Trade Zone Number 145, the port's role as a transportation facilitator will be greatly augmented with the addition of water transportation.

Barge and towing operations and river transportation on the Red River are in the initial stages. The location of a large number of companies at the port is an encouraging sign. Private investment is projected at more than $450 million. The companies committed to or operating at the port site include Red River Terminals (Atlas Processing Company/ Hollywood Marine), Special Oil/Quaker State, Reyncor, Olin, Eagle Asphalt/ Coastal Towing, Neste Trifinery, and Bioenergy Development Corporation.

*Constraints and Impediments* - Because the Red River Navigation Project was completed in 1995, it may take several years to develop a fully operational navigation system with efficient barge supply and towing services. Cargo diversions from rail and trucking to water transportation will be gradual and dependent on the construction of private and public marine

*Potential Vessel Services and Constraints* - The adequacy of the navigation channel which only accommodates small vessels with less than nine-foot draft, must be tested. The winding nature of the North Pass and mud flats on the channel may impose some constraints. The port has potential for River/Ocean vessel service.

- agricultural crops (to $409 million from $245 million)
- petroleum and coal products (to $70 million from $21 million)
- paper and forest products (to $20 million from $10 million)

Importance of Water Transportation to Louisiana Trade with Mexico

Analysis of cargo movements to Mexico from Louisiana, including the fastest growing product categories mentioned above, suggests that water transportation accounted for approximately $527 million or 70 percent of trade recorded with Mexico during 1994.[12] This is the opposite pattern seen from the U.S. aggregate trade data previously shown in *Table 9* and that of other states in trade with Mexico. States such as Texas, California, Arizona, Illinois, Michigan, and other states that have seen NAFTA trade grow significantly via land transport routes are looking to land-based solutions (expansion/completion of interstate highways such as the "I 35 Corridor" project) for improving North/South trade movements between Mexico and their respective states. In contrast, Louisiana trade data with Mexico suggests that emphasis should be placed on water-based transportation solutions as a means of improving existing and future trade movements to and from Mexico. Improving and expanding water transportation services to and from Louisiana ports in routings for North/South trade with Mexico will be a key strategy for generating increased NAFTA trade for the state.

[12]Based upon NPWI analysis of Transborder Freight Movements, Bureau of Transportation Statistics, U.S. DOT (1994/95 data) and Nafta Trade : Past, Present, and Future (Dean International, 1996).

- agricultural crops (to $409 million from $245 million)
- petroleum and coal products (to $70 million from $21 million)
- paper and forest products (to $20 million from $10 million)

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Forecasted Trade and Direct Jobs Created

Assuming that current commodity flows and trading patterns continue, Louisiana exports to Mexico could double by the year 2000 to almost $1.5 billion and direct jobs totaling over 24,400 could be created annually as a result of this increased export activity.[13]

*Figure 18.* and *Table 10.* show both trade and job growth.

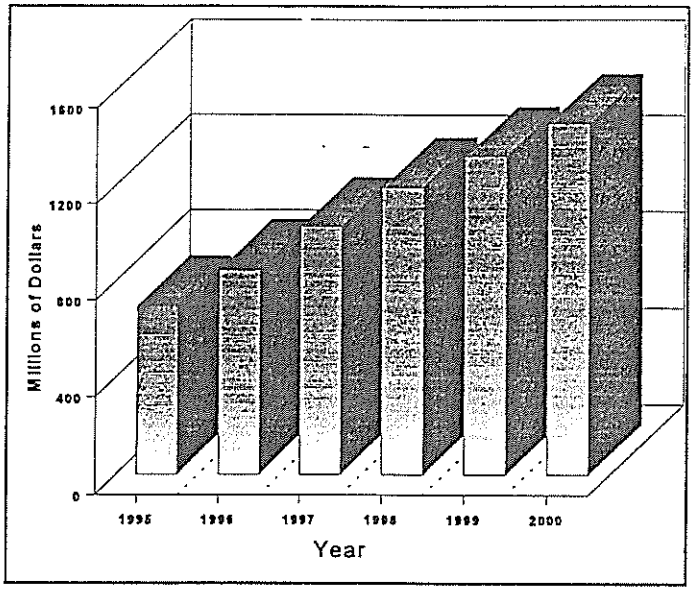


Figure 18. Forecasted Louisiana Exports to Mexico

TABLE 10. EXPECTED LOUISIANA JOBS CREATED

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|
| **Forecasted Exports** *Millions ($)* | 693 | 845 | 1,022 | 1,188 | 1,318 | 1,456 |
| **Direct Jobs Created** | 11,642 | 14,203 | 17,185 | 19,967 | 22,143 | 24,468 |

The U.S. Department of Commerce estimates that for each $1 billion generated in international trade about 16,800 new direct jobs are created in the U.S. economy. Assuming proportional job creation by value of trade, and that the current Louisiana trade trends with Mexico will continue, this could mean approximately 17,000 direct jobs attributed to Louisiana waterborne trade with Mexico by the year 2000.

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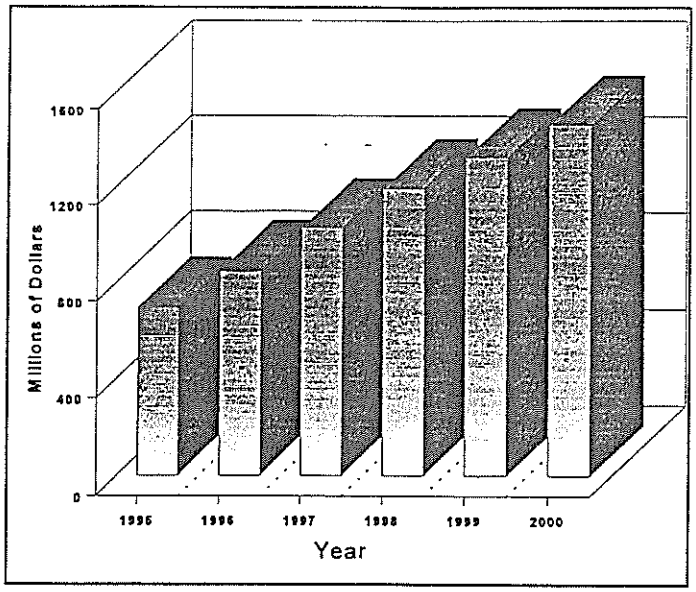

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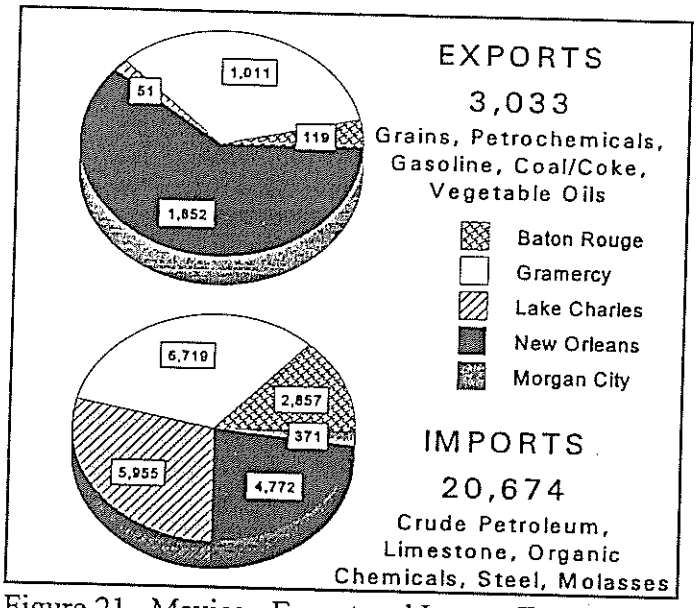


Figure 21. Mexican Export and Import Tonnage Shipped Through Louisiana Ports in 1995 (in 000 short tons) Source: PIERS

Existing Systems for the Inland River / Coastal Movement of Major Bulk Commodity Shipments

Current vessel and maritime service activity is concentrated on coastal deep-sea major bulk movements via tanker or bulker and containerized vessel movements for general merchandise. There is also a well-developed barge feeder system on the lower Mississippi river that can "midstream", or transfer bulk cargos, (i.e. grains, soybeans, fertilizers, petrochemicals) from 1,500-ton jumbo barges into deep-sea vessels of 5,000-15,000 DWT capacities. These existing bulk transfer systems with related docks and infrastructure (i.e. grain elevator and petrochemical distribution systems), will continue to provide deep-sea opportunities from the lower Mississippi waterway network utilizing Louisiana ports for the shipment of major bulk commodity movements of grain and petroleum related products between the U.S. and Mexico. The level of trade for these services will grow as the overall trade with Mexico expands. NAFTA-based benefits of increased general trade could produce volume gains for deep sea/major bulk services averaging six to eight percent annually from approximately the same hinterland areas. However,

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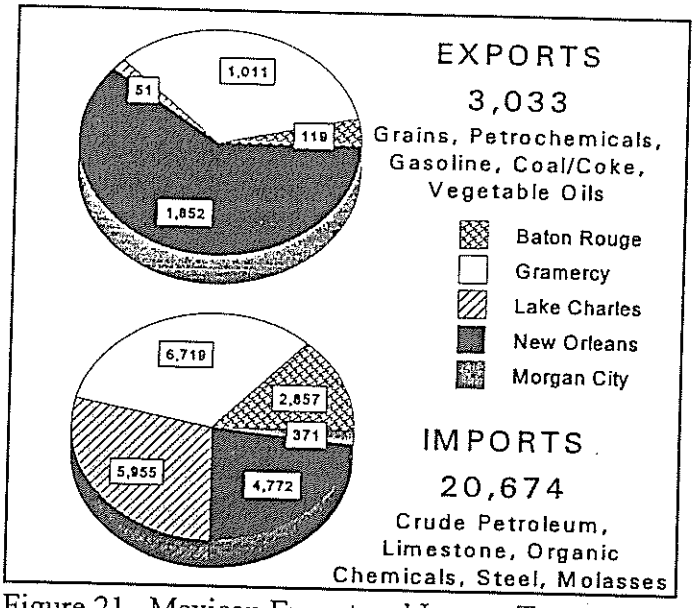


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future market penetration into the Central regions of Mexico and the U.S. from these services are limited unless more competitive intermodal rates and service times are offered for cargos originating or destined to and from the central regions of both countries..

## Emerging Maritime Systems for the Movement of Bulk and General Cargos

### River/Ocean Service

River/ocean (R/O) vessel service is an emerging maritime system that can and should be considered for the movement of minor bulk (i.e. less than 3,000-ton unit shipments) and general/palletized cargos moving in north/south trade between the U.S. and Mexico. This type of maritime service has been sporadically offered since 1994 along the Mississippi inland river system. The most recent service currently operating between Mexico and Louisiana is NAFTA Lines operating the MV. Gulf Viking (1500 DWT) in contract service between proposed U.S. ports of call including Morgan City, St. Bernard, Lake Charles, Houston, and Galveston along with the Mexican Gulf ports of Tampico/Altamira, Tuxpan, Veracruz, Coatzacoalcos, Frontera, Campeche, and Progreso.

Current R/O contract service for NAFTA Lines goes as far north as Little Rock, Arkansas with northbound movements of fertilizer from Mexico. Louisiana inland river ports such as Lake Providence, Krotz Springs, Baton Rouge, Port Manchac, Iberia, Morgan City, and West St. Mary could benefit from this type of service by providing southbound cargos for the contractual R/O service. Minor bulk commodities such as rice, wood pulp, limestone, gravel/aggregates and soybeans already moving southbound to the central and eastern regions of Mexico are typical commodities that could be handled. Palletized general cargos such as plastic resins, fertilizers, bagged rice, paper and newsprint materials, plywood, steel, and canned food products are typical of southbound products/cargos from the above mentioned Louisiana ports that could also be handled by the current R/O service. Limited volumes of containers could also be stored on a ship's deck for southbound movement to Mexico. Current R/O service is providing southbound movement to Veracruz. Contractual rates per metric ton vary between $25-$50 including port costs, with the individual negotiated rates depending on volumes, type of commodity, distance from plant to port, and other contractual variables.

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Additional telephone and in-person interviews were performed on selected large Louisiana shippers in order to assure adequate coverage in certain product categories and to obtain more detailed cost information. Interviews with management of both deep draft and shallow draft Louisiana ports were also conducted to verify existing and potential prospects for NAFTA related cargo movements.

The Trans-Border Surface Freight Transportation Data Base (CD-ROM) covering the period 1993-1995 (March), published by the Bureau of Transportation Statistics, U.S. DOT, was also utilized to identify state and commodity-specific (by value) origin and destination movements for exports to Mexico via all land routings (truck and rail) from Louisiana.

Finally, the Journal of Commerce's database, Port Import and Export Reporting System (PIERS) was provided to the study team by the Port of New Orleans. It allowed the Institute to analyze existing waterborne cargo movements to and from Mexico through Louisiana ports for the 1994-1995 period.

Results from the analysis of the above mentioned database sources, surveys, and interviews were incorporated to assess the current and future market potential for various maritime services in Louisiana highlighted in Chapters II and III, and for comparative cost and service analysis for all-land versus potential intermodal movements to Mexico from Louisiana, discussed in Chapter V. Survey and interview results were also used to recommend market opportunities, strategies, and port infrastructure requirements included in Chapter VII. Potential Louisiana port routings

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TABLE 14. SHORT SEA / COASTAL COST COMPARISON: PLAQUEMINE-MORGAN CITY-VERACRUZ-MEXICO CITY (CHEMICALS)

I. Shipment Profile

*Routing Characteristics:*

| | | |
|---|---|---|
| Origin | Plaquemine, LA | |
| Destination | Mexico City, Mexico | |
| *Using Water Service:* | | miles |
| From Origin | Plaquemine, LA | 0 |
| To Loading Port | Morgan City, LA | 100 |
| To Discharging Port | Veracruz, Mexico | 860 |
| To Destination | Mexico City, Mexico | 250 |
| TOTAL MILEAGE | | 1,210 |
| *All Land:* | | miles |
| From Origin | Plaquemine, LA | 0 |
| To Border Crossing | Laredo/Nvo. Laredo | 544 |
| To Destination | Mexico City, Mexico | 720 |
| TOTAL MILEAGE | | 1,264 |

*Cargo Characteristics:*

| | | |
|---|---|---|
| Commodity | Chemicals | |
| Typical cargo volume | 10,000 | metric tons |
| Truckload | 20 | metric tons |
| Number of trucks | 500 | |

II. Total Cost/Freight Calculations:

*Using Coastal Service*

| Description | Unit | Value | |
|---|---|---|---|
| 1. Inland US (Louisiana) | | | |
| Distance | miles | 100 | |
| Rate per mile per truckload | $ | 1.45 | Reflects lower intrastate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 72,500 | |
| 2. Cross Gulf | | | |
| Typical cargo volume | tons | 10,000 | |
| Rate per ton | $ | 15.00 | |
| Total Cross Gulf Service | $ | 150,000 | |
| 3. Inland Mexico: | | | |
| Flat rate per truck (FNM) | $ | 300.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 150,000 | |
| Grand Total | $ | 372,500 | |

*All Truck*

| Description | Unit | Value | |
|---|---|---|---|
| 1. Inland US (Louisiana/Texa | | | |
| Distance | miles | 544 | |
| Rate per mile per truckload | $ | 1.75 | Reflects higher interstate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 476,000 | |
| 2. Inland Mexico | | | |
| Flat rate per truck | $ | 775.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 387,500 | |
| Grand Total | $ | 863,500 | |

III. Modal Comparison:

| | $ | $/mt |
|---|---|---|
| Intermodal (using Coastal vs | 372,500 | 37.25 |
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| Rate per mile per truckload | $ | 1.45 | Reflects lower intrastate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 72,500 | |
| 2. Cross Gulf | | | |
| Typical cargo volume | tons | 10,000 | |
| Rate per ton | $ | 15.00 | |
| Total Cross Gulf Service | $ | 150,000 | |
| 3. Inland Mexico: | | | |
| Flat rate per truck (FNM) | $ | 300.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 150,000 | |
| Grand Total | $ | 372,500 | |

*All Truck*

| Description | Unit | Value | |
|---|---|---|---|
| 1. Inland US (Louisiana/Texa | | | |
| Distance | miles | 544 | |
| Rate per mile per truckload | $ | 1.75 | Reflects higher interstate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 476,000 | |
| 2. Inland Mexico | | | |
| Flat rate per truck | $ | 775.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 387,500 | |
| Grand Total | $ | 863,500 | |

III. Modal Comparison:

| | $ | $/mt |
|---|---|---|
| Intermodal (using Coastal vs | 372,500 | 37.25 |
| All Truck | 863,500 | 86.35 |
| Difference | 491,000 | 49.10 |

TABLE 19. SUMMARY OF RATE AND SERVICE COMPARISONS FOR TRAILER FERRY SERVICE

| From | Transportation Options | $/Unit | Days | | Equipment | $/ton |
|---|---|---|---|---|---|---|
| | | | Travel | Frequency | | |
| Atlanta | (a) Existing Land | 2,514 | 5.0 | 1.0 | 48' | 112 |
| | (b) Existing Maritime | 1,967 | 10.0 | 7.0 | 40' | 106 |
| | (c) Proposed Maritime | 1,858 | 5.5 | 2.0 | 48' | 83 |
| | (b) - (a) | (547) | 5.0 | | | (5) |
| | (c) - (a) | (656) | 0.5 | | | (29) |
| Charlotte | (a) Existing Land | 2,856 | 5.5 | 1.0 | 48' | 127 |
| | (b) Existing Maritime | 2,050 | 9.0 | 7.0 | 40' | 111 |
| | (c) Proposed Maritime | 2,107 | 6.5 | 2.0 | 48' | 94 |
| | (b) - (a) | (806) | 3.5 | | | (16) |
| | (c) - (a) | (749) | 1.0 | | | (33) |
| Chicago | (a) Existing Land | 2,872 | 7.0 | 1.0 | 48' | 128 |
| | (b) Existing Maritime | 2,230 | 10.0 | 7.0 | 40' | 121 |
| | (c) Proposed Maritime | 2,317 | 6.5 | 2.0 | 48' | 103 |
| | (b) - (a) | (642) | 3.0 | | | (7) |
| | (c) - (a) | (555) | (0.5) | | | (25) |
| Indianapolis | (a) Existing Land | 2,833 | 5.0 | 1.0 | 48' | 126 |
| | (b) Existing Maritime | 2,534 | 10.0 | 7.0 | 40' | 137 |
| | (c) Proposed Maritime | 2,300 | 6.5 | 2.0 | 48' | 102 |
| | (b) - (a) | (299) | 5.0 | | | 11 |
| | (c) - (a) | (533) | 1.5 | | | (24) |
| Memphis | (a) Existing Land | 2,153 | 5.0 | 1.0 | 48' | 96 |
| | (b) Existing Maritime | 2,295 | 12.0 | 7.0 | 40' | 124 |
| | (c) Proposed Maritime | 1,726 | 5.5 | 2.0 | 48' | 77 |
| | (b) - (a) | 142 | 7.0 | | | 28 |
| | (c) - (a) | (427) | 0.5 | | | (19) |
| New Orleans | (a) Existing Land | 1,912 | 4.0 | 1.0 | 48' | 85 |
| | (b) Existing Maritime | 1,950 | 5.0 | 7.0 | 40' | 105 |
| | (c) Proposed Maritime | 1,300 | 4.5 | 2.0 | 48' | 58 |
| | (b) - (a) | 38 | 1.0 | | | 20 |
| | (c) - (a) | (612) | 0.5 | | | (27) |
| New York | (a) Existing Land | 3,126 | 6.0 | 1.0 | 48' | 139 |
| | (b) Existing Maritime | 2,425 | 10.0 | 7.0 | 40' | 131 |
| | (c) Proposed Maritime | 2,458 | 7.5 | 2.0 | 48' | 109 |
| | (b) - (a) | (701) | 4.0 | | | (8) |
| | (c) - (a) | (668) | 1.5 | | | (30) |
| Pittsburgh | (a) Existing Land | 2,773 | 5.0 | 1.0 | 48' | 123 |
| | (b) Existing Maritime | 2,760 | 10.0 | 7.0 | 40' | 149 |
| | (c) Proposed Maritime | 2,424 | 7.5 | 2.0 | 48' | 108 |
| | (b) - (a) | (13) | 5.0 | | | 26 |
| | (c) - (a) | (349) | 2.5 | | | (16) |
| St. Louis | (a) Existing Land | 2,495 | 5.0 | 1.0 | 48' | 111 |
| | (b) Existing Maritime | 2,535 | 10.0 | 7.0 | 40' | 137 |
| | (c) Proposed Maritime | 2,304 | 6.5 | 2.0 | 48' | 102 |
| | (b) - (a) | 40 | 5.0 | | | 26 |
| | (c) - (a) | (191) | 1.5 | | | (8) |
| Tampa | (a) Existing Land | 2,219 | 5.0 | 1.0 | 48' | 99 |
| | (b) Existing Maritime | 2,100 | 10.0 | 7.0 | 40' | 114 |
| | (c) Proposed Maritime | 1,823 | 5.0 | 2.0 | 48' | 81 |
| | (b) - (a) | (119) | 5.0 | | | 15 |
| | (c) - (a) | (396) | 0.0 | | | (18) |

*Note:*

Rate comparisons are intended to compare maritime options (existing and proposed) with existing land options.

U.S. imports of fruits and vegetables from the Central American countries and Mexico are transportation cost sensitive. Interviews with port officials and importers indicated that transportation costs constitute a significant portion of the wholesale cost of these commodities. For example, the actual production cost to U.S. markets of honeydew melons in Mexico is about $4 per case and cantaloupes about $6.[3] Transportation costs for these products range from between $6-$9 per case. The total wholesale market cost is about $13-$15 per case with transportation cost, accounting for at least 50 percent. Transportation is therefore one of the major factors considered, and shippers are always trying to reduce these costs.

**Evaluation of Transportation Costs for Perishable Imports from Mexico**

Cost analysis concentrated on identifying transportation costs for direct truck and water shipments of fresh & frozen fruits and vegetables from Mexico to the United States with particular attention given to shipments via the Port of New Orleans.

Two transportation scenarios were evaluated. A truck transportation scenario considered direct shipments from Mexican points of origin to U.S. destinations. A water transportation scenario involved truck shipments from Mexican points of origin to the Port of Veracruz, water shipment from Veracruz to the selected U.S. ports of entry, cargo transfer at these ports, and truck transportation from U.S. ports to the selected U.S. destinations. The total transportation costs for each scenario for various origin destination points were calculated.

Two origin regions for Mexican perishable exports were considered North and West Mexico (Sonora) and the Eastern Region. These two regions are the major producers of perishables shipped to the U.S. Eight U.S. destination points were selected including Chicago, New York, Philadelphia, New Orleans, St. Louis, Memphis, Dallas, and Birmingham. Five U.S. ports of entry were selected: Philadelphia, Tampa, Charleston, New Orleans, and Houston.

Truck transportation cost estimates were developed for direct land shipments from Mexico to the U.S. and for movements to and from ocean ports within the water transportation scenario. The

[3]Op. Cit. U.S. Department of Agriculture, study of Mexican fruit and vegetable production factors (1993).

cost estimates were developed on the same assumptions. Data for the estimates were obtained from interviews with trucking companies, cold storage operators, and the U.S. Department of Agriculture, AMS Fruit and Vegetable Fleet Truck Cost Reports. More than 45 individual quotes for various origin-destination points were received.

The U.S. Department of Agriculture, AMS, Fruit and Vegetable Fleet Truck Cost report for April 1996 estimated the average cost for a fruit and vegetable truck fleet to be $1.36 per mile[4]. An average quoted rate per mile per truck for shipments of FFFV amounted to $1.44. An average tonnage per load differs depending on the type of carried fruits and vegetables. For example, a typical full truckload of tomatoes consists of 1,600 25-pound packages which totals 40,000 pounds. A typical full truck-load of melons amounts to 700 85-pound cartons or 59,500 pounds per truckload. Based on the structure of FFFV imports from Mexico, it was assumed that an average truckload for this trade amounted to 24 tons. Therefore, an average rate of $0.06 per ton per mile was used for truck transportation cost estimates.

Direct Truck Shipments and Truck Shipments To/From Ocean Ports

*Table 20* provides information on the distances and estimates of truck transportation costs from Mexico to the selected U.S. destinations. It was assumed that an average distance from the North-West region of Mexico to Nogales is 400 miles, and from the Eastern Region to Laredo 500 miles.

Distances from border crossing points to U.S. destinations were obtained from the U.S. road atlas. The calculated total transportation distance was multiplied by $0.06 to estimate the total truck transportation cost. The results of these calculations are shown in *Table 21.*

To provide necessary information for the evaluation of water transportation scenarios, the distances and costs of truck transportation from Mexican production centers to Veracruz, and from the U.S. ports of entry to inland destinations, were estimated. It was assumed that an average truck shipment from North-West Mexico FFFV production points to the Port of Veracruz amounts to 1,000 miles, and from the Eastern Region production centers 100 miles. Distances from the U.S. ports of entry to inland destinations were obtained from the U.S. road

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[4] USDA, AMS, Fruit and Vegetable Fleet Truck Cost Report, April 1996.

The quoted ocean freight rates (per ton) to the following destinations are as follows: Gulf ports $70, Charleston $75, and Philadelphia $80. (*Table 22.*)

Cargo Handling Costs and Total Transportation Costs

Based on interviews with port authorities and shipping lines, it was assumed for the purposes of this analysis that cargo handling rates are $20 at U.S. entry ports, and $10 at the Port of Veracruz.

The developed rate estimates for truck, ocean freight, and cargo handling charges were used to estimate the total transportation cost for various scenarios for FFFV shipments between Mexico and the U.S. by truck and water. The results of the total transportation cost calculations, and transportation cost difference between water shipments via New Orleans and other routes, are shown in *Tables 23* and *24* and *Figures 27 and 28.*

The developed transportation cost estimates indicate that at the current truck rate structure and the quoted ocean freight rates, the Port of New Orleans is not competitive for shipments of FFFV from Mexico. Although water shipments via New Orleans to St. Louis and Memphis are cheaper than those via the competitive ports, FFFV can be delivered from Mexico to these destinations directly by truck at significant cost savings. This is related to New Orleans' proximity to Mexico. Due to relatively short distances involved in water shipments between Mexico and New Orleans, transportation cost advantages resulting from ocean transportation are significantly lower than for longer routes. The difference in the quoted ocean freight for shipments to New Orleans and Philadelphia amounts to only $10 per ton, despite a significant difference in distance. The estimates indicate that water transportation provides savings over truck transportation for shipments via Philadelphia destined to the East Coast. However, truck transportation is the most competitive mode of transportation for FFFV shipments to the U.S. Midwest destinations.

The transportation cost disadvantage of New Orleans for shipments of Mexican FFFV can be illustrated using an example of shipments from the East Mexico region to Chicago. The total truck transport distance for water shipment via New Orleans involves 1,128 truck miles (to the Port of Veracruz and from the Port of New Orleans). The total direct truck movement is 1,903 miles. On the assumption that truck transportation rates are proportional to the distance, and rates are equal to the national average of $0.06 per ton per mile, with total cargo handling

TABLE 22 : WATER TRANSPORTATION SCENARIO, ESTIMATED TOTAL TRANSPORTATION COST PER TON, IMPORT OF FRESH FRUITS AND VEGETABLES FROM MEXICO.

*I. Ocean Freight From Veracruz to Selected U.S. Ports and Port Cargo Handling Charges*

| U.S. Ports of Entry | Ocean Freight | Cargo Handling Charge | | Ocean Freight and Cargo Handling |
|---|---|---|---|---|
| | | Veracruz | U.S. Ports | |
| Philadelphia | $80 | $10 | $20 | $110 |
| Tampa | $70 | $10 | $20 | $100 |
| Charleston | $75 | $10 | $20 | $105 |
| New Orleans | $70 | $10 | $20 | $100 |
| Houston | $70 | $10 | $20 | $100 |

*II. Total Cost for Water Transportation Scenario (Ocean Freight, Port Cargo Handling, and Truck Transportation)*

*Shipments Originating in Sonora:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $216 | $177 | $170 | $244 | $224 | $231 | $258 | $223 |
| Tampa | $231 | $229 | $223 | $199 | $221 | $210 | $227 | $195 |
| Charleston | $220 | $212 | $206 | $212 | $216 | $210 | $228 | $194 |
| New Orleans | $222 | $250 | $234 | $170 | $201 | $184 | $190 | $181 |
| Houston | $225 | $260 | $254 | $181 | $207 | $194 | $175 | $200 |

*Shipments Originating in Mexico Eastern Region:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $162 | $123 | $116 | $190 | $170 | $177 | $204 | $169 |
| Tampa | $177 | $175 | $169 | $145 | $167 | $156 | $173 | $141 |
| Charleston | $166 | $158 | $152 | $158 | $162 | $156 | $174 | $140 |
| New Orleans | $168 | $196 | $180 | $116 | $147 | $130 | $136 | $127 |
| Houston | $171 | $206 | $200 | $127 | $153 | $140 | $121 | $146 |

TABLE 23 : TOTAL TRANSPORTATION COST PER TON, WATER AND TRUCK TRANSPORTATION SENARIOS

*1. Water Transportation Scenario:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $216 | **$177** | **$170** | $244 | $224 | $231 | $258 | $223 |
| Tampa | $231 | $229 | $223 | $199 | $221 | $210 | $227 | $195 |
| Charleston | $220 | $212 | $206 | $212 | $216 | $210 | $228 | $194 |
| New Orleans | $222 | $250 | $234 | $170 | $201 | $184 | $190 | $181 |
| Houston | $225 | $260 | $254 | $181 | $207 | $194 | $175 | $200 |

*2. Truck Transportation Scenario:*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nogales | **$135** | $183 | $185 | **$115** | **$126** | **$111** | $82 | $124 |

## II. Shipments Originating in Mexico Eastern Region:

*1. Water Transportation Scenario:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $162 | **$123** | **$116** | $190 | $170 | $177 | $204 | $169 |
| Tampa | $177 | $175 | $169 | $145 | $167 | $156 | $173 | $141 |
| Charleston | $166 | $158 | $152 | $158 | $162 | $156 | $174 | $140 |
| New Orleans | $168 | $196 | $180 | $116 | $147 | $130 | $136 | $127 |
| Houston | $171 | $206 | $200 | $127 | $153 | $140 | $121 | $146 |

*2.Truck Transportation Scenario:*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Laredo | **$114** | $159 | $163 | **$70** | **$94** | **$83** | **$56** | $91 |

TABLE 24. TRANSPORT COST DIFFERENCE PER TON BETWEEN WATER SHIPMENTS VIA NEW ORLEANS AND MOST COMPETITIVE ROUTE

| | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| From Sonora : | $87 | $73 | $64 | $55 | $75 | $73 | $108 | $57 |
| From MER : | $54 | $73 | $64 | $46 | $53 | $47 | $80 | $36 |

transportation for shipments via Philadelphia destined to the East Coast. However, truck transportation is the most competitive mode of transportation for FFFV shipments to the U.S. Midwest destinations.

The transportation cost disadvantage of New Orleans for shipments of Mexican FFFV can be illustrated using an example of shipments from the East Mexico region to Chicago. The total truck transport distance for water shipment via New Orleans involves 1,128 truck miles (to the Port of Veracruz and from the Port of New Orleans). The total direct truck movement is 1,903 miles. On the assumption that truck transportation rates are proportional to the distance, and rates are equal to the national average of $0.06 per ton per mile, with total cargo handling charges at ports of $30, the water transportation leg should amount to $16 per ton to make the water transportation scenario equally attractive to the truck transportation alternative. This is much lower than the current $70 per ton rate quoted for the Veracruz-New Orleans shipments by shipping lines.

The Institute's previous research has indicated that about 150,000 tons annually combined in both directions would be needed to sustain a weekly type of service. Interviews with potential service users indicate that this type of service may have to be extended north outside of Louisiana up to about Memphis, Tennessee in order to attract the regular volumes of cargos necessary for a viable longer term service. Potential industries such as rice producers, forest product plants, and plastic resin chemical producers seem the most likely to benefit from R/O service to Mexico. Midstreaming charges from barge to vessel, currently averaging three dollars per ton in the lower Mississippi, could also be eliminated. Flexibility on pilotage charges for such services may be critical but initial concessions have already been given to the current service offered by Nafta Marine Express.

While this type of maritime service may not be as attractive to significant rail users, shippers currently utilizing trucks within 150 miles of a Louisiana port of loading will find River/Ocean service to be a competitive option. Provision by the port for free storage/ consolidation for shipments of between 300 tons to 1,500 tons will be needed to attract sufficient volumes required for regular R/O services.

**Short Sea Coastal Service**

Although coastal services would generally require larger lot shipments of 5,000 - 10,000 tons to Mexico, interviews with Louisiana based shippers and a review of current cargo movements indicate that sufficient volume appears to be available from imports and exports currently moving via fully loaded rail cars or trucks of cargos such as steel, chemicals, grains, forest products, and plastic resins moving to and from the central and eastern regions of Mexico and Louisiana. Short sea coastal services could provide intermodal rate savings of 10-15 percent over loaded rail car shipments of similar products to and from Louisiana and Mexico City. Savings over shipment by truck to Mexico City would be higher and are estimated at 25-30 percent from Louisiana to and from Mexico City.

In order to obtain these potential savings for shippers, Louisiana ports should consider offering port storage under "free-time" or other agreements to consolidate existing rail car and truck shipments into larger lot movements. Coastal services would provide these larger movements into Mexico's eastern and Central regions. Lot sizes of 5,000 - 10,000 tons would be needed to obtain the saving mentioned above.

## Trailer Ferry Service

Market potential for such a service would appear to be quite large and would extend through the midwest and eastern portions of the U.S. provided that good intermodal connections can be maintained from a Louisiana port offering the service. The institute's previous research indicates that an annual volume of 50,000 trailers, or about a seven percent market share of current land volumes, would be necessary to make the service viable. The study team believes that the port of New Orleans currently has superior rail and road connections to major trade lane corridors engaged in U.S.-Mexican trade that are necessary for the larger market potential for such a service. Cost analysis indicates that at current market rates, savings of between 15-20 percent could be achieved for shippers currently moving cargo via all land routings from the central and eastern portions of the U.S. to the central and eastern portions of Mexico. Additionally, the port of New Orleans has current roll-on/roll-off facilities at the France Road Terminal to begin such a service with minimal terminal improvements needed. Service at other Louisiana ports would require construction of an on-dock roll-on/roll-off berth. Unlike previous negotiations with CSX Transportation during 1994-95 when New Orleans was considering a project to provide rail ferry service, the study team would recommend support of a ferry service focusing entirely on the movement of truck trailers. This type of service should also be considered a public of service offered to all potential users and require substantially less up front port investments.

## Refrigerated Service for Fresh and Frozen Fruits and Vegetables

A significant volume of Mexican perishables (fruits/vegetables) is shipped in small volumes and is therefore dominated by the trucking mode of transportation. The development of water transportation as a viable option would necessitate cargo consolidation/distribution at Mexican and U.S. Gulf Coast ports. This means that modern refrigerated cargo handling facilities located on-dock at both locations are needed to facilitate cargo consolidation and distribution to hinterland markets in the midwestern and southern regions of the U.S.

In order to minimize the possibility of cargo damage with intermodal transfer, specialized refrigerated cargo terminals will need to be designed and developed to offer modern cargo handling technologies similar to those offered at competitive ports (i.e. Gulfport and Tampa).

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In order to minimize the possibility of cargo damage with intermodal transfer, specialized refrigerated cargo terminals will need to be designed and developed to offer modern cargo handling technologies similar to those offered at competitive ports (i.e. Gulfport and Tampa).

Another important variable is the commodity and its characteristics. Items such as unit size, weight, shape, and density can effect actual transfer rates. Finally, the experience factor of the workforce and even demographic factors such as average age of the gang can influence cargo handling rates. For example an experienced crane operator will have significant influence over the "pick rate," or number of moves recorded by various port stevedoring companies. The experience of entire gangs in handling certain types of cargos will also have a major influence over recorded hourly transfer rates, and can directly influence crane downtime results. For certain types of cargos such as bagged goods, a younger workforce or gang composition will usually outperform an older workforce because of obvious physical and stamina related issues. For example, one of the reasons given for Lake Charles' relatively high productivity rates for bagged agricultural products such as rice, flour, and animal feeds was the relatively low average age (i.e. 28 years on average) of labor employed in the gangs. Averaging 55 tons per gang hour for bagged dry bulk gives the Port of Lake Charles over 36 percent advantage above its next closest port competitor, Gulfport.

***Containers***

The Port of New Orleans, Louisiana's main container handling port, compares favorably for large-scale container handling output with average handling rates between 26 to 33 moves per hour using gantry crane equipment. Private terminal operations at the Sea-Land facility reported even higher output rates of between 35 to 38 moves per hour. Only one port in the Gulf region- Gulfport, reported higher average container handling rates of 32 to 38 moves per hour. Charleston, in the South Atlantic region, reported container handling rates between 34 to 36 moves per hour using similar equipment. A summary of comparative container handling rates (excluding ships' gear) is presented in *Figure 29*.

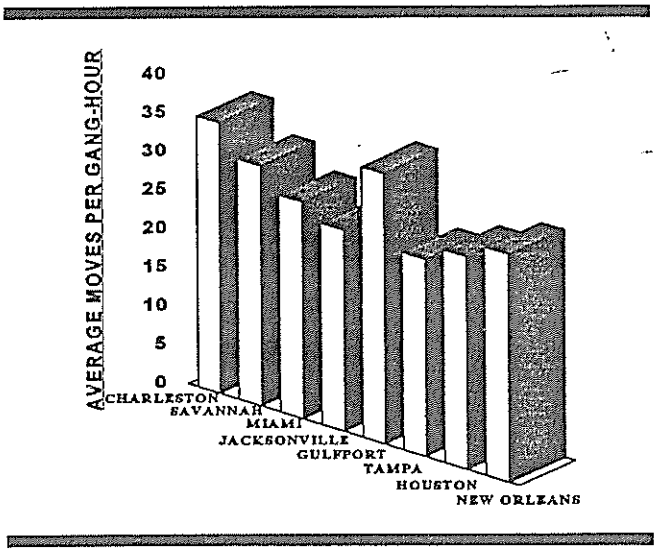


Figure 29
Container Handling Rates

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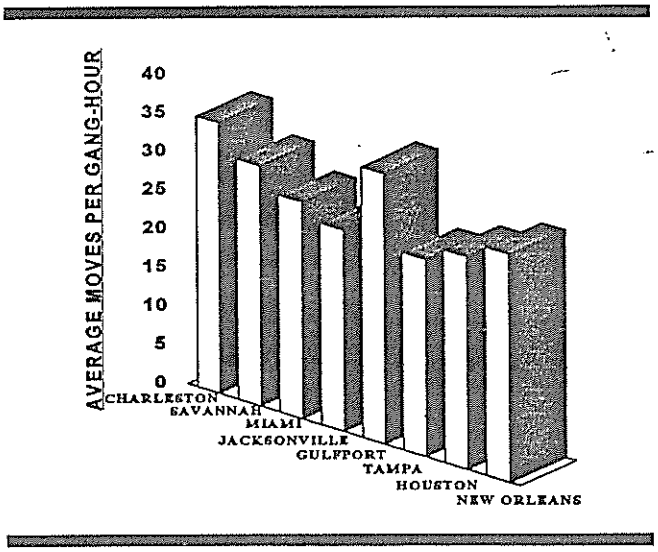


Figure 29
Container Handling Rates

*Steel*

New Orleans and Houston have the highest ship-to-shore handling rates of ports in the Gulf region for steel products such as steel coils and pipe-related cargos. Both ports average 100-120 tons per gang hour for coils and about 60 tons per gang hour for pipe. This could be one factor in the continued increase of steel tonnage through the Port of New Orleans.

South Atlantic ports (Charleston, Jacksonville, and Savannah) reported higher steel handling rates of 140-150 tons per gang hour for coil-related cargos and 65 tons per hour handled for pipes. Lake Charles and Baton Rouge have steel-handling rates for coils comparable to Gulfport at about 60 tons per hour. A graphical summary of steel related handling rates (coil related cargos) by port is summarized in *Figure 30.*

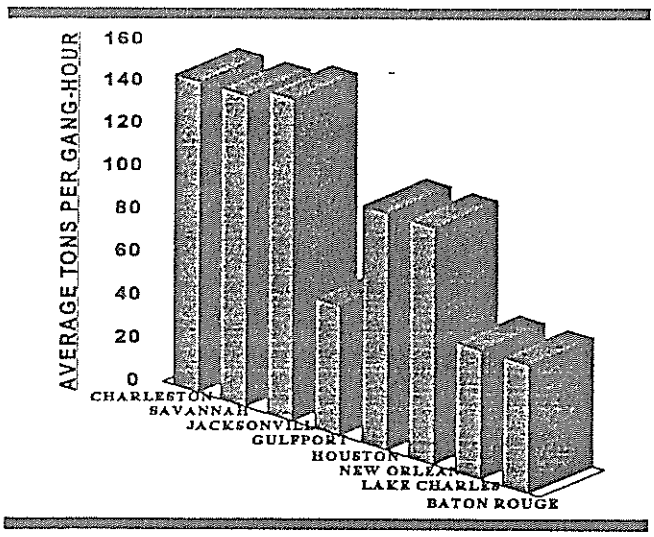


Figure 30.
Steel Handling Rates

***Lumber Products***

Handling rates for lumber related products vary significantly by the type of product (i.e. logs, plywood/finished lumber). *Figure 31* graphically breaks out both types of commodities among the ports surveyed. New Orleans, Baton Rouge, and Lake Charles have comparable handling rates for both finished lumber, at about 80 to 90 tons per gang hour versus 80,000 to 120,000 board-feet per gang hour (i.e. 80-120 tons/hour.), and for log handling (1000 board feet is roughly equivalent to one ton). The Port of Baton Rouge is actually the highest of the three, reporting average handling rates of about 90 tons per gang hour for finished lumber and up to 130,000 board-feet per gang hour (130 tons) for logs. Gulfport reported significantly lower numbers for both categories with 35-40 tons per gang hour for finished lumber and 65,000-90,000 board-feet (65-90 tons) per hour for logs. Houston reported higher handling rates for finished lumber as did the South Atlantic ports of Charleston, Savannah, and Jacksonville. These ports, however, use sophisticated conveyor systems to produce rates close to 300,000 board-feet (300 tons) per gang hour.

*Steel*

New Orleans and Houston have the highest ship-to-shore handling rates of ports in the Gulf region for steel products such as steel coils and pipe-related cargos. Both ports average 100-120 tons per gang hour for coils and about 60 tons per gang hour for pipe. This could be one factor in the continued increase of steel tonnage through the Port of New Orleans.

South Atlantic ports (Charleston, Jacksonville, and Savannah) reported higher steel handling rates of 140-150 tons per gang hour for coil-related cargos and 65 tons per hour handled for pipes. Lake Charles and Baton Rouge have steel-handling rates for coils comparable to Gulfport at about 60 tons per hour. A graphical summary of steel related handling rates (coil related cargos) by port is summarized in *Figure 30.*

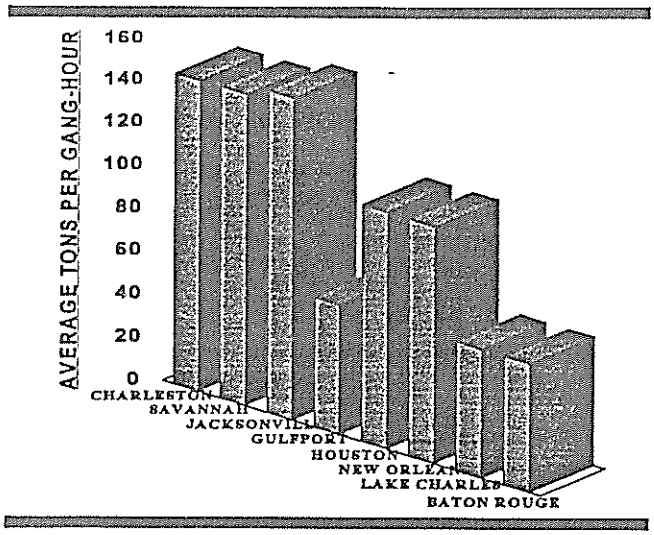


Figure 30.
Steel Handling Rates

***Lumber Products***

Handling rates for lumber related products vary significantly by the type of product (i.e. logs, plywood/finished lumber). *Figure 31* graphically breaks out both types of commodities among the ports surveyed. New Orleans, Baton Rouge, and Lake Charles have comparable handling rates for both finished lumber, at about 80 to 90 tons per gang hour versus 80,000 to 120,000 board-feet per gang hour (i.e. 80-120 tons/hour.), and for log handling (1000 board feet is roughly equivalent to one ton). The Port of Baton Rouge is actually the highest of the three, reporting average handling rates of about 90 tons per gang hour for finished lumber and up to 130,000 board-feet per gang hour (130 tons) for logs. Gulfport reported significantly lower numbers for both categories with 35-40 tons per gang hour for finished lumber and 65,000-90,000 board-feet (65-90 tons) per hour for logs. Houston reported higher handling rates for finished lumber as did the South Atlantic ports of Charleston, Savannah, and Jacksonville. These ports, however, use sophisticated conveyor systems to produce rates close to 300,000 board-feet (300 tons) per gang hour.

*Tables 31* and *32* present similar summary comparisons for the ports of Miami and Jacksonville. Both ports have very active container operations with Miami offering not only a strong demographic advantage for southeastern and local cargo distribution but also container transshipment potential for the Gulf, Caribbean, and Central American regions. Miami's total estimated costs per ship call and estimated costs per move are the second lowest of the ports analyzed. In addition, they are about one-third lower than total costs estimated for New Orleans. In contrast, Jacksonville appears to be the highest cost port for medium and large size vessels of those ports analyzed. Port charges are generally higher in Jacksonville, as are the estimated stevedoring charges, due to lower overall handling rates and higher downtime costs (i.e. gross gang hours charged include payments for non-working periods due to weather or mechanical problems). Crane downtime reportedly has been averaging over eight percent at the port's container facilities versus about 1-3 percent at the other ports surveyed. New Orleans' crane downtime compares favorably at the France Road complex, with about a 1-1.5 percent downtime factor over the last 12 months.

| MIAMI | Small Vessel | Medium Vessel | Large Vessel |
|---|---|---|---|
| Dockage and Wharfage Cost | $2,889 | $8,882 | $14,664 |
| Crane Rental Cost | $2,250 | $5,850 | $9,900 |
| Stevedoring Cost (ship-to-shore) | $2,736 | $10,032 | $20,292 |
| Other Costs * | $5,179 | $7,858 | $9,827 |
| *Port Related Subtotal* | $13,055 | $32,623 | $54,684 |
| Steaming Cost | $0 | $0 | $0 |
| Pilotage and Tug Hire Costs | $2,978 | $6,469 | $9,119 |
| *Vessel Related Subtotal* | $2,979 | $6,470 | $9,120 |
| TOTAL CHARGES | $16,034 | $39,093 | $63,804 |
| Total Cost Per Move (inclusive) | $160.34 | $111.69 | $106.34 |

*Includes costs such as harbor fee, U.S. Govt. fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

TABLE 31.
VESSEL AND CONTAINER CHARGES IN MIAMI

| JACKSONVILLE | Small Vessel | Medium Vessel | Large Vessel |
|---|---|---|---|
| Dockage and Wharfage Cost | $5,181 | $16,438 | $27,137 |
| Crane Rental Cost | $3,000 | $8,400 | $14,400 |
| Stevedoring Cost (ship-to-shore) | $4,144 | $16,058 | $31,598 |
| Other Costs * | $5,039 | $7,718 | $9,687 |
| *Port Related Subtotal* | $17,365 | $48,615 | $82,823 |
| Steaming Cost | $2,504 | $3,336 | $4,680 |
| Pilotage and Tug Hire Costs | $2,978 | $6,469 | $9,119 |
| *Vessel Related Subtotal* | $5,483 | $9,806 | $13,800 |
| TOTAL CHARGES | $22,848 | $58,421 | $96,623 |
| Total Cost Per Move (inclusive) | $228.48 | $166.92 | $161.04 |

*Includes costs such as harbor fee, U.S. Govt. fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

TABLE 32
VESSEL AND CONTAINER CHARGES IN JACKSONVILLE

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TABLE 32
VESSEL AND CONTAINER CHARGES IN JACKSONVILLE

## Cost/call and Cost/Move Comparisons for the Five Ports

*Figures 34* and *35* summarize the total cost per call and cost per move comparisons for the container operations analyzed at the five ports. *Figures 36 ,37* and *38* summarize comparisons of specific cost elements/categories (i.e. dockage and wharfage, crane rental costs, stevedoring costs, pilotage and tug hire, etc.) for each port by vessel size/lot size analyzed on a per ship call basis. *Figures 39 ,40* and *41* make similar comparisons on a per move basis.

## Cost/call and Cost/Move Comparisons for the Five Ports

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rail docks, scheduled for completion in mid-1996. Additional warehouse storage is scheduled for construction over the next several years.

Auxiliary equipment available at the terminal includes cranes, dozers, front-end loaders and all other equipment as needed. The facility is under the continuous support of the port's 24-hour waterborne emergency response unit, which operates a 1200 horsepower fire boat, an 800-horse-power fast response/ rescue boat, and two 600-horsepower patrol vessels.

The Bulk Handling Dock at Globalplex measures 570-by-44 feet and is also equipped with upstream and downstream mooring buoys which allow for dockage of Panamax-class vessels. Bulk handling equipment at the terminal includes a 1,200 tons/hour ship loader, a Manitowoc 4600 swing crane with hopper, an upgraded bulk commodities conveyor system capable of running up to 2500 tons/hour, and an 800 tons per hour screw-type unloader scheduled for completion in early 1997.

*Potential Vessel Services and Constraints* - The layout of the dock, separated from the terminal by the levee, will impose constraints on transfer of cargo between the dock and terminal. However, the terminal is strategically located on the Mississippi River and well placed with regard to rail access and highway connections. Market development remains a major challenge.

**Port of New Orleans**

*Physical and Operational Parameters* - The Port of New Orleans has historically been one of the primary load-center ports in the country. The port's strategically advantageous position near the mouth of the Mississippi River, at the river's junction with the GIWW, has enabled New Orleans to serve as the connecting point for deep-sea and inland system traffic.

The Port of New Orleans is located approximately between miles 81.5 AHP and 114.9 AHP on the Mississippi River. It has 334 piers, wharves, and docks located within its jurisdiction (an area of 22 miles spread along the Mississippi River, the Industrial Canal and the Mississippi River Gulf Outlet). The port offers 22 million square feet of cargo handling area within its various facilities.

Primary import commodities at the Port in order of tonnage are iron and steel, coffee, forest products, natural rubber, cordage and twine, refrigerated cargo, synthetic rubber, and construction and building equipment. Major export commodities in order of tonnage are forest products, iron and steel, bagged grains and flour products, sugar, soybeans and soybean products, vegetable oils, fabric (includes raw cotton), polyethylene, melamine, urea resins, and synthetic rubber.

The Port of New Orleans has upgraded its infrastructure by investing $215 million during the last five years. Such projects provide for the construction of modern, specialized port facilities and the modification of existing facilities to provide expanded berthing and cargo storage capacity. The projects are divided into six sections:

**Mississippi River Facilities** - includes the construction of 3,170 linear feet of heavy duty bulkhead and 13 acres of marshaling areas between the Nashville Avenue and Napoleon Avenue wharves (resulting in 10,000 continuous linear feet of bulkhead along the river); replacement of the front apron of Napoleon Avenue Wharf "C"; construction of a 767 linear foot open wharf, in front of the Milan Street Wharf; construction of approximately 30,000 square feet of wharf deck upstream of the Milan Street Wharf; a 50-foot wide connection between the Harmony Street and Louisiana Avenue wharves; a study of the Tchoupitoulas Corridor; the demolition of the existing transit shed on Louisiana Avenue Wharf "F" and construction of a larger shed; concrete paving of 2.8 acres of upland area connected to Louisiana Avenue Wharf "F"; and railroad track improvements.

**France Road Terminal** - includes the construction of a flood wall to protect against terminal flooding; modifications and refurbishing to meet tenant requirements at Berths one and four; paving to those areas at Berths five & six that have not been surfaced due to settlement in the area; site preparations at port property adjacent to the France Road Terminal; construction of an intermodal terminal for transfer of container carrying rail cars to the France Road Terminal; and the construction of a guarded entrance to the terminal.

**Jourdan Road Terminal** - includes the installation of steel sheet pile breasting dolphins to permit berthing for Ro/Ro vessels; and modifications at the terminal to meet tenant requirements.

**Maintenance** - includes general facility maintenance and bridge maintenance for the St.Claude Avenue, Florida Avenue, L&N, and Sea Brook bridges.

**Equipment** - includes the purchase of a container crane installed at France Road Terminal Berth six and the purchase of cranes for Berths four and five at the France Road Terminal.
**Miscellaneous Projects** - includes Rivergate asbestos abatement, port security, generic terminal improvements, joint ventures, commerce park (a proposed commercial industrial park in Jefferson Parish), planning for a new office building, warehouse storage, and land acquisition.

*Potential Vessel Services and Constraints* - The Port of New Orleans is an ideal location in terms of physical, operational and institutional infrastructure for the four targeted vessel services: River/Ocean vessel services, short sea coastal vessel service, fast-ferry trailer service and refrigerated vessel services. Impediments include the lack of the following: "on terminal" cold storage facilities, established "service infrastructure" in terms of specialized cargo brokers, quality inspectors and technicians, and strong networking with Mexican importers and exporters.

**St. Bernard Port**

*Physical and Operational Parameters* - The Chalmette Slip owned by the St. Bernard Port is located on the Mississippi River, 90.5 miles from the Gulf of Mexico. The draft in the main channel is 45 feet and alongside the docks the draft is 36 feet. The site is located on St.Bernard Highway (LA Hwy.46), with connections to Interstate-510 two miles to the east and Interstate-10 East/West five miles from the terminal.

The Chalmette Slip is a 1,700-foot long channel, 300 feet wide and 36 feet deep, protruding at an acute angle into the left descending bank of the Mississippi River. As deep draft, calm water harbor on the Mississippi River, the slip is a unique facility. The slip provides safe harbor to vessels loading or discharging cargos.

Dock No.1 occupies the upstream side of the slip. It is 1,300 feet long by 150 feet wide and is divided into three berths. The rear of the dock is served by three rail spur lines. Dock No.1 is currently used primarily for the transhipment of dry bulk materials. Dock No.2 is 1,680 feet long by 150 feet wide and primarily handles break-bulk, neo-bulk, and containers. The rear of the dock is also served by rail and has an additional 150-foot wide marshaling area adjacent to the tracks.

The port has 100,000 square feet of covered space with rail tracks and truck bays. The port has 136.5 acres of yard storage. There are approximately 12 acres of water frontage, 124.5 acres for leasing and one acre of concrete pad. The port does not own any stevedoring equipment. Independent contractors can supply mobile floating cranes as needed.

*Potential Vessel Services and Constraints* - Present port activities are limited to handling dry-bulk and container cargo and direct transfer of break bulk cargo from vessels to barge, rail cars, and trucks. With improvements, additional cargoes could be developed. The location of the port near the Gulf and major industrial areas is advantageous for market development.

**Shallow-Draft Ports on the Mississippi River**

**Port of Lake Providence**

*Physical and Operational Parameters* - The Port of Lake Providence is located on the Mississippi River at mile 484 A.H.P. in the northeast corner of Louisiana in East Carroll Parish. Major facilities available at the port and selected operational parameters are shown in Table III.10. The port has four berths: (1) General Cargo Dock, 50 by 250 feet with an eight inch pipeline; (2) General Cargo Ramp, 30 by 360 feet with an eight inch pipeline; (3) Grain Dock; and (4) Dry Fertilizer Dock.

The access channel to the port is 8,200 feet long and 150 feet wide and is maintained by the Corps of Engineers at 9 feet depth. The water depth is normally 12 feet-plus, with 44 days in the last seven years having less than 12 feet draft in September and October 1991. The turning basin radius of the channel is 400 by 800 feet. The port has a total of 6,600 feet of rail track with the longest continuous track being 4,350 feet. Delta Southern Railway Company of Tallulah provides rail service to the port. The main access road to the port is a hard surfaced blacktop road 1/3 mile long and connected to U.S. 65, a major north-south highway. Interstate-20 is located 30 miles south at Tallulah, LA. Louisiana Highway 2 lies 8.5 miles north of the port and provides a direct east-west connection at Bastrop, 50 miles to the west. Louisiana Highway 134 lies five miles west of the port and provides access to Monroe via Interstate 20, 70 miles to the southwest. Greenville, Mississippi, is 50 miles to the north and Vicksburg, Mississippi is 50 miles to the south.

Major commodities handled at the port are dry-bulk and liquid bulk fertilizer, bulk grain, and cotton seed. General cargo service is provided by open and covered hopper barges 35 by 195 feet with nine feet of draft carrying 1,500 tons. Liquid fertilizer barges are usually 50 by 290 feet with nine feet of draft and carrying 3,000 tons. Approximately 234 barges are served at the port with an annual average of 530,000 tons. General cargo service is provided by open and covered hopper barges typically 35 by 195 feet with nine feet of draft and carrying 1,500 tons. Liquid fertilizer barges are usually 50 by 290 feet with 9 feet of draft and carrying 3,000 tons. Approximately 234 barges are served in an average year. Eight to ten hours are needed to unload a barge at the dock or ramp. It takes approximately five minutes to load a truck from the storage pad and 15-20 minutes to load a rail car.

The general cargo dock and ramp have a 75-ton crawler crane with a four cubic yard clamshell bucket for loading and unloading. The dock has a conveyor belt, 36" by 690 feet, with radial stacker connection to a 72,000 square-foot concrete storage pad. Rail tracks extend to the end of the dock for direct river to rail service. In addition an 8" liquid fertilizer pipeline extends to the end of the dock and ramp.

Adjacent to the dock, connected by a radial stacker, is a 72,000 square foot concrete storage pad. Three acres of flood free auxiliary area are nearby. Three acres of flood prone land lie adjacent to the fertilizer warehouse and are used to store lime and rock. Another three acres of flood prone land lie 1/4 mile south of the dock and are used to store rock.

The port owns three general cargo warehouses: Two 20,000 square foot capacity warehouses and one 4,800 square foot warehouse. The two 20,000 square foot warehouses have aprons to the rail tracks with a total of four truck bays. The 4,800 square foot warehouse has three truck bays and is adjacent to the tracks. The port also has a 21,000 square foot Muskogee warehouse with a hydraulic truck dumper for cottonseed storage with rail and truck access. Construction will soon begin on a new 21,000 square foot Muskogee warehouse for additional cottonseed storage with an expected completion date of August 31, 1996. A Bulk Fertilizer and Landfill project for another port tenant is still in the design phase, with an expected completion date of summer 1997.

*Potential Vessel Services and Constraints* -The port is located on the Mississippi River with good rail and highway access. Its strategic location provides opportunities to attract cargo from

Arkansas, Mississippi and North Louisiana. The port is centrally located as a convenient port of call for any ocean/river service on the Mississippi. As the port has not traditionally handled general cargo, working out initial operational details, market research and development remain major challenges. Another impediment to the port's growth is the lack of flood-free land. Past and current inquiries suggest that any flood free land would be quickly utilized.

**Madison Parish Port**

*Physical and Operational Parameters* - The Madison Parish Port is located on the Mississippi River south of Lake Providence. The port offers a barge dock, 30,000 square feet of warehouse, and a truck weighing scale. The port is served by Delta Southern Rail lines and has 3,718 linear feet of rail spur. The port access road connects to U.S. Highway 65.

*Potential Vessel Services and Constraints* - Cargo handling operations at the Port are limited to dry-bulk and liquid-bulk cargo. Institutional capabilities of the Port at present are limited. Market development and other arrangements for handling general cargo vessels remain challenges. The potential exists for development of River/Ocean vessel services.

**Ports on the Atchafalaya River**

**Port of Morgan City**

*Operational and Physical Parameters* -The Port of Morgan City is located on the bank of Bayou Boeuf (Gulf Intracoastal Waterway) approximately one half mile east of its intersection with the Lower Atchafalaya River in St. Mary Parish. It is 18 miles from the open waters of the Gulf of Mexico. The nearest ports capable of handling 20-foot draft vessels are Lake Charles to the west and New Orleans to the east.

Waterway access south to the Gulf of Mexico is through the Lower Atchafalaya River, which has a 20-foot deep and 400-foot wide channel. Other accessible navigable waterways include the Gulf Intracoastal Waterway, with access north to Baton Rouge, and the Mississippi River. Planned development of rail facilities at the Port of Morgan City will include construction of rail access to Southern Pacific Transportation Company's main east-west route. This main line is located approximately 600 feet north of the port site. The rail spur extending from the Southern

Pacific main line will include 2,000 linear feet of rail spur, and 1,500 linear feet of sidings, and a reinforced concrete loading/unloading dock approximately 20 feet wide and 200 feet long. The rail spur and the loading/unloading dock will provide rail access to the transit shed under construction as well as a proposed transit shed.

Louisiana Delta Railroad will pick up and deliver rail cars at the port site with daily rail service. The design criteria indicate that up to six boxcars may be loaded or unloaded without moving a car string. This will be accomplished by passing through three boxcars adjacent to the dock to reach three outside boxcars. Furthermore, the port expects to acquire a trackmobile through the Surplus Military Properties Program that will be used to switch the rail cars and position them for loading/unloading within the port's facilities. The project should take approximately two years to complete, and rail services may be available to the port in late 1998 or early 1999.

Highway access includes U.S. Highway 90 East to New Orleans with connections to Interstate 10 East and West and Interstate 55 North and 59 North. U.S. Highway 90 West to Lafayette connects with to Interstate 10 East and West and Interstate 49 North. The port is located 1.1 miles from a stretch of U.S. Highway 90 that is designed to handle heavy industrial traffic. Interstate 10 can be accessed via U.S. Highway 90 to traveling 71 miles west to Lafayette or 90 miles east to New Orleans.

Waterfront footage of the dock on Bayou Boeuf totals 839 feet, and the concrete dock is 80 feet wide and 500 feet long. The terminal is designed to handle break-bulk and/or container cargo.

The port site has a total area of 16.14 acres, with 12.39 acres located inside the Corps of Engineers flood wall and 3.75 acres located between the flood wall and Bayou Boeuf. According to the Port Master Plan, future yard expansion includes construction of a paved six-acre truck marshaling yard.

*Potential Vessel Services and Constraints* - The layout of port facilities will impose major operational constraints for rapid vessel turnover. Forklits can transfer cargo between the ship and the transit open yard adjacent to the dock; however, tractor/trailer units must move cargo to other areas of the port site including transfer from the transit shed to the vessels. The port's proximity to the Gulf of Mexico is advantageous for short sea and river/ocean vessel services, the port's distance from major metropolitan areas puts it at a disadvantage.

## Port of Krotz Springs

*Physical and Operational Parameters* - The Port of Krotz Springs is located at mile 47.5 below the juncture of the Atchafalaya River with the Mississippi River near Simmesport and 76 miles above the confluence of the Atchafalaya River with the Gulf Intracoastal Waterway at Morgan City. The Atchafalaya River is maintained at a depth of 12 feet by the U.S. Army Corps of Engineers. At the port, the channel is approximately 1,000 feet wide, providing ample clearances for anchorage and fleeting.

The Port of Krotz Springs is located approximately one-quarter mile from U.S. Highway 190, which is a four lane highway connecting with interstates 10 and 49. The port is located on the Union Pacific Railroad line running from New Orleans and Baton Rouge to Houston. The railroad is joined at Livonia, located seven miles east of Krotz Springs, by the Union Pacific line running north through Alexandria and Shreveport. Connections can be made with the Illinois Central Railroad and Kansas City Southern Railroad main line at Lafayette via a branch from Opelousas.

The port is located on 134 acres, about half of which are occupied, and has six terminals in operation at the present time -- five for handling oil and one for handling grain. Future plans include a general cargo dock with a 75-ton crane. The dock is in the final stages of engineering and construction is expected to be complete in 1997. The next phase of this project, which has already been approved and funded, will include warehousing, parking and liquid storage to complement the dock. The port handled 2.9 million tons in 1995, mainly consisting of liquid-bulk (petroleum) and dry-bulk (grain).

*Constraints and Impediments* - Most of the necessary infrastructure for targeting vessel services will not be available for about two years. Improvements to the port's access road are necessary to accommodate additional traffic. Market research and development to attract general cargo and shippers remain major challenges. However, the port's location in terms of transportation facilities makes it an ideal port for exporting and importing goods generated by local industries.

## Ports on the Red River.

### The Port of Caddo-Bossier

*Physical and Operational Parameters* -The Port of Caddo-Bossier is located at the head of the Red River in Northwest Louisiana four miles south of the city of Shreveport. The Red River navigation channel is nine feet deep by 200 feet wide, allowing six-barge tows on the river. The port owns 2,000 acres of land and approximately 125 of which are earmarked for development of port-related infrastructure. The port has a general cargo wharf and a liquids wharf, both of which can service two standard river barges simultaneously. Two concrete access roads connect the docks to Louisiana Highway 1 and 22,500 linear feet of rail spur is also under construction. A general cargo transit shed, two and one half acre paved yard storage, one-acre coal pile/open storage area, truck/rail certified weigh scales, and 30- and 50-ton bridge cranes are all to be completed in 1996. The port is expected to be fully operational by 1997.

The port is served by a Union Pacific main line rail with access to the Kansas City Southern and Southern Pacific, and has access to Interstate 20 and Interstate 49, allowing extensive north-south and east-west access. The multimodal transportation system at the port is enhanced by the Ark-La-Tex Intermodal Center, a $3,000,000 container freight handling facility, boasting the only double stack capability in the area. Designated a United States Customs port of entry and Foreign Trade Zone Number 145, the port's role as a transportation facilitator will be greatly augmented with the addition of water transportation.

Barge and towing operations and river transportation on the Red River are in the initial stages. The location of a large number of companies at the port is an encouraging sign. Private investment is projected at more than $450 million. The companies committed to or operating at the port site include Red River Terminals (Atlas Processing Company/ Hollywood Marine), Special Oil/Quaker State, Reyncor, Olin, Eagle Asphalt/ Coastal Towing, Neste Trifinery, and Bioenergy Development Corporation.

*Constraints and Impediments* - Because the Red River Navigation Project was completed in 1995, it may take several years to develop a fully operational navigation system with efficient barge supply and towing services. Cargo diversions from rail and trucking to water transportation will be gradual and dependent on the construction of private and public marine

*Potential Vessel Services and Constraints* - The adequacy of the navigation channel which only accommodates small vessels with less than nine-foot draft, must be tested. The winding nature of the North Pass and mud flats on the channel may impose some constraints. The port has potential for River/Ocean vessel service.

- agricultural crops (to $409 million from $245 million)
- petroleum and coal products (to $70 million from $21 million)
- paper and forest products (to $20 million from $10 million)

Importance of Water Transportation to Louisiana Trade with Mexico

Analysis of cargo movements to Mexico from Louisiana, including the fastest growing product categories mentioned above, suggests that water transportation accounted for approximately $527 million or 70 percent of trade recorded with Mexico during 1994.[12] This is the opposite pattern seen from the U.S. aggregate trade data previously shown in *Table 9* and that of other states in trade with Mexico. States such as Texas, California, Arizona, Illinois, Michigan, and other states that have seen NAFTA trade grow significantly via land transport routes are looking to land-based solutions (expansion/completion of interstate highways such as the "I 35 Corridor" project) for improving North/South trade movements between Mexico and their respective states. In contrast, Louisiana trade data with Mexico suggests that emphasis should be placed on water-based transportation solutions as a means of improving existing and future trade movements to and from Mexico. Improving and expanding water transportation services to and from Louisiana ports in routings for North/South trade with Mexico will be a key strategy for generating increased NAFTA trade for the state.

[12]Based upon NPWI analysis of Transborder Freight Movements, Bureau of Transportation Statistics, U.S. DOT (1994/95 data) and Nafta Trade : Past, Present, and Future (Dean International, 1996).

- agricultural crops (to $409 million from $245 million)
- petroleum and coal products (to $70 million from $21 million)
- paper and forest products (to $20 million from $10 million)

Importance of Water Transportation to Louisiana Trade with Mexico

Analysis of cargo movements to Mexico from Louisiana, including the fastest growing product categories mentioned above, suggests that water transportation accounted for approximately $527 million or 70 percent of trade recorded with Mexico during 1994.[12] This is the opposite pattern seen from the U.S. aggregate trade data previously shown in *Table 9* and that of other states in trade with Mexico. States such as Texas, California, Arizona, Illinois, Michigan, and other states that have seen NAFTA trade grow significantly via land transport routes are looking to land-based solutions (expansion/completion of interstate highways such as the "I 35 Corridor" project) for improving North/South trade movements between Mexico and their respective states. In contrast, Louisiana trade data with Mexico suggests that emphasis should be placed on water-based transportation solutions as a means of improving existing and future trade movements to and from Mexico. Improving and expanding water transportation services to and from Louisiana ports in routings for North/South trade with Mexico will be a key strategy for generating increased NAFTA trade for the state.

[12]Based upon NPWI analysis of Transborder Freight Movements, Bureau of Transportation Statistics, U.S. DOT (1994/95 data) and Nafta Trade : Past, Present, and Future (Dean International, 1996).

Forecasted Trade and Direct Jobs Created

Assuming that current commodity flows and trading patterns continue, Louisiana exports to Mexico could double by the year 2000 to almost $1.5 billion and direct jobs totaling over 24,400 could be created annually as a result of this increased export activity.[13]

*Figure 18.* and *Table 10.* show both trade and job growth.

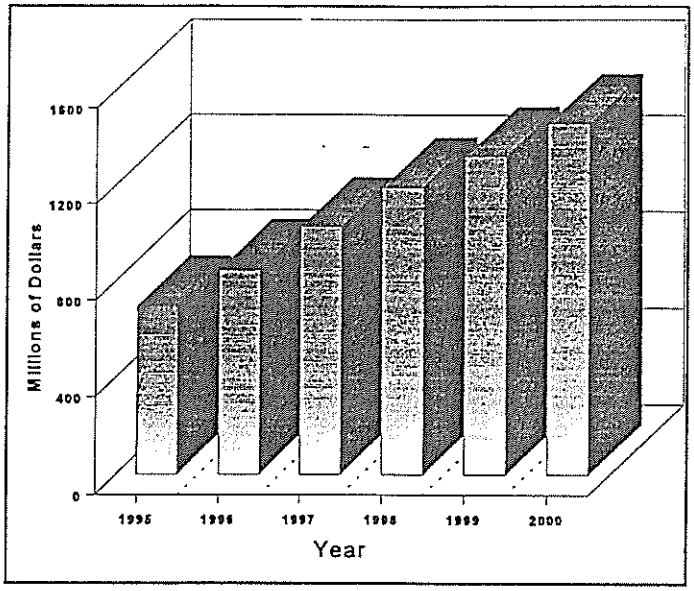


Figure 18. Forecasted Louisiana Exports to Mexico

TABLE 10. EXPECTED LOUISIANA JOBS CREATED

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 |
|---|---|---|---|---|---|---|
| **Forecasted Exports** *Millions ($)* | 693 | 845 | 1,022 | 1,188 | 1,318 | 1,456 |
| **Direct Jobs Created** | 11,642 | 14,203 | 17,185 | 19,967 | 22,143 | 24,468 |

The U.S. Department of Commerce estimates that for each $1 billion generated in international trade about 16,800 new direct jobs are created in the U.S. economy. Assuming proportional job creation by value of trade, and that the current Louisiana trade trends with Mexico will continue, this could mean approximately 17,000 direct jobs attributed to Louisiana waterborne trade with Mexico by the year 2000.

[13]Nafta Trade ; Past, Present and Future (Dean International, 1996) pg. 85.

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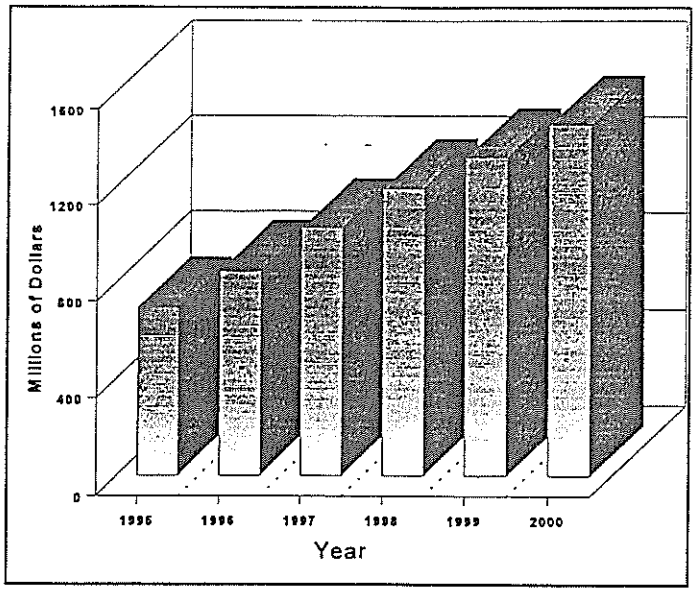

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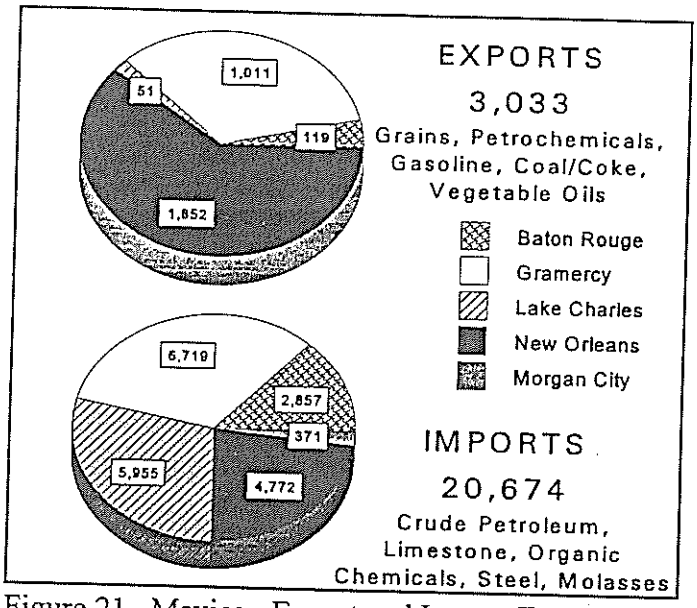


Figure 21. Mexican Export and Import Tonnage Shipped Through Louisiana Ports in 1995 (in 000 short tons) Source: PIERS

Existing Systems for the Inland River / Coastal Movement of Major Bulk Commodity Shipments

Current vessel and maritime service activity is concentrated on coastal deep-sea major bulk movements via tanker or bulker and containerized vessel movements for general merchandise. There is also a well-developed barge feeder system on the lower Mississippi river that can "midstream", or transfer bulk cargos, (i.e. grains, soybeans, fertilizers, petrochemicals) from 1,500-ton jumbo barges into deep-sea vessels of 5,000-15,000 DWT capacities. These existing bulk transfer systems with related docks and infrastructure (i.e. grain elevator and petrochemical distribution systems), will continue to provide deep-sea opportunities from the lower Mississippi waterway network utilizing Louisiana ports for the shipment of major bulk commodity movements of grain and petroleum related products between the U.S. and Mexico. The level of trade for these services will grow as the overall trade with Mexico expands. NAFTA-based benefits of increased general trade could produce volume gains for deep sea/major bulk services averaging six to eight percent annually from approximately the same hinterland areas. However,

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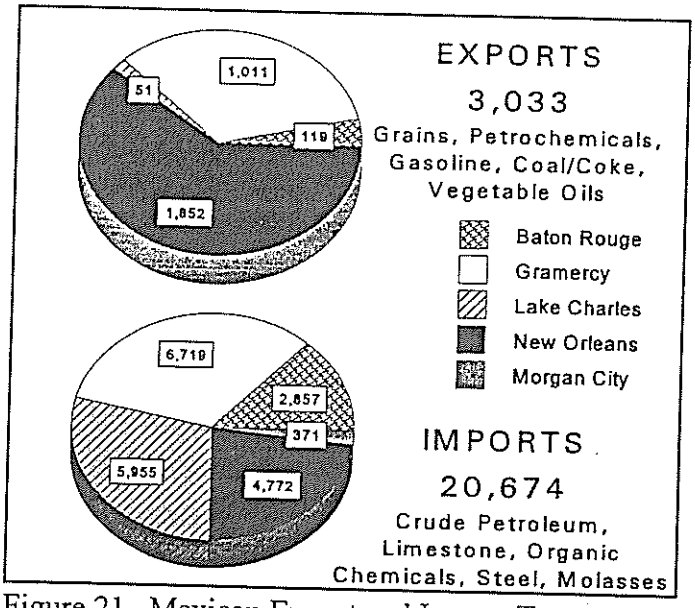


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future market penetration into the Central regions of Mexico and the U.S. from these services are limited unless more competitive intermodal rates and service times are offered for cargos originating or destined to and from the central regions of both countries..

## Emerging Maritime Systems for the Movement of Bulk and General Cargos

### River/Ocean Service

River/ocean (R/O) vessel service is an emerging maritime system that can and should be considered for the movement of minor bulk (i.e. less than 3,000-ton unit shipments) and general/palletized cargos moving in north/south trade between the U.S. and Mexico. This type of maritime service has been sporadically offered since 1994 along the Mississippi inland river system. The most recent service currently operating between Mexico and Louisiana is NAFTA Lines operating the MV. Gulf Viking (1500 DWT) in contract service between proposed U.S. ports of call including Morgan City, St. Bernard, Lake Charles, Houston, and Galveston along with the Mexican Gulf ports of Tampico/Altamira, Tuxpan, Veracruz, Coatzacoalcos, Frontera, Campeche, and Progreso.

Current R/O contract service for NAFTA Lines goes as far north as Little Rock, Arkansas with northbound movements of fertilizer from Mexico. Louisiana inland river ports such as Lake Providence, Krotz Springs, Baton Rouge, Port Manchac, Iberia, Morgan City, and West St. Mary could benefit from this type of service by providing southbound cargos for the contractual R/O service. Minor bulk commodities such as rice, wood pulp, limestone, gravel/aggregates and soybeans already moving southbound to the central and eastern regions of Mexico are typical commodities that could be handled. Palletized general cargos such as plastic resins, fertilizers, bagged rice, paper and newsprint materials, plywood, steel, and canned food products are typical of southbound products/cargos from the above mentioned Louisiana ports that could also be handled by the current R/O service. Limited volumes of containers could also be stored on a ship's deck for southbound movement to Mexico. Current R/O service is providing southbound movement to Veracruz. Contractual rates per metric ton vary between $25-$50 including port costs, with the individual negotiated rates depending on volumes, type of commodity, distance from plant to port, and other contractual variables.

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Additional telephone and in-person interviews were performed on selected large Louisiana shippers in order to assure adequate coverage in certain product categories and to obtain more detailed cost information. Interviews with management of both deep draft and shallow draft Louisiana ports were also conducted to verify existing and potential prospects for NAFTA related cargo movements.

The Trans-Border Surface Freight Transportation Data Base (CD-ROM) covering the period 1993-1995 (March), published by the Bureau of Transportation Statistics, U.S. DOT, was also utilized to identify state and commodity-specific (by value) origin and destination movements for exports to Mexico via all land routings (truck and rail) from Louisiana.

Finally, the Journal of Commerce's database, Port Import and Export Reporting System (PIERS) was provided to the study team by the Port of New Orleans. It allowed the Institute to analyze existing waterborne cargo movements to and from Mexico through Louisiana ports for the 1994-1995 period.

Results from the analysis of the above mentioned database sources, surveys, and interviews were incorporated to assess the current and future market potential for various maritime services in Louisiana highlighted in Chapters II and III, and for comparative cost and service analysis for all-land versus potential intermodal movements to Mexico from Louisiana, discussed in Chapter V. Survey and interview results were also used to recommend market opportunities, strategies, and port infrastructure requirements included in Chapter VII. Potential Louisiana port routings

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TABLE 14. SHORT SEA / COASTAL COST COMPARISON: PLAQUEMINE-MORGAN CITY-VERACRUZ-MEXICO CITY (CHEMICALS)

I. Shipment Profile

*Routing Characteristics:*

| | | |
|---|---|---|
| Origin | Plaquemine, LA | |
| Destination | Mexico City, Mexico | |
| *Using Water Service:* | | miles |
| From Origin | Plaquemine, LA | 0 |
| To Loading Port | Morgan City, LA | 100 |
| To Discharging Port | Veracruz, Mexico | 860 |
| To Destination | Mexico City, Mexico | 250 |
| TOTAL MILEAGE | | 1,210 |
| *All Land:* | | miles |
| From Origin | Plaquemine, LA | 0 |
| To Border Crossing | Laredo/Nvo. Laredo | 544 |
| To Destination | Mexico City, Mexico | 720 |
| TOTAL MILEAGE | | 1,264 |

*Cargo Characteristics:*

| | | |
|---|---|---|
| Commodity | Chemicals | |
| Typical cargo volume | 10,000 | metric tons |
| Truckload | 20 | metric tons |
| Number of trucks | 500 | |

II. Total Cost/Freight Calculations:

*Using Coastal Service*

| Description | Unit | Value | |
|---|---|---|---|
| 1. Inland US (Louisiana) | | | |
| Distance | miles | 100 | |
| Rate per mile per truckload | $ | 1.45 | Reflects lower intrastate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 72,500 | |
| 2. Cross Gulf | | | |
| Typical cargo volume | tons | 10,000 | |
| Rate per ton | $ | 15.00 | |
| Total Cross Gulf Service | $ | 150,000 | |
| 3. Inland Mexico: | | | |
| Flat rate per truck (FNM) | $ | 300.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 150,000 | |
| Grand Total | $ | 372,500 | |

*All Truck*

| Description | Unit | Value | |
|---|---|---|---|
| 1. Inland US (Louisiana/Texa | | | |
| Distance | miles | 544 | |
| Rate per mile per truckload | $ | 1.75 | Reflects higher interstate rate structure. |
| Number of trucks | | 500 | |
| Total Inland US | $ | 476,000 | |
| 2. Inland Mexico | | | |
| Flat rate per truck | $ | 775.00 | Actual market rate reflecting lane/volume imbalances. |
| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 387,500 | |
| Grand Total | $ | 863,500 | |

III. Modal Comparison:

| | $ | $/mt |
|---|---|---|
| Intermodal (using Coastal vs | 372,500 | 37.25 |
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| Number of trucks | | 500 | |
| Total Inland Mexico | $ | 387,500 | |
| Grand Total | $ | 863,500 | |

III. Modal Comparison:

| | $ | $/mt |
|---|---|---|
| Intermodal (using Coastal vs | 372,500 | 37.25 |
| All Truck | 863,500 | 86.35 |
| Difference | 491,000 | 49.10 |

TABLE 19. SUMMARY OF RATE AND SERVICE COMPARISONS FOR TRAILER FERRY SERVICE

| From | Transportation Options | $/Unit | Days | | Equipment | $/ton |
|---|---|---|---|---|---|---|
| | | | Travel | Frequency | | |
| Atlanta | (a) Existing Land | 2,514 | 5.0 | 1.0 | 48' | 112 |
| | (b) Existing Maritime | 1,967 | 10.0 | 7.0 | 40' | 106 |
| | (c) Proposed Maritime | 1,858 | 5.5 | 2.0 | 48' | 83 |
| | (b) - (a) | (547) | 5.0 | | | (5) |
| | (c) - (a) | (656) | 0.5 | | | (29) |
| Charlotte | (a) Existing Land | 2,856 | 5.5 | 1.0 | 48' | 127 |
| | (b) Existing Maritime | 2,050 | 9.0 | 7.0 | 40' | 111 |
| | (c) Proposed Maritime | 2,107 | 6.5 | 2.0 | 48' | 94 |
| | (b) - (a) | (806) | 3.5 | | | (16) |
| | (c) - (a) | (749) | 1.0 | | | (33) |
| Chicago | (a) Existing Land | 2,872 | 7.0 | 1.0 | 48' | 128 |
| | (b) Existing Maritime | 2,230 | 10.0 | 7.0 | 40' | 121 |
| | (c) Proposed Maritime | 2,317 | 6.5 | 2.0 | 48' | 103 |
| | (b) - (a) | (642) | 3.0 | | | (7) |
| | (c) - (a) | (555) | (0.5) | | | (25) |
| Indianapolis | (a) Existing Land | 2,833 | 5.0 | 1.0 | 48' | 126 |
| | (b) Existing Maritime | 2,534 | 10.0 | 7.0 | 40' | 137 |
| | (c) Proposed Maritime | 2,300 | 6.5 | 2.0 | 48' | 102 |
| | (b) - (a) | (299) | 5.0 | | | 11 |
| | (c) - (a) | (533) | 1.5 | | | (24) |
| Memphis | (a) Existing Land | 2,153 | 5.0 | 1.0 | 48' | 96 |
| | (b) Existing Maritime | 2,295 | 12.0 | 7.0 | 40' | 124 |
| | (c) Proposed Maritime | 1,726 | 5.5 | 2.0 | 48' | 77 |
| | (b) - (a) | 142 | 7.0 | | | 28 |
| | (c) - (a) | (427) | 0.5 | | | (19) |
| New Orleans | (a) Existing Land | 1,912 | 4.0 | 1.0 | 48' | 85 |
| | (b) Existing Maritime | 1,950 | 5.0 | 7.0 | 40' | 105 |
| | (c) Proposed Maritime | 1,300 | 4.5 | 2.0 | 48' | 58 |
| | (b) - (a) | 38 | 1.0 | | | 20 |
| | (c) - (a) | (612) | 0.5 | | | (27) |
| New York | (a) Existing Land | 3,126 | 6.0 | 1.0 | 48' | 139 |
| | (b) Existing Maritime | 2,425 | 10.0 | 7.0 | 40' | 131 |
| | (c) Proposed Maritime | 2,458 | 7.5 | 2.0 | 48' | 109 |
| | (b) - (a) | (701) | 4.0 | | | (8) |
| | (c) - (a) | (668) | 1.5 | | | (30) |
| Pittsburgh | (a) Existing Land | 2,773 | 5.0 | 1.0 | 48' | 123 |
| | (b) Existing Maritime | 2,760 | 10.0 | 7.0 | 40' | 149 |
| | (c) Proposed Maritime | 2,424 | 7.5 | 2.0 | 48' | 108 |
| | (b) - (a) | (13) | 5.0 | | | 26 |
| | (c) - (a) | (349) | 2.5 | | | (16) |
| St. Louis | (a) Existing Land | 2,495 | 5.0 | 1.0 | 48' | 111 |
| | (b) Existing Maritime | 2,535 | 10.0 | 7.0 | 40' | 137 |
| | (c) Proposed Maritime | 2,304 | 6.5 | 2.0 | 48' | 102 |
| | (b) - (a) | 40 | 5.0 | | | 26 |
| | (c) - (a) | (191) | 1.5 | | | (8) |
| Tampa | (a) Existing Land | 2,219 | 5.0 | 1.0 | 48' | 99 |
| | (b) Existing Maritime | 2,100 | 10.0 | 7.0 | 40' | 114 |
| | (c) Proposed Maritime | 1,823 | 5.0 | 2.0 | 48' | 81 |
| | (b) - (a) | (119) | 5.0 | | | 15 |
| | (c) - (a) | (396) | 0.0 | | | (18) |

*Note:*

Rate comparisons are intended to compare maritime options (existing and proposed) with existing land options.

U.S. imports of fruits and vegetables from the Central American countries and Mexico are transportation cost sensitive. Interviews with port officials and importers indicated that transportation costs constitute a significant portion of the wholesale cost of these commodities. For example, the actual production cost to U.S. markets of honeydew melons in Mexico is about $4 per case and cantaloupes about $6.[3] Transportation costs for these products range from between $6-$9 per case. The total wholesale market cost is about $13-$15 per case with transportation cost, accounting for at least 50 percent. Transportation is therefore one of the major factors considered, and shippers are always trying to reduce these costs.

**Evaluation of Transportation Costs for Perishable Imports from Mexico**

Cost analysis concentrated on identifying transportation costs for direct truck and water shipments of fresh & frozen fruits and vegetables from Mexico to the United States with particular attention given to shipments via the Port of New Orleans.

Two transportation scenarios were evaluated. A truck transportation scenario considered direct shipments from Mexican points of origin to U.S. destinations. A water transportation scenario involved truck shipments from Mexican points of origin to the Port of Veracruz, water shipment from Veracruz to the selected U.S. ports of entry, cargo transfer at these ports, and truck transportation from U.S. ports to the selected U.S. destinations. The total transportation costs for each scenario for various origin destination points were calculated.

Two origin regions for Mexican perishable exports were considered North and West Mexico (Sonora) and the Eastern Region. These two regions are the major producers of perishables shipped to the U.S. Eight U.S. destination points were selected including Chicago, New York, Philadelphia, New Orleans, St. Louis, Memphis, Dallas, and Birmingham. Five U.S. ports of entry were selected: Philadelphia, Tampa, Charleston, New Orleans, and Houston.

Truck transportation cost estimates were developed for direct land shipments from Mexico to the U.S. and for movements to and from ocean ports within the water transportation scenario. The

[3]Op. Cit. U.S. Department of Agriculture, study of Mexican fruit and vegetable production factors (1993).

cost estimates were developed on the same assumptions. Data for the estimates were obtained from interviews with trucking companies, cold storage operators, and the U.S. Department of Agriculture, AMS Fruit and Vegetable Fleet Truck Cost Reports. More than 45 individual quotes for various origin-destination points were received.

The U.S. Department of Agriculture, AMS, Fruit and Vegetable Fleet Truck Cost report for April 1996 estimated the average cost for a fruit and vegetable truck fleet to be $1.36 per mile[4]. An average quoted rate per mile per truck for shipments of FFFV amounted to $1.44. An average tonnage per load differs depending on the type of carried fruits and vegetables. For example, a typical full truckload of tomatoes consists of 1,600 25-pound packages which totals 40,000 pounds. A typical full truck-load of melons amounts to 700 85-pound cartons or 59,500 pounds per truckload. Based on the structure of FFFV imports from Mexico, it was assumed that an average truckload for this trade amounted to 24 tons. Therefore, an average rate of $0.06 per ton per mile was used for truck transportation cost estimates.

Direct Truck Shipments and Truck Shipments To/From Ocean Ports

*Table 20* provides information on the distances and estimates of truck transportation costs from Mexico to the selected U.S. destinations. It was assumed that an average distance from the North-West region of Mexico to Nogales is 400 miles, and from the Eastern Region to Laredo 500 miles.

Distances from border crossing points to U.S. destinations were obtained from the U.S. road atlas. The calculated total transportation distance was multiplied by $0.06 to estimate the total truck transportation cost. The results of these calculations are shown in *Table 21.*

To provide necessary information for the evaluation of water transportation scenarios, the distances and costs of truck transportation from Mexican production centers to Veracruz, and from the U.S. ports of entry to inland destinations, were estimated. It was assumed that an average truck shipment from North-West Mexico FFFV production points to the Port of Veracruz amounts to 1,000 miles, and from the Eastern Region production centers 100 miles. Distances from the U.S. ports of entry to inland destinations were obtained from the U.S. road

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[4] USDA, AMS, Fruit and Vegetable Fleet Truck Cost Report, April 1996.

The quoted ocean freight rates (per ton) to the following destinations are as follows: Gulf ports $70, Charleston $75, and Philadelphia $80. (*Table 22.*)

Cargo Handling Costs and Total Transportation Costs

Based on interviews with port authorities and shipping lines, it was assumed for the purposes of this analysis that cargo handling rates are $20 at U.S. entry ports, and $10 at the Port of Veracruz.

The developed rate estimates for truck, ocean freight, and cargo handling charges were used to estimate the total transportation cost for various scenarios for FFFV shipments between Mexico and the U.S. by truck and water. The results of the total transportation cost calculations, and transportation cost difference between water shipments via New Orleans and other routes, are shown in *Tables 23* and *24* and *Figures 27 and 28.*

The developed transportation cost estimates indicate that at the current truck rate structure and the quoted ocean freight rates, the Port of New Orleans is not competitive for shipments of FFFV from Mexico. Although water shipments via New Orleans to St. Louis and Memphis are cheaper than those via the competitive ports, FFFV can be delivered from Mexico to these destinations directly by truck at significant cost savings. This is related to New Orleans' proximity to Mexico. Due to relatively short distances involved in water shipments between Mexico and New Orleans, transportation cost advantages resulting from ocean transportation are significantly lower than for longer routes. The difference in the quoted ocean freight for shipments to New Orleans and Philadelphia amounts to only $10 per ton, despite a significant difference in distance. The estimates indicate that water transportation provides savings over truck transportation for shipments via Philadelphia destined to the East Coast. However, truck transportation is the most competitive mode of transportation for FFFV shipments to the U.S. Midwest destinations.

The transportation cost disadvantage of New Orleans for shipments of Mexican FFFV can be illustrated using an example of shipments from the East Mexico region to Chicago. The total truck transport distance for water shipment via New Orleans involves 1,128 truck miles (to the Port of Veracruz and from the Port of New Orleans). The total direct truck movement is 1,903 miles. On the assumption that truck transportation rates are proportional to the distance, and rates are equal to the national average of $0.06 per ton per mile, with total cargo handling

TABLE 22 : WATER TRANSPORTATION SCENARIO, ESTIMATED TOTAL TRANSPORTATION COST PER TON, IMPORT OF FRESH FRUITS AND VEGETABLES FROM MEXICO.

*I. Ocean Freight From Veracruz to Selected U.S. Ports and Port Cargo Handling Charges*

| U.S. Ports of Entry | Ocean Freight | Cargo Handling Charge | | Ocean Freight and Cargo Handling |
|---|---|---|---|---|
| | | Veracruz | U.S. Ports | |
| Philadelphia | $80 | $10 | $20 | $110 |
| Tampa | $70 | $10 | $20 | $100 |
| Charleston | $75 | $10 | $20 | $105 |
| New Orleans | $70 | $10 | $20 | $100 |
| Houston | $70 | $10 | $20 | $100 |

*II. Total Cost for Water Transportation Scenario (Ocean Freight, Port Cargo Handling, and Truck Transportation)*

*Shipments Originating in Sonora:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $216 | $177 | $170 | $244 | $224 | $231 | $258 | $223 |
| Tampa | $231 | $229 | $223 | $199 | $221 | $210 | $227 | $195 |
| Charleston | $220 | $212 | $206 | $212 | $216 | $210 | $228 | $194 |
| New Orleans | $222 | $250 | $234 | $170 | $201 | $184 | $190 | $181 |
| Houston | $225 | $260 | $254 | $181 | $207 | $194 | $175 | $200 |

*Shipments Originating in Mexico Eastern Region:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $162 | $123 | $116 | $190 | $170 | $177 | $204 | $169 |
| Tampa | $177 | $175 | $169 | $145 | $167 | $156 | $173 | $141 |
| Charleston | $166 | $158 | $152 | $158 | $162 | $156 | $174 | $140 |
| New Orleans | $168 | $196 | $180 | $116 | $147 | $130 | $136 | $127 |
| Houston | $171 | $206 | $200 | $127 | $153 | $140 | $121 | $146 |

TABLE 23 : TOTAL TRANSPORTATION COST PER TON, WATER AND TRUCK TRANSPORTATION SENARIOS

*1. Water Transportation Scenario:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $216 | **$177** | **$170** | $244 | $224 | $231 | $258 | $223 |
| Tampa | $231 | $229 | $223 | $199 | $221 | $210 | $227 | $195 |
| Charleston | $220 | $212 | $206 | $212 | $216 | $210 | $228 | $194 |
| New Orleans | $222 | $250 | $234 | $170 | $201 | $184 | $190 | $181 |
| Houston | $225 | $260 | $254 | $181 | $207 | $194 | $175 | $200 |

*2. Truck Transportation Scenario:*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Nogales | **$135** | $183 | $185 | **$115** | **$126** | **$111** | $82 | $124 |

## II. Shipments Originating in Mexico Eastern Region:

*1. Water Transportation Scenario:*

| U.S. Port of Entry | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| Philadelphia | $162 | **$123** | **$116** | $190 | $170 | $177 | $204 | $169 |
| Tampa | $177 | $175 | $169 | $145 | $167 | $156 | $173 | $141 |
| Charleston | $166 | $158 | $152 | $158 | $162 | $156 | $174 | $140 |
| New Orleans | $168 | $196 | $180 | $116 | $147 | $130 | $136 | $127 |
| Houston | $171 | $206 | $200 | $127 | $153 | $140 | $121 | $146 |

*2.Truck Transportation Scenario:*

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Laredo | **$114** | $159 | $163 | **$70** | **$94** | **$83** | **$56** | $91 |

TABLE 24. TRANSPORT COST DIFFERENCE PER TON BETWEEN WATER SHIPMENTS VIA NEW ORLEANS AND MOST COMPETITIVE ROUTE

| | U.S. Destinations | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Chicago | New York | Philadelphia | New Orleans | St. Louis | Memphis | Dallas | Birmingham |
| From Sonora : | $87 | $73 | $64 | $55 | $75 | $73 | $108 | $57 |
| From MER : | $54 | $73 | $64 | $46 | $53 | $47 | $80 | $36 |

transportation for shipments via Philadelphia destined to the East Coast. However, truck transportation is the most competitive mode of transportation for FFFV shipments to the U.S. Midwest destinations.

The transportation cost disadvantage of New Orleans for shipments of Mexican FFFV can be illustrated using an example of shipments from the East Mexico region to Chicago. The total truck transport distance for water shipment via New Orleans involves 1,128 truck miles (to the Port of Veracruz and from the Port of New Orleans). The total direct truck movement is 1,903 miles. On the assumption that truck transportation rates are proportional to the distance, and rates are equal to the national average of $0.06 per ton per mile, with total cargo handling charges at ports of $30, the water transportation leg should amount to $16 per ton to make the water transportation scenario equally attractive to the truck transportation alternative. This is much lower than the current $70 per ton rate quoted for the Veracruz-New Orleans shipments by shipping lines.

The Institute's previous research has indicated that about 150,000 tons annually combined in both directions would be needed to sustain a weekly type of service. Interviews with potential service users indicate that this type of service may have to be extended north outside of Louisiana up to about Memphis, Tennessee in order to attract the regular volumes of cargos necessary for a viable longer term service. Potential industries such as rice producers, forest product plants, and plastic resin chemical producers seem the most likely to benefit from R/O service to Mexico. Midstreaming charges from barge to vessel, currently averaging three dollars per ton in the lower Mississippi, could also be eliminated. Flexibility on pilotage charges for such services may be critical but initial concessions have already been given to the current service offered by Nafta Marine Express.

While this type of maritime service may not be as attractive to significant rail users, shippers currently utilizing trucks within 150 miles of a Louisiana port of loading will find River/Ocean service to be a competitive option. Provision by the port for free storage/ consolidation for shipments of between 300 tons to 1,500 tons will be needed to attract sufficient volumes required for regular R/O services.

**Short Sea Coastal Service**

Although coastal services would generally require larger lot shipments of 5,000 - 10,000 tons to Mexico, interviews with Louisiana based shippers and a review of current cargo movements indicate that sufficient volume appears to be available from imports and exports currently moving via fully loaded rail cars or trucks of cargos such as steel, chemicals, grains, forest products, and plastic resins moving to and from the central and eastern regions of Mexico and Louisiana. Short sea coastal services could provide intermodal rate savings of 10-15 percent over loaded rail car shipments of similar products to and from Louisiana and Mexico City. Savings over shipment by truck to Mexico City would be higher and are estimated at 25-30 percent from Louisiana to and from Mexico City.

In order to obtain these potential savings for shippers, Louisiana ports should consider offering port storage under "free-time" or other agreements to consolidate existing rail car and truck shipments into larger lot movements. Coastal services would provide these larger movements into Mexico's eastern and Central regions. Lot sizes of 5,000 - 10,000 tons would be needed to obtain the saving mentioned above.

## Trailer Ferry Service

Market potential for such a service would appear to be quite large and would extend through the midwest and eastern portions of the U.S. provided that good intermodal connections can be maintained from a Louisiana port offering the service. The institute's previous research indicates that an annual volume of 50,000 trailers, or about a seven percent market share of current land volumes, would be necessary to make the service viable. The study team believes that the port of New Orleans currently has superior rail and road connections to major trade lane corridors engaged in U.S.-Mexican trade that are necessary for the larger market potential for such a service. Cost analysis indicates that at current market rates, savings of between 15-20 percent could be achieved for shippers currently moving cargo via all land routings from the central and eastern portions of the U.S. to the central and eastern portions of Mexico. Additionally, the port of New Orleans has current roll-on/roll-off facilities at the France Road Terminal to begin such a service with minimal terminal improvements needed. Service at other Louisiana ports would require construction of an on-dock roll-on/roll-off berth. Unlike previous negotiations with CSX Transportation during 1994-95 when New Orleans was considering a project to provide rail ferry service, the study team would recommend support of a ferry service focusing entirely on the movement of truck trailers. This type of service should also be considered a public of service offered to all potential users and require substantially less up front port investments.

## Refrigerated Service for Fresh and Frozen Fruits and Vegetables

A significant volume of Mexican perishables (fruits/vegetables) is shipped in small volumes and is therefore dominated by the trucking mode of transportation. The development of water transportation as a viable option would necessitate cargo consolidation/distribution at Mexican and U.S. Gulf Coast ports. This means that modern refrigerated cargo handling facilities located on-dock at both locations are needed to facilitate cargo consolidation and distribution to hinterland markets in the midwestern and southern regions of the U.S.

In order to minimize the possibility of cargo damage with intermodal transfer, specialized refrigerated cargo terminals will need to be designed and developed to offer modern cargo handling technologies similar to those offered at competitive ports (i.e. Gulfport and Tampa).

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In order to minimize the possibility of cargo damage with intermodal transfer, specialized refrigerated cargo terminals will need to be designed and developed to offer modern cargo handling technologies similar to those offered at competitive ports (i.e. Gulfport and Tampa).

Another important variable is the commodity and its characteristics. Items such as unit size, weight, shape, and density can effect actual transfer rates. Finally, the experience factor of the workforce and even demographic factors such as average age of the gang can influence cargo handling rates. For example an experienced crane operator will have significant influence over the "pick rate," or number of moves recorded by various port stevedoring companies. The experience of entire gangs in handling certain types of cargos will also have a major influence over recorded hourly transfer rates, and can directly influence crane downtime results. For certain types of cargos such as bagged goods, a younger workforce or gang composition will usually outperform an older workforce because of obvious physical and stamina related issues. For example, one of the reasons given for Lake Charles' relatively high productivity rates for bagged agricultural products such as rice, flour, and animal feeds was the relatively low average age (i.e. 28 years on average) of labor employed in the gangs. Averaging 55 tons per gang hour for bagged dry bulk gives the Port of Lake Charles over 36 percent advantage above its next closest port competitor, Gulfport.

***Containers***

The Port of New Orleans, Louisiana's main container handling port, compares favorably for large-scale container handling output with average handling rates between 26 to 33 moves per hour using gantry crane equipment. Private terminal operations at the Sea-Land facility reported even higher output rates of between 35 to 38 moves per hour. Only one port in the Gulf region- Gulfport, reported higher average container handling rates of 32 to 38 moves per hour. Charleston, in the South Atlantic region, reported container handling rates between 34 to 36 moves per hour using similar equipment. A summary of comparative container handling rates (excluding ships' gear) is presented in *Figure 29*.

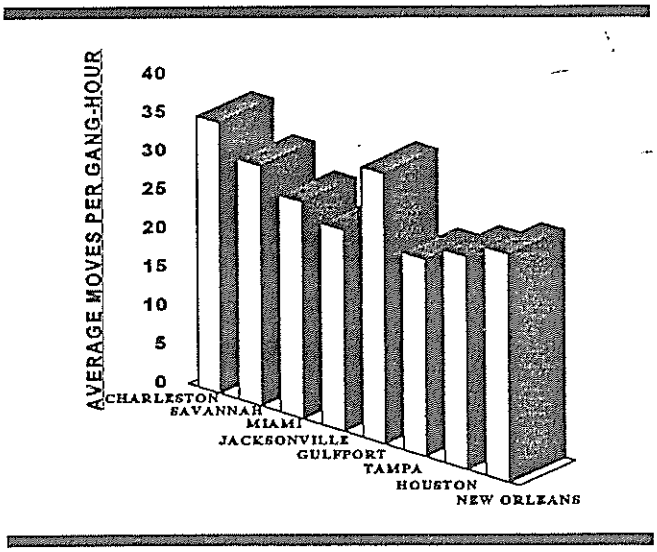


Figure 29
Container Handling Rates

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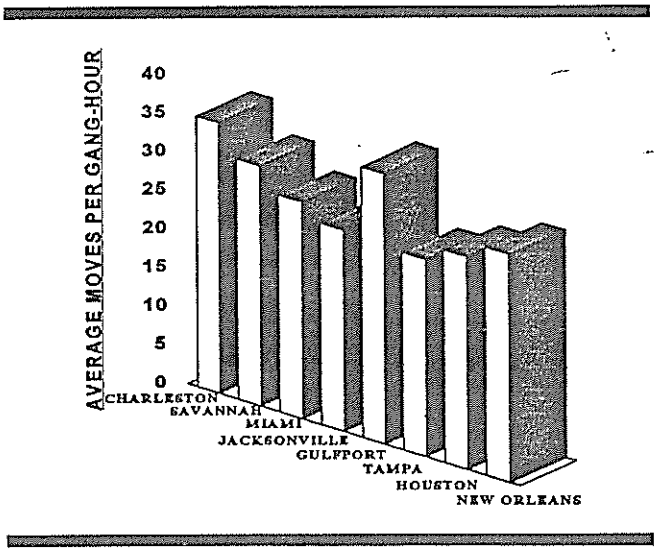


Figure 29
Container Handling Rates

*Steel*

New Orleans and Houston have the highest ship-to-shore handling rates of ports in the Gulf region for steel products such as steel coils and pipe-related cargos. Both ports average 100-120 tons per gang hour for coils and about 60 tons per gang hour for pipe. This could be one factor in the continued increase of steel tonnage through the Port of New Orleans.

South Atlantic ports (Charleston, Jacksonville, and Savannah) reported higher steel handling rates of 140-150 tons per gang hour for coil-related cargos and 65 tons per hour handled for pipes. Lake Charles and Baton Rouge have steel-handling rates for coils comparable to Gulfport at about 60 tons per hour. A graphical summary of steel related handling rates (coil related cargos) by port is summarized in *Figure 30.*

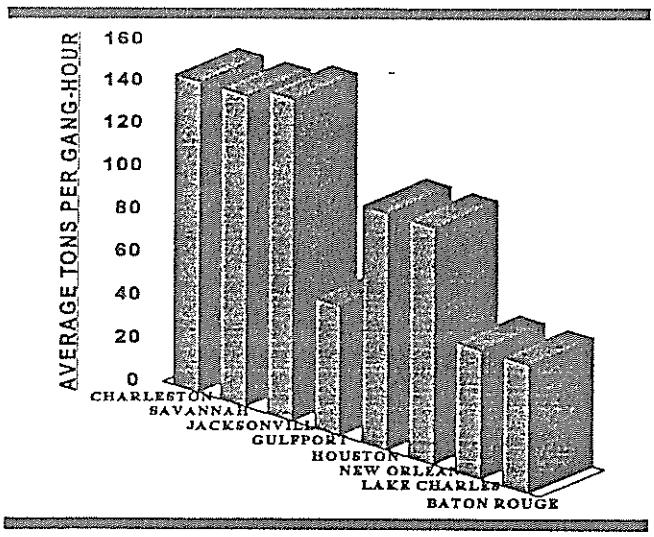


Figure 30.
Steel Handling Rates

***Lumber Products***

Handling rates for lumber related products vary significantly by the type of product (i.e. logs, plywood/finished lumber). *Figure 31* graphically breaks out both types of commodities among the ports surveyed. New Orleans, Baton Rouge, and Lake Charles have comparable handling rates for both finished lumber, at about 80 to 90 tons per gang hour versus 80,000 to 120,000 board-feet per gang hour (i.e. 80-120 tons/hour.), and for log handling (1000 board feet is roughly equivalent to one ton). The Port of Baton Rouge is actually the highest of the three, reporting average handling rates of about 90 tons per gang hour for finished lumber and up to 130,000 board-feet per gang hour (130 tons) for logs. Gulfport reported significantly lower numbers for both categories with 35-40 tons per gang hour for finished lumber and 65,000-90,000 board-feet (65-90 tons) per hour for logs. Houston reported higher handling rates for finished lumber as did the South Atlantic ports of Charleston, Savannah, and Jacksonville. These ports, however, use sophisticated conveyor systems to produce rates close to 300,000 board-feet (300 tons) per gang hour.

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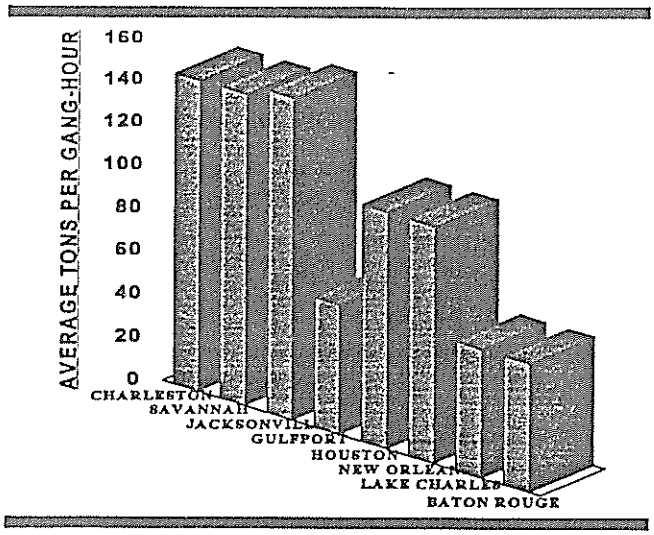


Figure 30.
Steel Handling Rates

***Lumber Products***

Handling rates for lumber related products vary significantly by the type of product (i.e. logs, plywood/finished lumber). *Figure 31* graphically breaks out both types of commodities among the ports surveyed. New Orleans, Baton Rouge, and Lake Charles have comparable handling rates for both finished lumber, at about 80 to 90 tons per gang hour versus 80,000 to 120,000 board-feet per gang hour (i.e. 80-120 tons/hour.), and for log handling (1000 board feet is roughly equivalent to one ton). The Port of Baton Rouge is actually the highest of the three, reporting average handling rates of about 90 tons per gang hour for finished lumber and up to 130,000 board-feet per gang hour (130 tons) for logs. Gulfport reported significantly lower numbers for both categories with 35-40 tons per gang hour for finished lumber and 65,000-90,000 board-feet (65-90 tons) per hour for logs. Houston reported higher handling rates for finished lumber as did the South Atlantic ports of Charleston, Savannah, and Jacksonville. These ports, however, use sophisticated conveyor systems to produce rates close to 300,000 board-feet (300 tons) per gang hour.

*Tables 31* and *32* present similar summary comparisons for the ports of Miami and Jacksonville. Both ports have very active container operations with Miami offering not only a strong demographic advantage for southeastern and local cargo distribution but also container transshipment potential for the Gulf, Caribbean, and Central American regions. Miami's total estimated costs per ship call and estimated costs per move are the second lowest of the ports analyzed. In addition, they are about one-third lower than total costs estimated for New Orleans. In contrast, Jacksonville appears to be the highest cost port for medium and large size vessels of those ports analyzed. Port charges are generally higher in Jacksonville, as are the estimated stevedoring charges, due to lower overall handling rates and higher downtime costs (i.e. gross gang hours charged include payments for non-working periods due to weather or mechanical problems). Crane downtime reportedly has been averaging over eight percent at the port's container facilities versus about 1-3 percent at the other ports surveyed. New Orleans' crane downtime compares favorably at the France Road complex, with about a 1-1.5 percent downtime factor over the last 12 months.

| MIAMI | Small Vessel | Medium Vessel | Large Vessel |
|---|---|---|---|
| Dockage and Wharfage Cost | $2,889 | $8,882 | $14,664 |
| Crane Rental Cost | $2,250 | $5,850 | $9,900 |
| Stevedoring Cost (ship-to-shore) | $2,736 | $10,032 | $20,292 |
| Other Costs * | $5,179 | $7,858 | $9,827 |
| *Port Related Subtotal* | $13,055 | $32,623 | $54,684 |
| Steaming Cost | $0 | $0 | $0 |
| Pilotage and Tug Hire Costs | $2,978 | $6,469 | $9,119 |
| *Vessel Related Subtotal* | $2,979 | $6,470 | $9,120 |
| TOTAL CHARGES | $16,034 | $39,093 | $63,804 |
| Total Cost Per Move (inclusive) | $160.34 | $111.69 | $106.34 |

*Includes costs such as harbor fee, U.S. Govt. fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

TABLE 31.
VESSEL AND CONTAINER CHARGES IN MIAMI

| JACKSONVILLE | Small Vessel | Medium Vessel | Large Vessel |
|---|---|---|---|
| Dockage and Wharfage Cost | $5,181 | $16,438 | $27,137 |
| Crane Rental Cost | $3,000 | $8,400 | $14,400 |
| Stevedoring Cost (ship-to-shore) | $4,144 | $16,058 | $31,598 |
| Other Costs * | $5,039 | $7,718 | $9,687 |
| *Port Related Subtotal* | $17,365 | $48,615 | $82,823 |
| Steaming Cost | $2,504 | $3,336 | $4,680 |
| Pilotage and Tug Hire Costs | $2,978 | $6,469 | $9,119 |
| *Vessel Related Subtotal* | $5,483 | $9,806 | $13,800 |
| TOTAL CHARGES | $22,848 | $58,421 | $96,623 |
| Total Cost Per Move (inclusive) | $228.48 | $166.92 | $161.04 |

*Includes costs such as harbor fee, U.S. Govt. fee, mooring/unmooring, steamship assessment, owners' items, agency fee, etc.

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TABLE 32
VESSEL AND CONTAINER CHARGES IN JACKSONVILLE

## Cost/call and Cost/Move Comparisons for the Five Ports

*Figures 34* and *35* summarize the total cost per call and cost per move comparisons for the container operations analyzed at the five ports. *Figures 36 ,37* and *38* summarize comparisons of specific cost elements/categories (i.e. dockage and wharfage, crane rental costs, stevedoring costs, pilotage and tug hire, etc.) for each port by vessel size/lot size analyzed on a per ship call basis. *Figures 39 ,40* and *41* make similar comparisons on a per move basis.

## Cost/call and Cost/Move Comparisons for the Five Ports

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