Louisiana Transportation Research

Identification of NAFTA-Induced Opportunities for Louisiana's Ports and Waterways

by

Anatoly Hochstein, Ph.D.
Adam Prokopowicz, Ph.D.
Wijepala Jayawardana, Ph.D.
Robert McLaughlin, M.B.A.

Louisiana State University

LTRC
Louisiana Transportation Research Center

Sponsored Jointly by Louisiana State University and the Louisiana Department of Transportation and Development

TECHNICAL REPORT STANDARD PAGE

1. Report No.	3. Recipient's Catalog No.
FHWA/LA-95-3SS (304)	
4. Title and Subtitle Identification of NAFTA-Induced Opportunities for Louisiana's Ports and Waterways	**5. Report Date** June 1996 **6. Performing Organization Code**
7. Author(s) A. Hochstein, R. Mclaughlin, W. Jayawardana, and A. Prokopowicz	**8. Performing Organization Report No.**
9. Performing Organization Name and Address Louisiana State University National Ports and Waterways Institute Helen Carter House, LSU, Baton Rouge	**10. Work Unit No.** **11. Contract or Grant No.** 95-3SS
12. Sponsoring Agency Name and Address Louisiana Transportation Research Center 4101 Gourrier Avenue Baton Rouge, LA 70808	**13. Type of Report and Period Covered** Research Report - Technology Transfer Program **14. Sponsoring Agency Code**

15. Supplementary Notes
Conducted in cooperation with the Louisiana Department of Transportation and Development.

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.

17. Key Words	18. Distribution Statement
(NAFTA), Short sea, River/ocean vessel, Water Bridge/Trailer Ferry	Unrestricted. This document is available through the National Technical Information Service, Springfield, VA 21161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	173	

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

by

Anatoly Hochstein, Ph.D.
Adam Prokopowicz, Ph.D.
Wijepala Jayawardana, Ph.D.
Robert McLaughlin, M.B.A.

National Ports and Waterways Institute
Louisiana State University
Baton Rouge, Louisiana 70803

LTRC PROJECT NO. 95-3SS
STATE PROJECT NO. 736-99-0216

conducted for

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
LOUISIANA TRANSPORTATION RESEARCH CENTER

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 rates and costs obtained from shippers, international freight forwarders/brokers, and transportation service 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 states involved with U.S. Gulf/Mexican Gulf trade, was evaluated qualitatively and quantitatively from site visits, discussions with shippers, freight forwarders, successful maritime operators, and previous work completed by the Institute for Louisiana's Statewide Intermodal Plan (July 1995). Finally, this research effort has proceeded to identify specific maritime services, infrastructure 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 maritime sector resulting from passage of the North American Free Trade Agreement (NAFTA) is the product of the collaborative efforts and feedback received from many interested groups. Our gratitude is extended to, first and foremost, the shippers themselves who took time out from normal activities to respond to in-person, written, and telephone inquiries by the National Ports and Waterways Institute. All real market opportunities must begin with potentially interested customers. Feedback received from the state port managers and shippers on cost and service requirements was extremely valuable in defining the implementation potential of various maritime services utilizing Louisiana's ports and 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.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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.

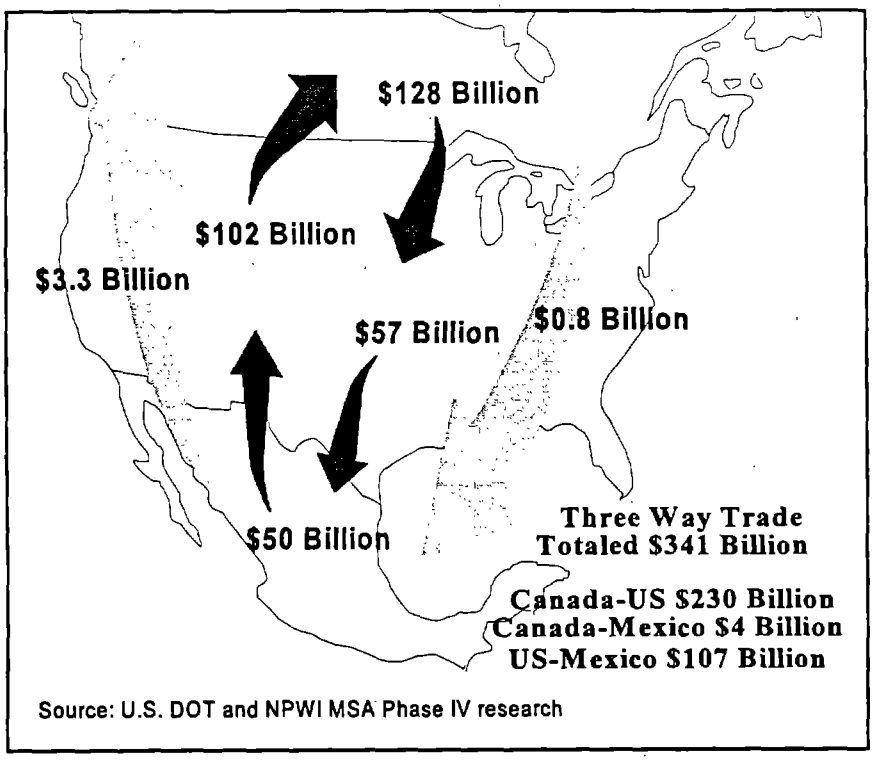


Figure 2. 1994 North American trade

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)

Overall, U.S. trade with Mexico grew 187 percent between 1987 and 1994 while U.S. exports to Mexico increased a cumulative 249 percent to $57 billion during the same period. Exports from Mexico to the U.S. more than doubled during the same period from $20 billion in 1987 to $50 billion by 1994. The Mexican economy had two severe recessions (1986 and 1994) and an approximately 40 percent devaluation of the peso, while the U.S. had one severe recession (1990/91).

Forecasted trade between the United States and Mexico is expected to advance to over $200 billion by the year 2000, as shown in figures 3 and 4.

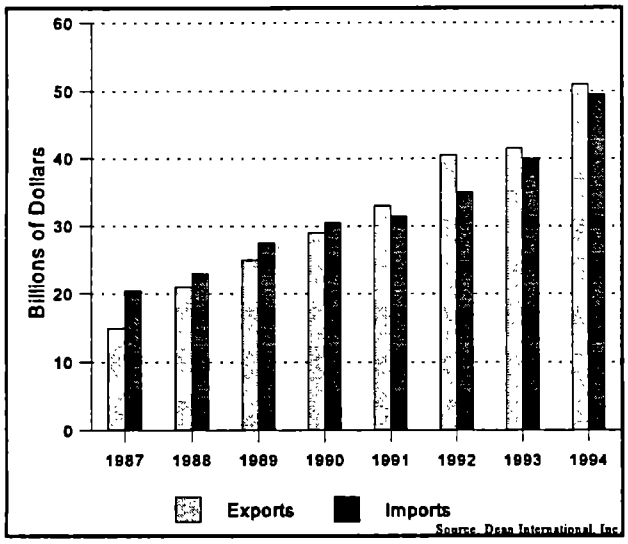


Figure 3. U.S. trade with Mexico

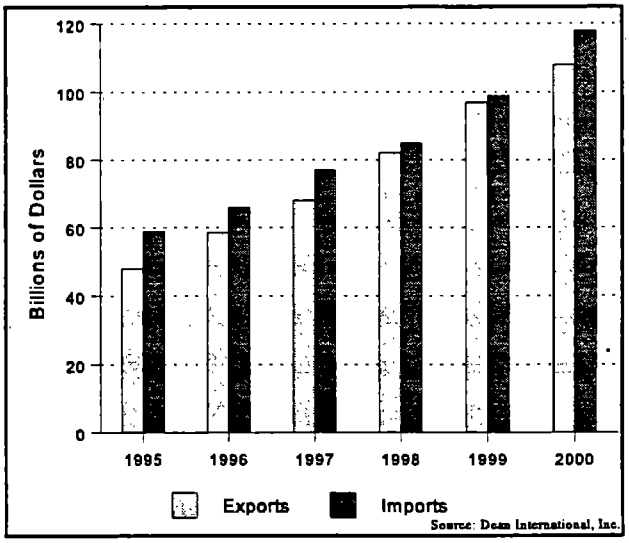


Figure 4. Forecasted U.S. trade with Mexico

Dominance of land based transportation systems in U.S. / Mexican Trade.

Mexico has long been considered an extension of the U.S. land mass by traffic managers and freight forwarders both in the United States and Mexico. With the exception of large bulk movements of lower value products such as crude petroleum, natural gas, gasoline, and coal, water transportation has generally not participated in the growth of cargo volumes between the two countries. A summary of U.S./Mexican exports and imports (since 1989, by mode) shown in *Figures 5 and 6* underscores the fact that over 90 percent of total trade by value before and since the signing of the NAFTA agreement has moved via truck or rail. The water transportation market share of trade has remained relatively flat while land based modal market shares have steadily risen.

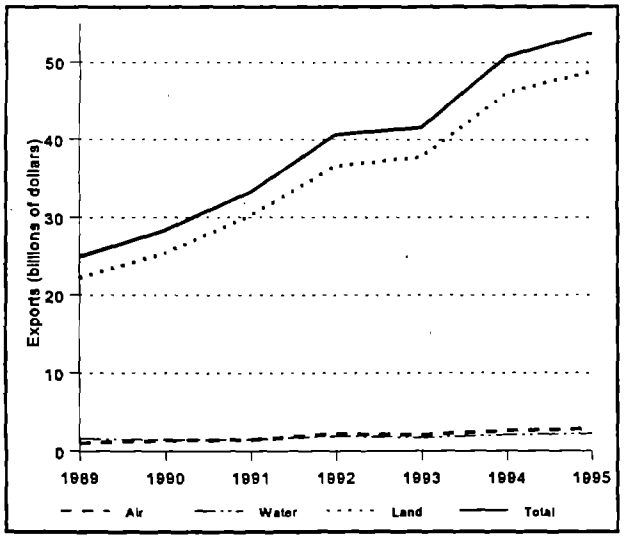


Figure 5. Total U.S. exports to Mexico by mode
Source: USDOT NPWI MSA Study Phases II and III

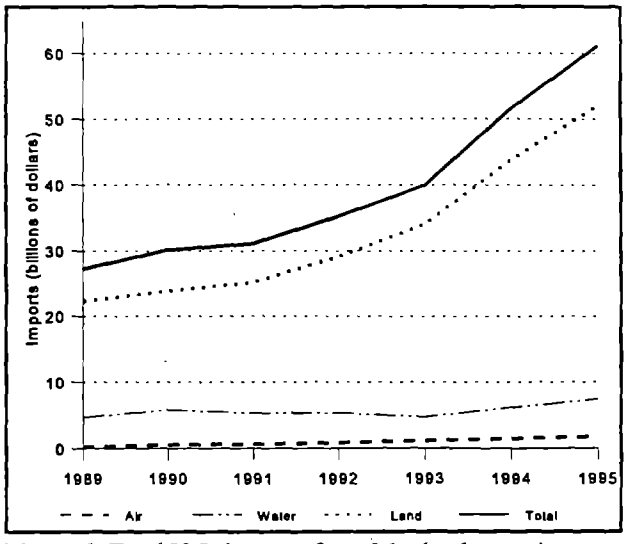


Figure 6. Total U.S. imports from Mexico by mode
Source: USDOT NPWI MSA Study Phases II and III

This increase in land transportation activity has created severe congestion at border crossing points such as Laredo, Texas. During 1995, for example, over 2.5 million trucks were recorded carrying freight to and from border crossing points (almost 50 percent of this volume crossing at Laredo). This border crossing volume is projected to climb to over 6 million trucks by the year 2000.[2]

Land based movement of cargo between the U.S. and Mexico, especially trucking, remains fiercely competitive at current rates per mile generally 6 percent-20 percent lower southbound and 5 percent -15 percent northbound (depending on the specific carrier and origins/destinations) than rates quoted during 1994, the year before the Mexican peso devaluation.[3] In order to improve Mexican rail service to/from the United States, through a privatization program accelerated by the Mexican peso devaluation crisis, the Mexican government announced the ground rules for the sale of its national railway system Ferrocarriles Nacionales de Mexico (FNM). The FNM system has been divided into three segments for which the Mexican

[2]Assessment of Border Crossings and Transportation Corridors for North American Trade; A Report to Congress, U.S. Department of Transportation (September, 1993).

[3]Based upon NPWI recent trucker survey (February, 1996) of point-to-point rates from 9 selected U.S. cities to major destinations in Mexico (Mexico City, Guadalajara, Monterrey, and Yucatan regions).

government is expected to begin auctioning off concessions. Bidding is scheduled in the near future. Large U.S. based railroads, such as Union Pacific, Southern Pacific, and Santa Fe/Burlington Northern, that already have substantial intermodal yard operations and infrastructure investments at various U.S./Mexican border crossing locations are expected to be the principal bidders. Joint venture partners such as Transportation Maritime Mexicana (TMM), Mexico's largest steamship line, and Kansas City Southern are also expected to participate in the concession bidding for FNM segments.

This current study of NAFTA-induced opportunities for Louisiana's ports and waterways seeks to build upon previous national research findings and implications done under the Maritime System of the Americas research program. By identifying specific market opportunities for Louisiana's maritime sector and the appropriate strategies necessary to capture these opportunities, it is hoped that a number of Louisiana ports will take advantage of these strategies and incorporate the findings of this research effort into their own strategic planning and marketing research efforts.

MARITIME SERVICES RELEVANT FOR CURRENT AND FUTURE NAFTA TRADE

Overview and Categorization of Services

There are five distinct types of maritime services currently operating or under active consideration for trade between the United States and Mexico Gulf region. These services include the following:

- Deep sea - current services are regional legs of longer itineraries between the United States, Mexico, Europe, and South America with frequency of calling ranging from weekly to monthly

- Coastal - these services are regional between U.S. and Mexican Gulf ports with calling frequency ranging from weekly to inducement only

- Feeder - regional feeders of deep sea services that do not call Mexico directly, with calling frequency generally bi-monthly

- River/ocean - direct services between Mexico and the lower Mississippi utilizing smaller shallow-draft vessels capable of navigating inland rivers and open sea

- Specialized vessel services- water bridge/ferry/refrigerated reefer direct services between U.S. and Mexican Gulf ports that have targeted markets requiring specialized vessels to handle cargos such as railcars, truck trailer units, and perishable cargos such as fruits and vegetables

As of May 1996, there were eighteen separate shipping line services available between the U.S. and Mexico, with the latest addition being a new river/ocean service from Tuxpan to Little Rock, Arkansas. with calls to Louisiana ports, as inaugurated in April 1996. A summary of these current services and particulars for each is summarized in *Table 1*. A more detailed discussion of each of these types of services follows.

Deep Sea / Conventional

Deep sea services. Most of the containerized traffic between the U.S. and Mexico is currently provided by deep sea vessels requiring water depths generally over 25 feet at berthing facilities. Some larger container vessels (4000-5000 TEU capacity) now utilized in transshipment trade in the region require over 900 feet of berthing space and 40 feet of water alongside berthing facilities. Services to Mexico are generally regional legs of longer itineraries between the U.S., Mexico, North Europe, and South America. The two principal deep sea services included in U.S. Mexican trade are:

- Services between Mexico and Northern Europe, the Mediterranean, and the Middle East which also call at U.S. North and South Atlantic ports

- Services between the U.S., Central America, and South America that call on route to Mexican Gulf Coast ports.

Lykes Lines and TMM (Mexican Line) are the principal deep sea carriers on the North Europe route and operate mid-sized container ships in the 2500 TEU range. Lykes' Chapter 11 reorganization proceedings announced in October 1995 may negatively effect the number and type of vessels deployed in this service. The carriers operating on the Central and South American routes include several smaller lines operating either breakbulk vessels or small (300-400 TEU) container ships.

TABLE 1. SHIPPING LINES SERVICES BETWEEN U.S. AND MEXICO

Type of Service	Shipping Line	Name of Service	Trade Route	No	Type of Vessel	TEUs	Freq. Days	Ports of Call
NORTH EUROPE, MED., & MIDDLE EAST	1 Lykes*	North Atlantic	USGC/EC-Eur	2 3 1	FCC FCC FCC	2,400 1,600 1,500	7	Antw-BH-Felix-LaHV// Norkfolk-Charleston-Miami-Houston// Veracruz// NOLA-Miami-Charleston- Norfolk
	2 TMM (TECOMAR Mexican Line)	North Europe	Mex-NEur	3 2	FCC FCC	2,200 1,900	7	Veracruz-Altamira//Houston-NOLA// Ant-Tamesport-BH//Miami*-Houston//Veracruz
		Mediterranean	Mex-Med	1 1	FCC FCC	816 816	25	Veracruz-Tuxpan*-Altamira//Houston-Mobile// Antwerp-Valencia-Barcelona-Antwerp*//VCZ
	3 Hoegh Lines	Middle East -India	US-ME	2 4 1	BB BB BB	914 1,660 1,708	10-24	NY-Baltimore-Norfolk-NOLA- Mobile// Tampico // Freeport-Houston- Mobile*-Savannah-NY// Middle East-India
	4 Sea-Land**	Med-Gulf Express	USGC-USEC-Med	na	na	na	7	Genoa-Valencia-Algeciras// Charleston-P.Everg.-Miami//Veracrzu-Houston
FEEDER	5 Maersk***	Gulf Feeder	GC	2	FCC	350, 247	14	Veracruz//Houston-NOLA//Kingston//Veracruz
	6 Zim	Caribbean Feeder	GC-Kingston	1	FCC	800	14	NOLA-Houston//Veracruz//Kingston
SOUTH & CENTRAL AMERICA	7 Venezuelan Line	Venezuela	Mex-ECSA	2	BB		14	Venezuela//Veracruz-Tampico//Houston//Venezuela
	8 Frota Amazonica	Brazil	USEC-Mex-USGC	2	BB		30	Jacksonville-Philadelphia-NY//Tampico//Point Confort- Houston-NOLA-Mobile-Miami
	9 Agromar Lines	South American	USGC-SA	4	BB		15	Veracruz (Tampico-Houston-Santa Marta-Bs.Aires-Cartagena-Puerto Limon-Puerto Cortez)
	10 Transnave	Ecuador	US-CA	2	MP	450	15	Miami-NOLA-Houston//Tampico//Cristobal-Ecuador
	11 Meridian Line		USGC-CA	1		206	15	NOLA-Houston//Sto.Tomas (Guatmla.)//Pto. Morelos
RIVER/OCEAN	12 NAFTA Marine Express*	Mexico-US	USGC-Mex	1		170	15	Tuxpan-Little Rock-Tuxpan
COASTAL	13 Crowley	Mexico	USEC-Mex	2	SC	323	7	Port Everglades//Progreso-Veracruz-Tampico
	14 Overseas Enterprises	Mexico-Gulf	USGC-Mex	2	SC	152	15	Veracruz-New Orleans-Houston-Veracruz
	15 Thompson Shipping Co.	Mexico- CA	USGC-CA	1	SC	289	14	Tampa-Progreso
	16 Linea Peninsular	Yucatan	Miss-Yucatan	2	SC	85	7	Port Bienville- Houston-Progreso
	17 VAG Transport	Mexico	USGC-Mex	2	BB	92	7	Veracruz-Houston-Wilmington-Veracruz
	18 Gorthon Lines	Mexico	Florida-Mex	2		290	12	Miami-Veracruz-Port Everglades
	19 IMC	Mexico	USG-Mex	4		80	15	Veracruz-Houston-N.Orleans-Puerto Cabello

Legend:
BB Break Bulk Vessel
FCC Fully Cellular Containership
MP Multi-Purpose Vessel
SC Semi-Container Vessel

* New services started in April 1996.
** New service to start in June 1996. Vessel number and characteristics not available at the moment.
*** Begin direct service to Veracruz from U.S. on April 22th 1996.

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.

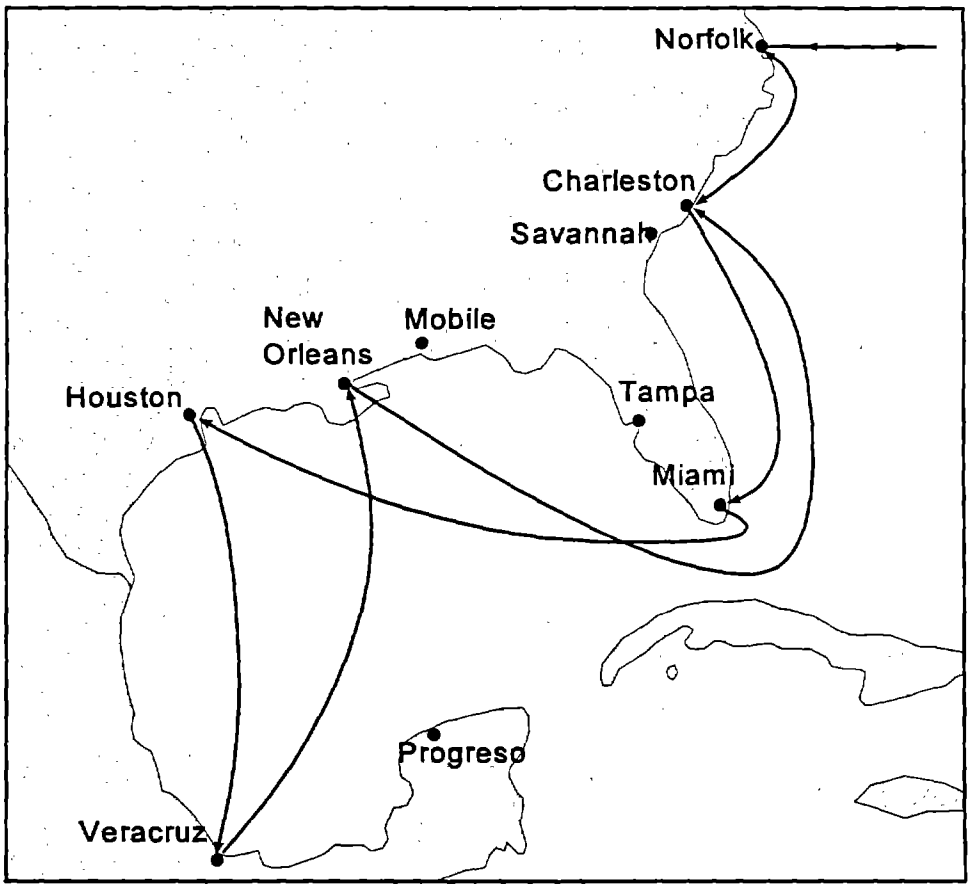


Figure 7. Lykes' North Atlantic service

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

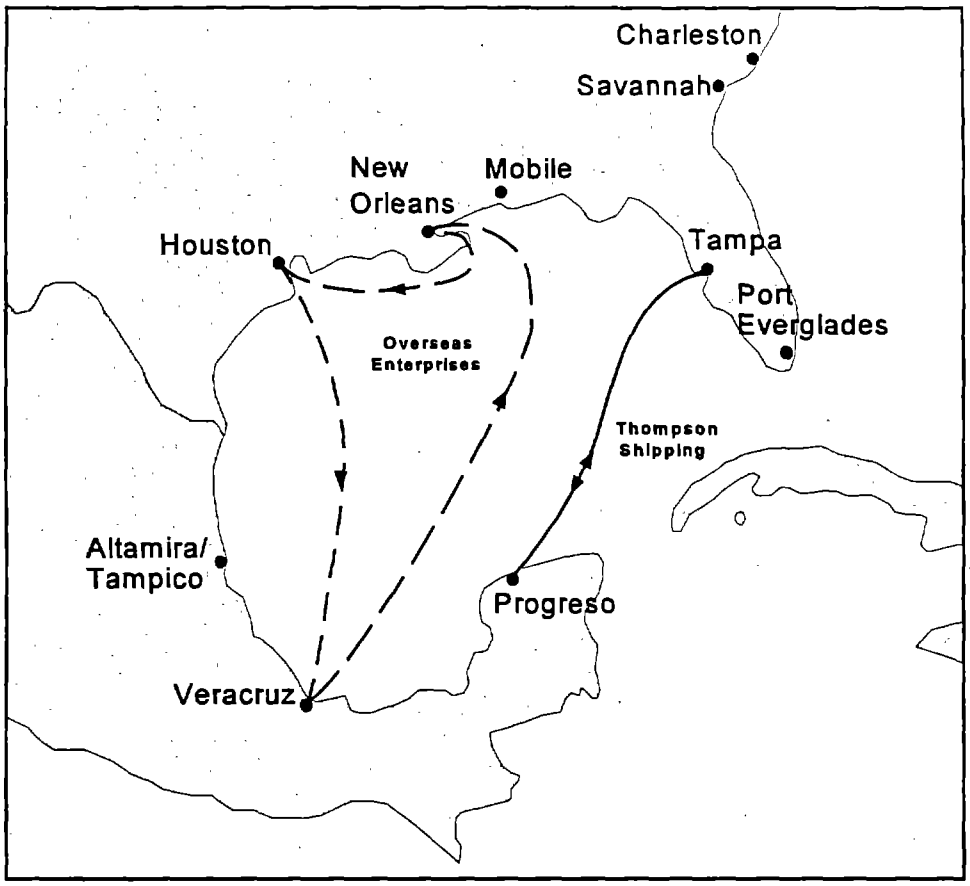


Figure 8. Sample of short sea/coastal services

Feeder Services

The primary purpose of feeder lines is to support longer deep sea (linehaul) routes. Existing feeder operations supplied by Zim Lines and Maersk serve trade routes between Mexico, Europe, the Far East, and South America. The feeder services follow an itinerary that includes a series of Gulf ports and a regional hub (in Miami or Jamaica, for example). While collecting or distributing containers at their regional hub location, the vessels also service trade between regional ports. Travel times are long because of the typical circuitous itineraries, and, when combined with typical 14-day frequency, the level of service is very low. As a result, these types of services have had limited volumes and low growth potential.

The main lines offering this type of service are Zim, Maersk, and, recently, Sea Land under joint charter agreements with Maersk. The feeder vessels are similar to coastal vessels but with

somewhat larger capacities of about 300-800 TEUs. Recent interviews by NPWI with these operators indicate that the lines are seeking to improve their market share by offering a more direct type of service from major Florida ports such as Miami and Port Everglades. These services should be in place by mid-1996. Mexican feeder services may be ultimately discontinued by one or more operators.

There are hybrid feeder services such as Crowley, where the regional service functions also as a feeder to South American trade. This type of service is also competing with coastal services. Crowley only calls at Port Everglades and does not directly serve any U.S. Gulf port in this trade. *Figure 9* presents sample itineraries of some of the feeder-type services.

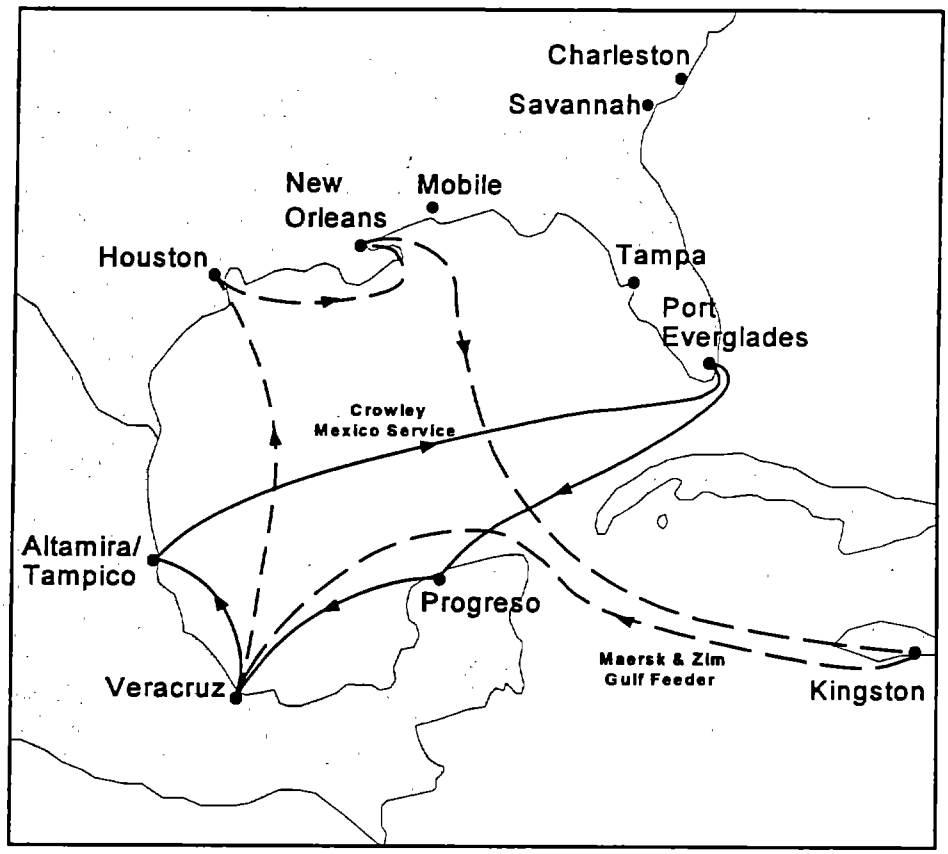


Figure 9. Sample of feeder services

River/ocean (r/o) and River Barge Services

Previous research conducted by NPWI for the U.S. Maritime Administration has demonstrated that maritime opportunities exist for smaller shallow draft river/ocean (R/O) vessels (i.e. 3200 DWT, 250 TEU capacity) that are capable of navigating inland waterways as well as the open waters of the Gulf of Mexico.[6] These types of vessels are widely used in Western Europe and in Russia. A specialized market exists for these types of vessels in the movement of higher value general cargos and for bulk cargos moving in small lots of generally less than 3000 tons. This type of service offers the greatest potential savings compared to rail service for direct cargo movements between the lower and middle Mississippi regions up to St. Louis and the central and southeastern regions of Mexico. R/O vessel itineraries can be tailored to the specific logistic needs of individual shippers since they are usually deployed on a contract basis. This type of service only has to capture a relatively small portion of the general cargo market to Mexico to make it a viable alternative. Previous analysis conducted by NPWI has indicated that R/O operations would require approximately 150,000 to 180,000 tons annually supplied from both northbound and southbound activity to sustain a weekly operating schedule.

Modern R/O vessels are multipurpose and can carry a variety of cargos on inland waterways or coastal ranges. The vessels require operating drafts of between 8-15 feet and can therefore be accommodated by most of Louisiana's smaller shallow-draft ports. Additional facilities or services, such as improved land access/connectivity to road and rail systems, open storage area, and limited processing infrastructure such as dock and shed facilities, may be needed in order to support the vessel call. A schematic comparison of river/ocean to rail/intermodal service is highlighted in *Figure 10.*

[6]Maritime System of the Americas Study, Phase I, River/ Ocean Operations. U.S. Department of Transportation, Maritime Administration (November, 1993).

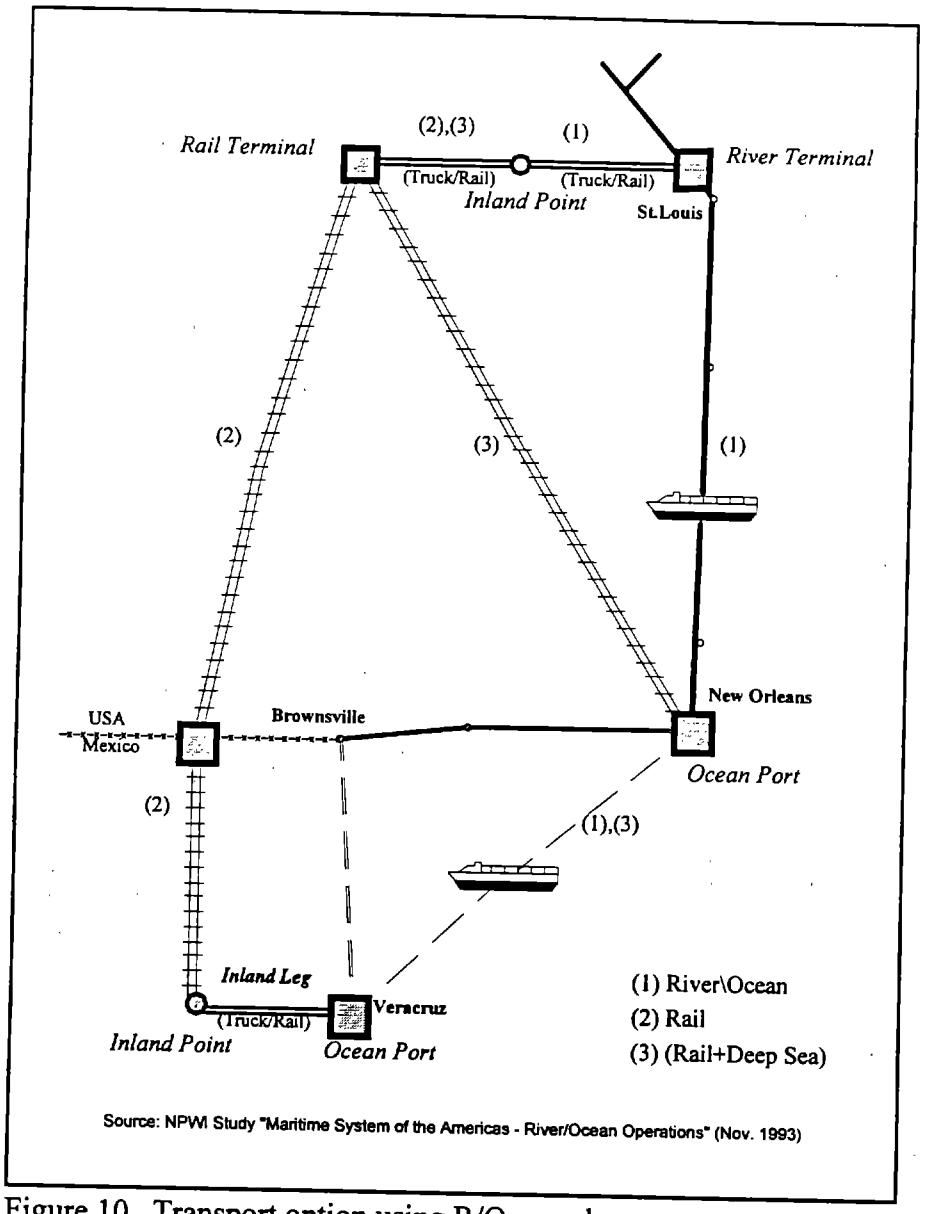


Figure 10. Transport option using R/O vessel

The comparative advantages of water transportation are obvious for the movement of major bulk commodity shipments of grains, chemicals, petroleum products, and other traditional bulk cargos between the U.S. and Mexico that typically involve 15,000 tons or more. These types of movements are handled by jumbo river barges (1500 ton capacity) with transhipment to larger deep sea bulk vessels in the Gulf. The mid-America inland waterway system has substantial cost advantages compared to unit train services for a relatively large portion of U.S. and Mexican

hinterlands. Direct services by river barges across the Gulf of Mexico do not appear to be competitive with conventional barge transshipment to deep sea ocean vessel. The sustained success of the major bulk sector for Louisiana's inland waterway system in trade with Mexico and other Latin American countries will be determined by the extent to which these emerging countries become long term consumers of U.S. midwest bulk commodities such as rice, wheat, corn, soybeans, chemicals, and ores.

Specialized Maritime Services

Ferry/water Bridge Service

A specialized form of short sea service called an intermodal "waterbridge service" has been used for years in trade between the U.S. and Puerto Rico. This service employs notched deck barges, triple-deck trailer barges, and integrated tug/barge operations. Crowley American Transport operates such a service out of Lake Charles, Louisiana, to Puerto Rico as does Trailer Barge out of Jacksonville, Florida.

Such ferry type services have been deployed for short sea movement of railcars, trailers, and containers.

Rail Ferries

An early NAFTA maritime ferry service connecting Galveston, Texas, with Coatzalcoalcos, Mexico was established via joint venture between the Burlington Northern Railway (BN) and a large Mexican construction/transportation company (Protexa International) during 1993. At the time BN, did not control any key border

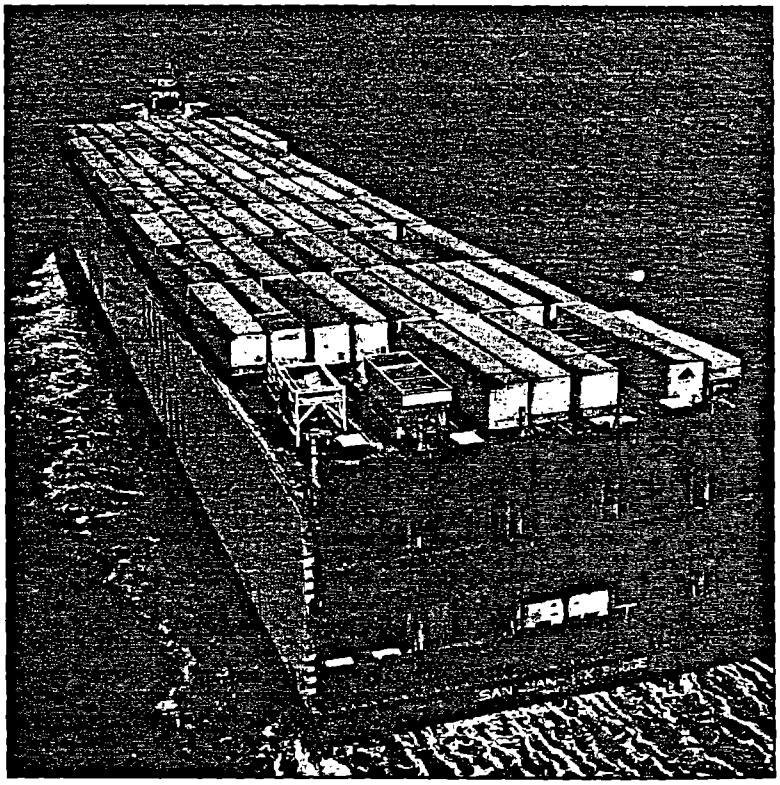


Figure 11. Trailer Barge

crossing transfer points between the U.S. and Mexico such as the Union Pacific, Southern Pacific, and Sante Fe railroads. The BN looked at this intermodal maritime service as an alternative to all rail movement for their Mexican and U.S. based customers. The service was limited to moving hopper cars of mainly feed grains using single deck barges with 56 railcar per barge capacity and average speeds of seven to eight knots. The service was ultimately discontinued in October of 1994 after the proposed merger of the BN and Sante Fe railroads gave BN the land border crossing transfer points and infrastructure it had previously lacked. Another probable reason for discontinuance of the service was its limited focus on only grain cargos. Another recent rail ferry service was seriously considered during 1994/95 by CSX Transportation out of New Orleans, Louisiana, to Veracruz, Mexico. For similar reasons as the BN, CSX did not control a border crossing point and was interested in moving cargo in and out of Mexico. The project was ultimately put on hold after the Mexican peso devaluation.

Besides the above mentioned rail ferries, there is rail ferry service in the Gulf between Mobile, Alabama and Puerto Rico. This service is based on small single deck barges pulled by tugboats. A similar concept was also implemented by Crowley in trade between Seattle, Washington, and Alaska (Hydrotrain Service) using 400'x100' double deck barges pulled by tugs.

Trailer and Container Ferries

Trailer ferries are common for short sea operations in other U.S. trade routes. Some examples are discussed below. Each type of service is geared to a specific trade which results in the use of slightly different vessel/maritime systems.

- Crowley and Trailer Bridge Puerto Rico Services

  Crowley provides this type of ferry service from three mainland U.S. ports (Philadelphia Pennsylvania , Jacksonville, Florida, and Lake Charles, Louisiana.) using trailer barges of varying sizes with the largest being of triple deck design with dimensions of 730'x100'x11' with a capacity of 512 40-foot trailers. The barges are stern loaded through a fixed shore-based triple deck ramp. The service operates at a speed of about nine knots and is provided weekly. Trailer Bridge provides a similar service between Jacksonville, Florida, and San Juan, Puerto Rico, using two triple deck barges with a capacity of 266 48-foot trailers. Trailer Bridge is a subsidiary of Allen Freight Lines (a trucking

company), which could explain the focus on truck equipment, their more truck-like, pricing policies, and their practice of charging by the total land and water miles between origin and destination.

- Tote's Alaskan Service

  Totem Ocean Trailer Express (Tote) provides twice weekly trailer ferry service between Tacoma, Washington, and Anchorage, Alaska. Tote operates a fleet of two 24-knot RoRo vessels and is contemplating an additional third vessel for deployment in the same trade. The vessels are 791'x105'x30' (LOAx beam x draft), with capacity for 410 40-foot trailers, and, have five decks connected by a system of ramps and elevators. Handling is through two shore-based ramps connecting from the side of the vessel to the weather deck. Loading/ unloading time is approximately eight hours at each end.

- Seaboard Marine South and Central American Service

  Seaboard Marine, a shipping subsidiary of a large midwestern U.S. shipping cooperative, operates seven separate services to various Central and South American destinations. Service frequencies vary between weekly and bi-monthly, and all routes utilize RoRo vessels ranging in size from 1000 DWT to 12,600 DWT carrying trailers and containers. The largest vessels have capacity for about 160 40-foot trailers. Service speeds average about 17 knots. Seaboard operates both services out of Miami, Florida.

There are other similar types of water bridge services in Europe and throughout the world. Typically, the vessels are specifically designed to fit the basic transport needs of the markets that they are serving.

A summary of these regional maritime transportation options and current estimated hinterlands is shown in *Figure 12*.

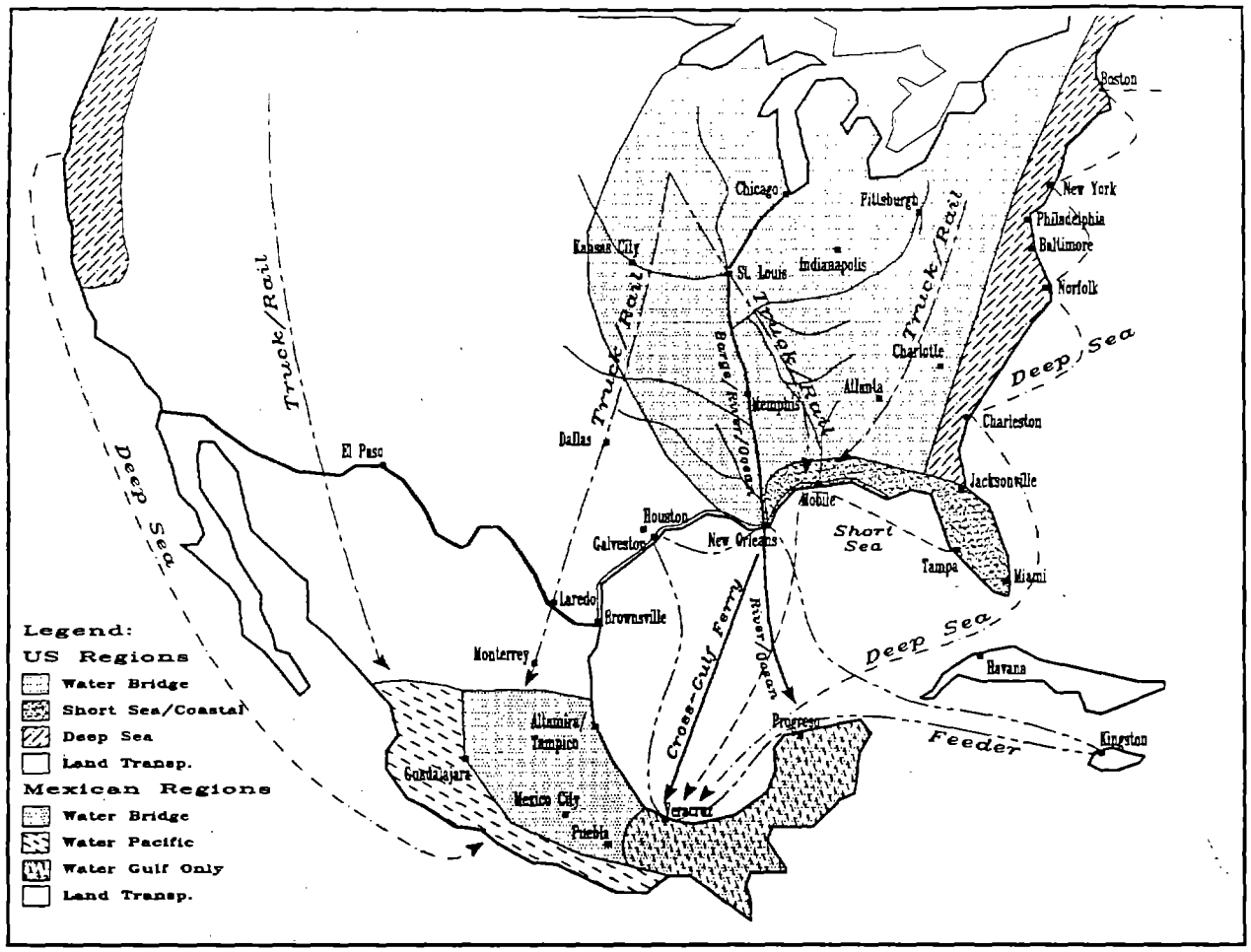


Figure 12. MSA regional transportation options

Refrigerated Vessel/reefer Service

During the 1990s, U.S. fresh and frozen fruit and vegetable import volumes have doubled to about six million metric tons per year versus about three million metric tons per year during the 1980's. A large portion of this supply comes from Mexico, and Mexican fresh and frozen fruit and vegetable export volumes to the U.S. have also doubled during this period from about 1.2 million metric tons during the 1980s to about 2.5 million metric tons annually during the 1990s.[7] A summary of Mexico's top ten fresh produce exports to the U.S. by volume is highlighted in *Table 2.*

[7]United States Imports of Fresh/Frozen Fruits and Vegetables from Mexico, UDSA, (1995).

TABLE 2. MEXICO'S TOP 10 FRESH PRODUCE EXPORTS TO THE U.S. (by volume - average 1991-1993)

RANK	COMMODITY	METRIC TONS	U.S. MARKET SHARE OF IMPORTS
1.	TOMATOES	317,800	98.2%
2.	CUCUMBERS	218,800	93.6%
3.	BANANAS	205,800	7.5%
4.	MELONS	187,500	58.2%
5.	PEPPERS	137,200	93.5%
6.	WATERMELONS	132,900	95.6%
7.	SQUASH	113,000	95.9%
8.	ONIONS	112,300	95.2%
9.	MANGOES	89,300	83.0%
10.	CITRUS*	64,800	65.2%

*excluding limes.

Source: U.S. Imports of Fresh/Frozen Fruits and Vegetables from Mexico (1982-1993), USDA

The NAFTA agreement and the sharp devaluation of the Mexican peso in 1995 have opened up even larger market potential for Mexican exports to the U.S. for 1996 and beyond. Currently about 90 percent of Mexican exports to the United States move via truck. The cost of transport is high for distances greater than 1200 miles. This type of distance is suited for short sea shipping, and should be within the competitive range of a refrigerated vessel type of service using pallets as the primary unit of shipment (as opposed to refrigerated 40' containers offered by deep sea services). The cost of containerized deep sea services remains very high from Mexico and other Latin American markets (approximately $3500 from Veracruz to New Orleans) and negatively effects all but the largest producers for shipments to the primary markets of the Northeast/Midwest/Southeast U.S., Southeast Canada, and North Europe.[8]

[8]Investigation of Market Potential for Refrigerated Cargo Exports From Mexico to The U.S. and Europe, (R.A. Lawler, et.al.), special report submitted to Philadelphia Port Corp.(1995).

ASSESSMENT OF PORT INFRASTRUCTURE NEEDS

INTRODUCTION

Well-integrated transportation systems with efficient intermodal cargo interchange are vital for successful vessel operations. Strategically located ports with large hinterlands and high cargo handling productivity will play a significant role in establishing competitive vessel services which could meet cost and service quality challenges posed by trucking and rail modes. Port operations are important not only for cost containment but also for other service quality demands made by shippers such as total transit time, reliable delivery schedules, door-to-door service, and the extent of loss or damage to cargo. This chapter will examine the pivotal role of ports in providing various maritime/vessel services, port infrastructure needed to support vessel services, and public port facilities available in the state that can be used for such services.

Since port infrastructure needs are geared to delivering a service package to shippers and vessel operators, it encompasses both physical and operational parameters. While physical facilities provide the capability to handle and transfer cargo, the "human factor" involved in the coordination of port operations, management, and marketing is crucial for service quality and success. These aspects, broadly identified as "institutional infrastructure" could play an important role especially at the initial stages of business development. Therefore, the port infrastructure needs analysis will briefly cover both physical and institutional infrastructure needed to establish vessel services. The first section will describe and analyze basic port operations associated with cargo handling activities and various other institutional procedures involved in the delivery of vessel services. The second section will identify port infrastructure needs for specific vessel services under various assumptions regarding vessel size, cargo mix, and supply arrangements for cargo handling equipment, etc. The third section develops Louisiana port profiles by evaluating the presently available infrastructure at individual ports and identifying major constraints for handling the targeted vessel services.

BASIC PORT ACTIVITIES

The vessel services identified require widely different port infrastructure in terms of physical facilities and levels of institutional capabilities. For example, the physical facilities and

institutional capabilities required to operate river/ocean and short sea coastal services may be relatively less than the requirements for Fast Ferry Trailer service and Reefer Cargo Terminal services. Conceptual layouts of a typical break-bulk cargo and container terminal incorporating major facilities required to support the targeted vessel services are shown in Figures 13 and 14. Intermodal cargo transfer between vessels and surface transportation modes involving loading/unloading of vessels, trucks and railcars, and temporary storage dictates physical infrastructure requirements. Small-scale general cargo shipments typically associated with River/Ocean and Short-Sea Coastal services could be handled at most Louisiana ports currently handling standard river barges. However, much more sophisticated cargo handling infrastructure, equipment, and organizational capabilities are required for other services.

Major challenges for operating regular vessel services will come in terms of institutional capabilities at large and small ports. For larger ports, physical facilities and staff capabilities may be adequate but market development and networking with shippers and vessel operators remain major challenges. For smaller ports, unlike routine bulk cargo handling operations, heavy demands will be made on limited staff in coordinating activities. For example, in international commerce, shipping documents and other information about the cargo must be transmitted for coordinating the activities between shippers, consignees, carriers, terminal operators, government agencies, and other transportation facilitators. The role played by these transportation facilitators in coordinating export and import activities is described in Tables 3 and 4. Although, the complexity of the activities described is generally applicable to large container shipments, some degree of coordination is necessary for all exports and imports.

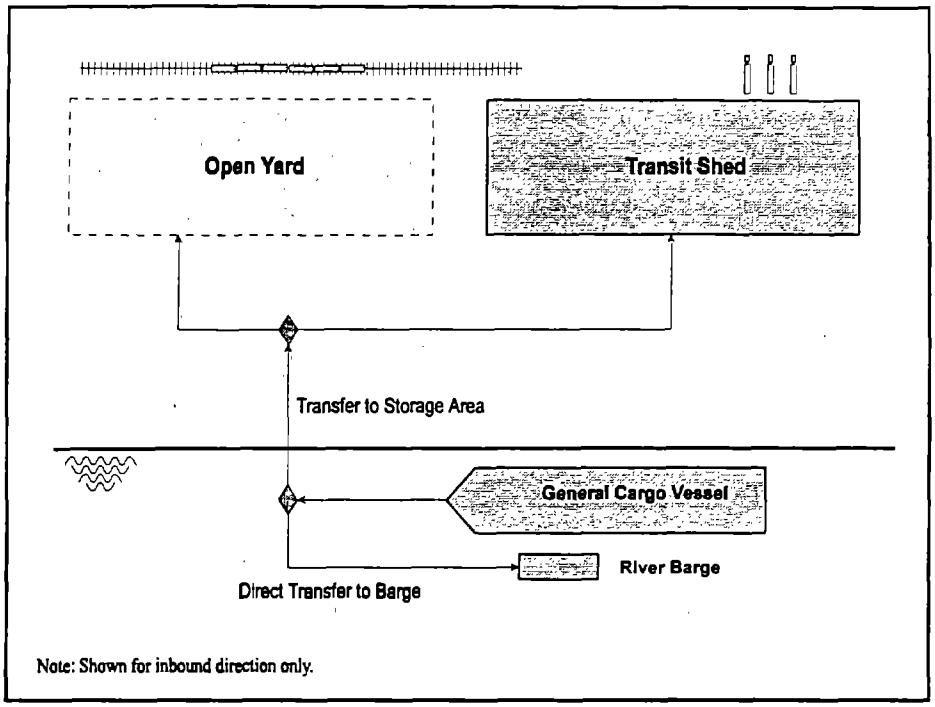


Figure 13. Conceptual layout of a general cargo terminal

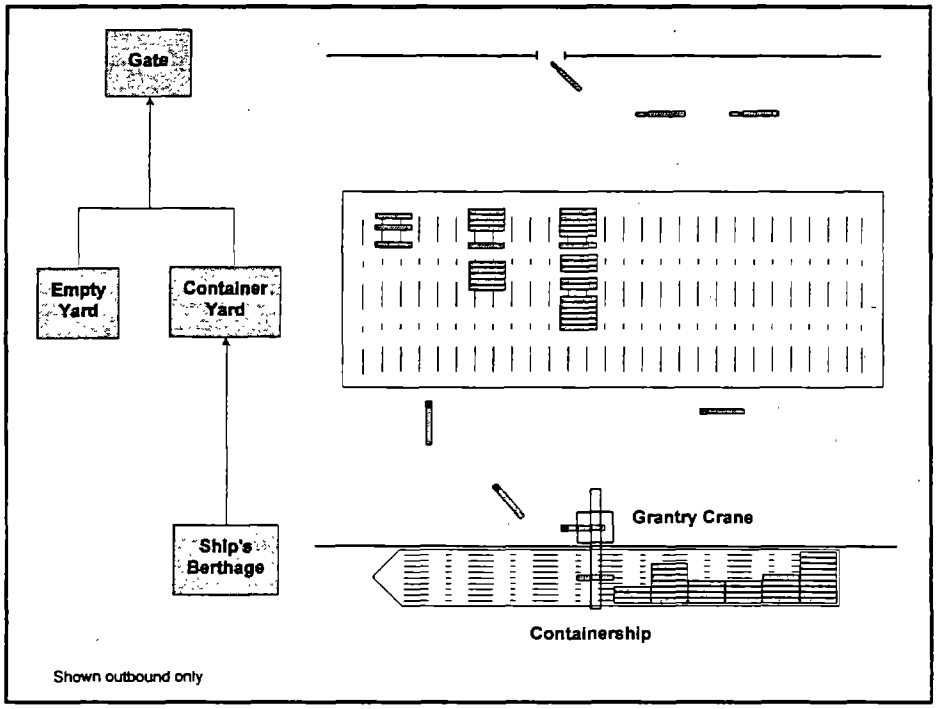


Figure 14. Conceptual layout of a container terminal

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 Rail: Total length of working track; number of tracks; Maximum continuous single track length; Railway yard capacity (cars) Highway: Highway access connections; Highway Classification (Interstate, State, and Local); 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; Type of ship/apron transfer unit (i.e. longshoremen gangs, ships gear, cranes, gantry cranes, Conveyor belts, hose connections, loading arms, ship loaders/ unloaders, etc..); Practical transfer rate per unit (tons/hour, lifts/hour) and time to load/unload ship; 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.). 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) 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); 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; 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.

- Storage/covered-- specialized cold storage and refrigeration and inspection areas totaling a minimum of 20,000 sq.ft., preferably directly adjacent to dock loading/unloading facilities

- Storage/open-- three to five acres as marshalling area for trucks and related handling equipment

- Docking/berth length-- 400' for side-ramp unloading (less if stern ramp unloaded)

- Land access/inland transport-- good highway connections, within 10 miles of major interstate system

- Shore-side equipment-- heavy-duty fork lifts, most vessels utilize ships'gear for crane support

- Other land side improvements-- maintenance and fumigation facilities totaling approximately 2,000-2,500 sq.ft.

- Intermodal transfer rates-- 50-80 tons per hour (one pallet weighs approximately one ton)

- Throughput rate--100-160 tons per hour assuming typical ship gear of 2 cranes per vessel

Terminal Facilities For Short Sea Services (Coastal and River/Ocean)

Short sea services have been separated into two basic categories: (1) coastal services that have relatively short port-to-port routes and may involve multi-port itineraries in a smaller region such as the Gulf of Mexico; and (2) river/ocean services using smaller shallow draft vessels capable of navigating inland waterways as well as open waters on the Gulf. Previous research by NPWI has demonstrated that a specialized market exists for this type of maritime service in NAFTA trade for higher value general and palletized cargos and bulk cargos moving in smaller lots of less than 3,000 tons. This type of service offers the greatest NAFTA water transportation potential for Louisiana's inland river and shallow draft ports.

Coastal Short Sea Service

Coastal lines provide direct service that is not part of other longer vessel itineraries (i.e. to Europe or the East Coast of the U.S.). Lines such as Linea Peninsular operating out of Bienville, Mississippi, have targeted agricultural, forest products, palletized dry bulk products such as fertilizers, and containerized cargos stored on-deck to growing areas of Mexico not served well by land transportation such as Mexico's Yucatan Peninsula. NPWI interviews with Louisiana based shippers have indicated they are using these types of services for certain portions of their shipments to Mexico. These types of services must be price competitive since the limited size of most coastal operators generally prevents them from offering coordinated intermodal services. Steel, plastic resins, specialty grains like rice, forest products, agricultural and industrial chemicals, and aggregates such as limestone and gypsum are potential Louisiana/Mexico traded commodities that these types of services could capture from all-land based transport options, depending on the specific origins/destinations of the movements.

The following criteria have been identified for the handling of short sea coastal services:

- Facility types-- general and bulk cargos
- Location-- marginal or finger pier located generally no more than 100-200 miles from targeted customer and plant facilities for both origin and destination points of shipment
- Channel depth-- varies widely by vessel type but generally requires between 15' to 28' of water
- Storage/covered-- 10,000 sq.ft. minimum with preferred 20,000 sq.ft. for typical operations
- Storage/open-- four to five acres most common for operations
- Approximate docking and berth length-- 300'-350' (marginal wharf most desirable)
- Land access-- intermodal yard (rail) desirable, highway access mandatory

- 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

- 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.

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

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.

Port profiles were developed for 16 ports- five deep-draft and eleven shallow-draft. The deep draft ports are St. Bernard Parish Port, New Orleans, South Louisiana, Baton Rouge and Lake Charles. The Plaquemines Parish Port is not considered because it does not own a general cargo dock and none is yet in the planning stage. The shallow-draft ports include the Port of Lake Providence and the Madison Parish Port which are shallow-draft ports on the Mississippi River; the Port of Krotz Springs and the Port of Morgan City on the Atchafalaya River, the Port of Shreveport Bossier, the Port of Natchitoches and the Port of Alexandria on the Red River; the Port of Iberia and the Port of West St. Mary on the Intracoastal Waterway; Port Fourchon on the Gulf; and Port Manchac on Lake Pontchartrain. The locations of these ports are shown in *Figure 16*. Port profiles describe physical and operational parameters of the port, planned upgradings and expansions, potential vessel services and present constraints for the implementation of such services. The data are summarized and presented as tables for each port in *Appendix I.* Additional information on port location, commodities handled, port services, and existing transportation infrastructure, including road and rail access, is also detailed in this Appendix. A summary of possible maritime services for Louisiana ports is presented in *Table 7.*

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

TABLE 7. SUMMARY OF POSSIBLE MARITIME SERVICES FOR LOUISIANA PORTS

LOUISIANA PORT	MARITIME SERVICE			
	Water Bridge Trailer Ferry	Refrigerated Vessel / Reefer	Coastal Short Sea	River / Ocean
DEEP DRAFT PORTS				
1. New Orleans	✔	✔	✔	✔
2. Baton Rouge			✔	✔
3. South Louisiana	✔	✔	✔	✔
4. Lake Charles			✔	✔
5. St. Bernard Parish	✔	✔	✔	✔
SHALLOW DRAFT PORTS				
6. Lake Providence				✔
7. Madison Parish				✔
8. Morgan City			✔	✔
9. Krotz Springs				✔
10. Shreveport-Bossier				✔
11. Natchitoches Parish				✔
12. Alexandria				✔
13. Iberia				✔
14. West St. Mary				✔
15. Fourchon			✔	✔
16. Manchac				✔

Deep-Draft Ports

Port of Lake Charles

Physical and Operational Parameters - The Port of Lake Charles City Docks (general cargo docks) is located 34 miles inland from the Gulf of Mexico in the southwestern corner of the state. Bulk Terminal No.1 is located 27 miles inland from the Gulf, and the Industrial Canal is located 22.4 miles inland from the Gulf at the confluence of the Calcasieu Ship Channel and the Gulf Intracoastal Waterway.

The Lake Charles Harbor and Terminal District encompasses 203 square miles in Calcasieu Parish. The District owns and operates three marine terminals, the City Docks, Bulk Terminal No.1 and the Industrial Canal. The District also owns and operates a public grain elevator and is in the process of developing an adjacent industrial park on 400 acres of property off Highway 397 in Lake Charles. The District is served by rail, water, air and highway, making it a multi modal facility. The District owns and maintains 32 miles of railroad trackage and owns a switch engine for movement within the port area. The access channel to the Port is maintained by the U.S. Army Corps of Engineers at a 40-foot draft with a 400-foot bottom width.

The City Docks has 11 general cargo berths and transit sheds providing nearly 871,000 square feet of covered storage and nearly two miles of continuous dockage. Rail access is provided by Union Pacific Railway Company. This facility is accessible by interstates 10 and 210 and State Highway 90. The District owns more than 600,000 square feet of warehousing behind the waterfront. These metal warehouses have concrete floors and are accessible by rail and truck.

Bulk Terminal No.1 is located on 71 acres at Rose Bluff Cutoff on the Calcasieu Ship Channel. It has a 1,200 square foot ship berth and a project depth of 40 feet. The raw coke storage facility has four pads with a combined storage capacity of 360,000 short tons. Bulk Terminal No.1 has ship and barge loading capability with an electric-powered mobile gantry crane, a loader chute and a conveyor system traversing 740 feet of dock. Coke handling capacity is 1,000 tons per hour.

The Bulk Terminal is served by the Kansas City Southern Railway and over-the-road motor carriers as well as inbound and outbound ships and barges. Other equipment includes a ship/barge clam bucket type unloader and conveyor which traverses 740 feet of dock and has an average unloading rate of 450 short tons of barite per hour and can handle vessel to vessel, vessel to rail and dual truck hopper loading facilities to open storage. The terminal also has a 100-ton railcar rollover facility capable of handling 1,200 tons per hour, three separate railcar shaker unloading pits, a hydraulic lift, and a full-truck unloading pit with an adjacent truck scale.

The Public Grain Elevator, a District-owned and operated bulk grain and a rice elevator is located in the City Docks area of the port. The ship berth located at this terminal has a 400- foot dock face that extends to 900 feet with dolphins. The water depth at this berth is maintained at 35 feet. The dock contains a ship loading tower, a traveling gantry shiploader and a covered

conveyor system. This facility has a storage capacity of 800,000 bushels and a loading rate of 25,000 bushels per hour from storage. Grain is received by truck and rail hopper cars with scales available for both methods. An hydraulic lift is available for conventional truck unloading.

The Industrial Canal is located 12 miles south of Lake Charles on 200 acres of property on the waterfront. The Industrial Canal is three miles long and has a 1,400 by 1,400-foot turning basin at its east end. The project depth is 40 feet and the bottom width is 400 feet. Port-owned railroad tracks from Lake Charles serve industries on the canal. Two rail carriers, Union Pacific and Southern Pacific, serve the area.

Potential Vessel Services and Constraints - In terms of physical, operational and institutional infrastructure the port provides excellent opportunities for River/Ocean vessel services and short sea vessel services. The proximity to the land border of Mexico is a disadvantage as it faces intense competition for cargo from rail and trucking services. As the port is endowed with a large primary market area, excellent market opportunities exist, especially for shipments of rice and other cereals and forest products.

Port of Greater Baton Rouge

Physical and Operational Parameters - Geographically, the Port of Greater Baton Rouge is the farthest inland deep water port on the Gulf of Mexico via the Mississippi River. This position, with the general cargo docks 229 river miles from the Gulf, permits shippers and receivers of freight to take advantage and benefit by generally paying lower inland transportation rates and charges for barge, rail and truck service. The port is located on the Mississippi River with a channel depth of 45 feet.

The port's current facilities for handling break-bulk cargo include shipside-covered transit shed space of 462,500 square feet, and two docks totaling 3,000 feet long capable of berthing four to six ships, depending upon the length of the vessels. Vessels are normally berthed upon arrival assuring a minimum time in port to the benefit of the shipper and vessel operator. Other terminals at the port include a grain elevator operated by Cargill, Inc., a molasses and liquid chemicals tank farm leased to Westway Trading Co., and a bulk oil dock and tanks operated by Petroleum Fuel and Terminals Company, a division of Apex Oil Company. Historically, the port

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.

Potential Vessel Services and Constraints - The Port of Greater Baton Rouge is an excellent facility for River/Ocean vessel services and short sea coastal services with the necessary physical infrastructure and institutional capabilities. Market research and development for suitable cargo and coordination of activities among shippers, vessel operators and freight forwarders remain a major challenge.

Port of South Louisiana

Physical and Operational Parameters - Located on the lower Mississippi River at Reserve, Louisiana at river mile 138.5 AHP, the Globalplex Intermodal Terminal lies between the cities of New Orleans and Baton Rouge. With a channel depth of 45 feet at low water stage and a depth alongside of at least 45 feet, Panamax-size vessels can easily make their way to this location.

The facility's general cargo dock opened in February 1996 and can be accessed via a dock-to-terminal access road which overpasses the Mississippi River levee and a parallel rural state highway. The dock measures 420 by 44 feet. Upstream and downstream mooring buoys allow for dockage of Panamax-class vessels.

Globalplex provides competitive rates for dockage, warehousing, and stevedoring. The terminal's stevedores are familiar with the handling of all types of cargo. Quotes for dockage, warehousing and stevedoring are available upon request.

Rail shipments at Globalplex are supported by 24,000 feet of rail and yard served by the Kansas City Southern and Illinois Central rail lines. A 100,000-pound capacity weighing scale supports the terminal's trucking operations. For easy access to U.S. markets, Globalplex is located just seven miles from Interstates 10 and 55, and just two miles from U.S. Highway 61.

Bulk-covered storage includes an existing 50,000 square foot warehouse and two 50,000 ton cement storage domes scheduled for completion in early 1997. More than 200 acres are available for open storage, warehousing or manufacturing development, with nine acres of paved open storage available in the bulk handling area of the complex. Covered general cargo storage is available in a 100,000 square foot warehouse with storage racks, climate control, rail docks, truck bays and office space. An additional 50,000 square foot transit shed with truck bays and

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

facilities along the river. With several locks on the river cargo movement for international commerce is expected to be time-consuming. During initial periods of operation on the river, more delays are likely owing to a lack of regular and frequent barge towing services.

Natchitoches Parish Port

Physical and Operational Parameters - A summary of the port's physical and operational parameters is presently not available. All facilities at the port are in the planning or construction stages.

Potential Vessel Services and Constraints - Future market development at the port is dependent on the successful operation of barge services on the Red River. The longer voyage time necessary to reach the port may impose constraints on regular vessel services. Potential exists for River/Ocean vessel services, especially with forest and paper products as the cargo base.

Port of Alexandria

Physical and Operational Parameters - The Port of Alexandria is the first developed port on the Red River. The general cargo dock has been operational for three years. The general cargo warehouse is under construction and will be operational in June 1996.

Potential Vessel Services and Constraints - As the port is in its initial stages in terms of organization and market development, maintaining adequate cargo volumes to sustain regular vessel services will be a difficult. Interior location and longer voyage time also will affect economic feasibility of such services. Potential for river/ocean vessel service does exist, however, especially as a port of call for vessel services with multi-port itineraries.

Ports on the Gulf Intracoastal Waterway

Port of Iberia

Physical and Operational Parameters - A summary of physical and operational parameters for the Port of Iberia is presented in Appendix I. The port presently handles break-bulk cargo

(mainly steel pipe) transported by barges from New Orleans. These are consigned to industrial tenants who are located at the port.

Potential Vessel Services and Constraints - Market constraints in terms of limited cargo availability and longer voyage periods on the GIWW provide major challenges for the port. If adequate cargo volumes are available, river/ocean vessel service is feasible.

Port of West St. Mary

Physical and Operational Parameters - A 10,000-foot T-shaped channel connects the general cargo terminal and bulkhead with the GIWW. In addition to the bulkhead, the Port has other basic infrastructure such as a warehouse, paved open yard, and rail and highway connections.

Potential Vessel Services and Constraints - The location of the port away from major metropolitan areas tends to limit cargo availability in substantial volumes. Longer travel time on the GIWW for smaller shipments may be a disincentive for vessel operators. If favorable market conditions develop, there is potential for river/ocean vessel service.

Other Ports

Port of Fourchon

Physical and Operational Parameters - Situated at the mouth of Bayou Lafourche in Lafourche Parish, Port Fourchon is Louisiana's only port on the Gulf of Mexico. Belle Pass is the port's entrance channel which is maintained by the Greater Lafourche Port Commission at a depth of 24 feet and width of 300 feet. The inland channel throughout the port is maintained at a 20-foot depth and a minimum of 300 foot width.

Major commodities include services for support of oil and gas exploration, construction equipment, oil production equipment, and seafood. More than 80 companies provide the myriad of services required to support oil and gas activities in the Gulf of Mexico. Numerous docks, slips, and shore side facilities for intermodal transfer of equipment and services exist. Warehousing is available including refrigeration. In addition to leasing facilities, the

commission owns and operates a public oil field dock, public commercial fishermen's marina, and public recreational boat launch.

Port Fourchon is the land base for the Louisiana's Offshore Oil Port (LOOP), which handles 15 percent of the nation's oil supply. The port's location on the Gulf of Mexico, channel size and depth, and existing infrastructure have made it the port of choice for deepwater drilling activity in the Central Gulf of Mexico. Projections for the next decade show tremendous potential for growth of both domestic and foreign trade.

Plans to deepen the entrance channel to 30 feet and interior channel to 26 feet are scheduled for 1997 by the U.S. Corps of Engineers. The second phase of the E-Slip expansion is under construction and scheduled for completion in 1997. Also under construction is a $35 million state of the art shore based facility to accommodate deepwater drilling activity.

Constraints and Impediments - Although the port's location on the Gulf of Mexico makes it accessible from the sea and ideal for offshore oil exploration service activities, land access is a major impediment to the development of targeted vessel services. Long distances from large production and consumer centers, and lack of four-lane highway connections remain impediments to the diversification of port activities. Shipments of petroleum industry-related equipment may provide some opportunities.

Port Manchac

Physical and Operational Parameters - Port Manchac is approximately eight miles south of Ponchatoula near Exit 15 of Interstate Highway 55. The port is served by navigating barges through Lake Pontchartrain's South Channel Entrance into Pass Manchac. From Pass Manchac barges are towed through North Pass about six miles to the port site.

The port is served by the Illinois Central Railroad and truck access is provided by Interstate Highway 55 and U.S. Highway 51. Basic infrastructure requirements such as a general cargo warehouse, a barge dock, and other equipment are available for small scale operations. As the port is engaged in handling breakbulk cargo and handling LASH barges, a trained labor pool is available.

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.

REGIONAL TRADE OVERVIEW, MARKET ANALYSIS, AND MARKET OPPORTUNITIES FOR MARITIME SERVICES AT LOUISIANA PORTS

Trade and Markets

Over $102 billion worth of products was traded between the United States and Mexico during 1994. In 1995, U.S./Mexican bilateral trade rose 13 percent over 1994 volumes to $115 billion despite the Mexican recession, and the inflationary impact that the Mexican peso devaluation had on the reduced rate of Mexican consumption of U.S. imports. Lower tariffs resulting from NAFTA initiatives and the peso devaluation, which helped to stimulate increased Mexican export activity to the U.S., contributed to the overall increase in bilateral trade.

TABLE 8. FIVE YEAR SUMMARY OF U.S. MEXICAN TRADE FOR THE PERIOD 1991-1995 IN BILLIONS OF U.S. DOLLARS (SOURCE: U.S. DEPT. OF COMMERCE)

Year	U.S. Exports to Mexico	Annual Change (Exports)	U.S. Imports from Mexico	Annual Change (Imports)
1991	$33.28	14.9%	$31.89	10.4%
1992	$40.60	21.9%	$35.19	10.3%
1993	$41.58	2.4%	$39.92	13.4%
1994	$50.84	22.2%	$51.49	23.4%
1995	$53.80	5.8%	$61.17	18.8%

On a dollar value basis, bilateral trade has been dominated by truck transport. In 1994, trucks transported an estimated $41.5 billion of U.S. exports to Mexico and $36.2 billion of U.S. imports from Mexico. Rail transport was a distant second modal choice, with $4.6 billion of U.S. exports to Mexico and $7.58 billion of U.S. imports from Mexico. Water transportation recorded about a four percent market share for exports and 12 percent market share for imports primarily due to Mexican bulk petroleum shipments to the United States.

TABLE 9. MODAL SHARE (BILLIONS) OF U.S./MEXICAN TRADE
(SOURCE: MCCRAY RESEARCH)

Mode	U.S. Exports to Mexico	% of Total Exports	U.S. Imports from Mexico	% of Total Imports
Truck	$41.5	81.62%	$36.22	70.34%
Rail	$4.6	9.07%	$7.58	14.72%
Sea	$2.08	4.1%	$6.18	12.01%
Air	$2.64	5.21%	$1.51	2.93%
Total	$50.84	100%	$51.49	100%

Shown below are the dominant land transport corridors for U.S./Mexican trade through southern border points. The most important flows of trade in terms of both volume and value are primarily from the northeastern and southeastern portions of the U.S. and Texas to the border cities of Laredo and El Paso.

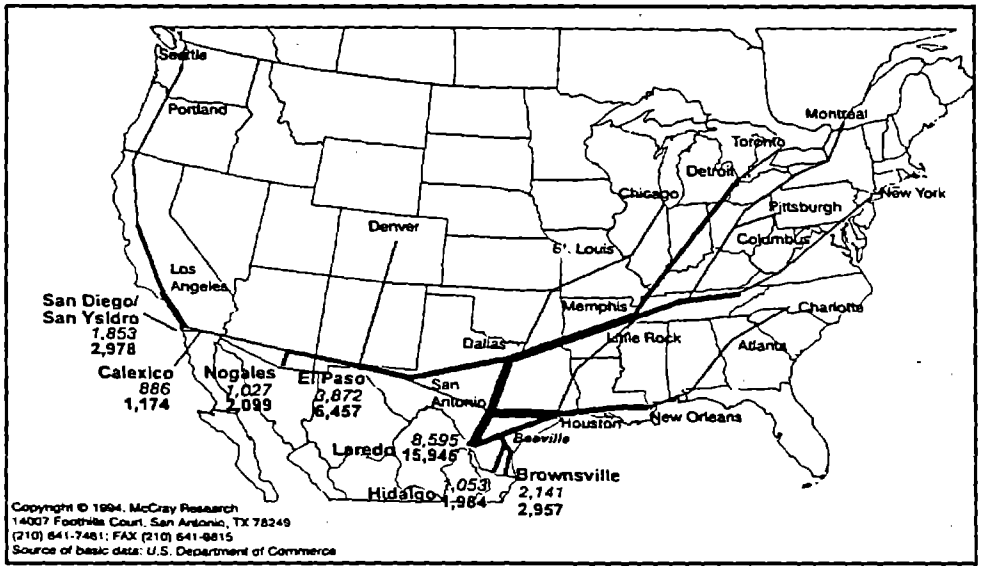


Figure 16. Major land transport corridors: US exports to Mexico through Southern border points (*1989* and 1993 - millions of dollars)

Louisiana Trade with Mexico

In 1994, Louisiana ranked 10th among all U.S. states in the value of exports to Mexico with a total of $753 million for the year. Only nine other states, including the border states of Texas, California, and Arizona, generated larger export volumes to Mexico. Louisiana's leading product categories for export to Mexico during 1994 included:

- agricultural crops ($409 million)
- chemicals and allied products ($109 million)
- petroleum and coal products ($70 million)
- food and kindred products ($49 million)
- industrial machinery & equipment ($31 million)

These five product categories accounted for 89 percent of the state's merchandise exports to Mexico during 1994.[11]

A seven year profile of Louisiana export trade to Mexico is shown in *Figure 17.* Louisiana exports to Mexico rebounded in 1994 by $252 million to the record level achieved during 1992 of $753 million. Downturns in exports in 1991 and 1993 resulted from U.S. recession effects (1991) and severe flooding conditions (1993), which affected agricultural exports-especially grains to Mexico.

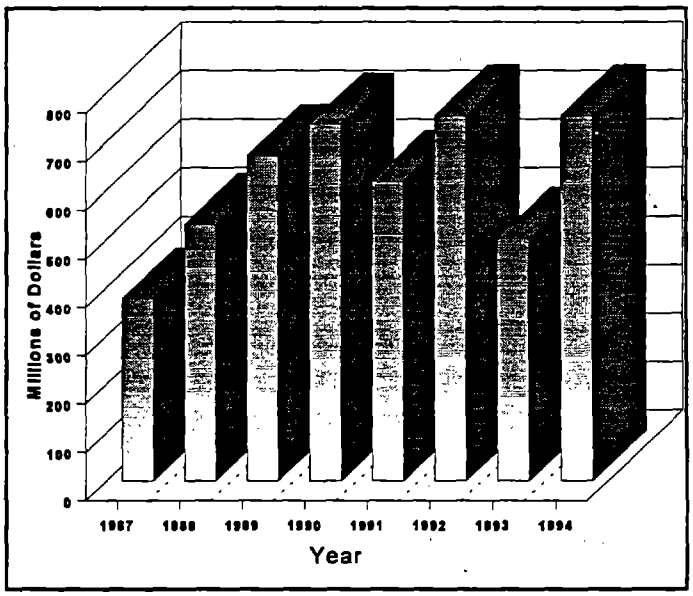


Figure 17. Louisiana Exports to Mexico (1987-1994)
Source: Dean International Inc.

In seven years, Louisiana's export trade with Mexico doubled from $377 million in 1987 to $753 million by 1994. Expansion of this trade was most notable for the following product groupings:

[11]NAFTA Trade Past, Present, and Future-A Fifty State Analysis , Dean International Inc. , Dallas, Texas (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.

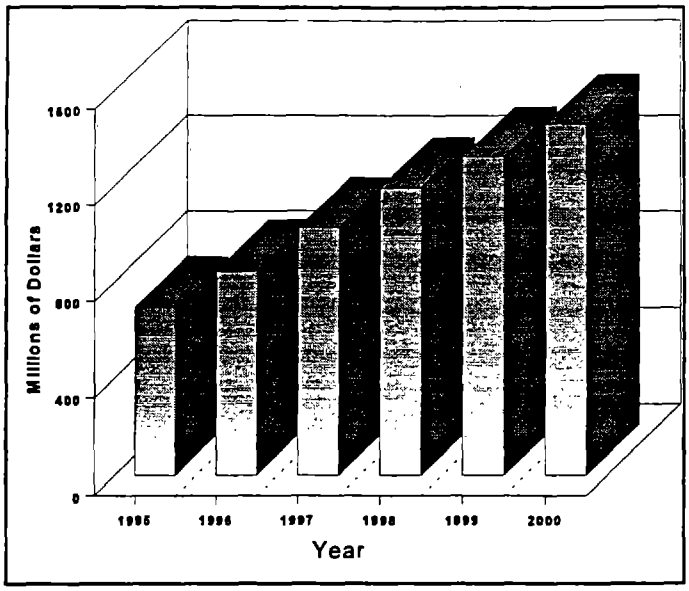


Figure 18. Forecasted Louisiana Exports to Mexico

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.

Regional Trade Divisions in Mexico

Previous NPWI research and analysis of cargo movements between the U.S. and Mexico have indicated that there are four regional geographic divisions of Mexico that form the basis of NAFTA trade with the United States as well as transportation service markets serving those regions. These regions include a northern border region, an eastern region, a central region, and a western region.

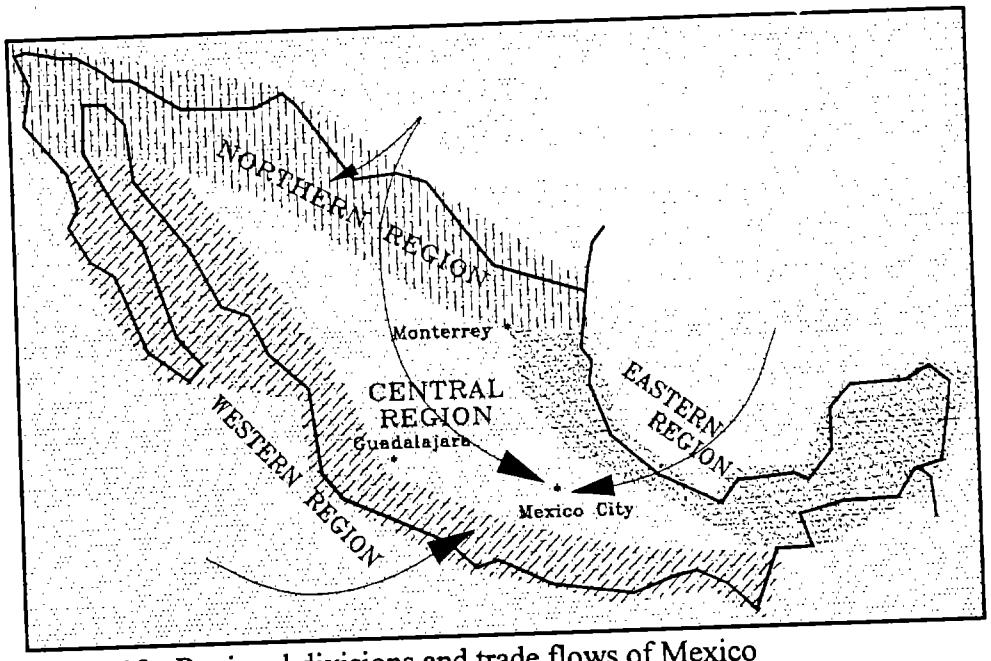


Figure 19. Regional divisions and trade flows of Mexico
Source: NPWI MSA study phases II and III (October)

Louisiana's extensive port and waterway system linking the Gulf region to the heavily populated central, eastern, and southeastern portions of the United States will continue to provide opportunities for North/South international trade, including NAFTA trade with Mexico. The central and eastern regions of Mexico will present cargo opportunities and markets that would most likely utilize water transportation between Louisiana ports and Mexico. Therefore, Louisiana's ports need to target shippers and trade/commodity activity located in the Eastern and Central regions/states of Mexico. Logistical and cost factors would generally exclude water transportation for Louisiana ports to and from the northern and western regions of Mexico.

The Eastern Region of Mexico

The Eastern region includes the six Mexican states of Veracruz, Campeche, Quintana Roo, San Luis Potosi, Tabasco, and Yucatan bordering the Gulf and the Yucatan regions of Mexico. The region accounted for approximately 12 percent of Mexico's gross national product at the end of 1994.[14] This region has the most active import/export port activities through the major ports of Veracruz and Altamira for the movement of containers, general cargos, agricultural, mining, petrochemical, and construction material products. Smaller regional ports such as Tampico, Tuxpan, and Progreso (Yucatan region) handle fishing products, garment materials/natural fibers, and perishable fruits and vegetables. The Port of Coatzacoalcos remains the dominant Mexican port for crude oil, gasoline, petrochemical, and natural gas exports to Louisiana and other U.S. Gulf and U.S. East Coast port locations.

The Mexican government has been encouraging industrial movement of production and distribution facilities into the eastern region from the congested northern region of Mexico with its high concentration of "in-bond" maquiladora plants. Currently, the eastern region's infrastructure for manufacturing includes food processing, electronic parts, toy manufacturing, textiles, pesticides, fertilizers, paper, iron, and steel. Inland access from this region to Mexico's population centers of Monterrey, Mexico City, and Guadalajara has remained a top priority of the current and previous Mexican government. The ports of Tuxpan and Veracruz are now linked to Mexico City via improved highway systems, and the ports of Altamira and Coatzacoalcos are targeted for new road improvements during the next three years.

Current types of commodities utilizing water transportation to and from this region are dominated by crude petroleum and petroleum related products such as petrochemicals, gasoline, and natural gas along with other bulk commodities such as coal, metallic ores, mineral oils, grains, fertilizers, and other dry/liquid bulk chemicals, salt, and rubber. The U.S. also imports significant amounts of fruits, vegetables, coffee, spices and other related food or perishable products from this region of Mexico that could move via refrigerated vessel or reefer container to Louisiana over a Cross-Gulf routing to say New Orleans and further distribution to Midwest and Southeast U.S. markets. The majority of these perishable products, however, currently move via truck from Mexico to final markets within the U.S.

---

[14]Bancomext Trade Directory, Summary of State Trade Profiles, 1994.

Other major categories of Louisiana exports that move into this region via land transportation include: forest products (finished lumber/ woodpulp/ newsprint/ paper), electrical equipment and industrial machinery, plastics/plastic resins, cereals/grains(i.e. rice), and organic chemicals.

Opportunities for Louisiana to expand the use of water transportation to and from this region appear most likely to succeed because of: (a) congestion and delays in the northern region along the U.S./ Mexican border, (b) the diversified and improved port system (i.e. privatized and more productive) located in the Eastern region of Mexico, © the expansion of industrial and agricultural trade in this region of Mexico with Louisiana and the rest of the U.S., and (d) existing and planned improvements to inland transportation connections via highway and rail from Mexican Gulf coast ports to Mexico's main population centers.

The Central Region of Mexico

The Central region of Mexico encompasses ten states including Aguascalientes, Distrito Federal, Guanajuato, Hidalgo, Mexico, Morelos, Puebla, Queretaro, Tlaxcala, and Zacatecas. This region of Mexico includes most of Mexico's major population centers, with the Federal District alone accounting for over 25 million in population. These states account for about 50 percent of Mexico's GNP and almost 55 percent of the country's import/export trade activity with the United States.[15] The central region is the most important in terms of overall volume of trade annually between the U.S. and Mexico, and this ten state market is also the most contested region for both water and land modes of transportation. Transportation cost, service, and reliability factors all come into play for modal selection by shippers importing and exporting from this region.

The central region is mountainous and has traditionally had difficult and limited transportation access to both Mexican coasts. The Mexican government has invested over $4 billion since 1993 to improve road access to and from the central region to other areas of Mexico. Privatized east/west toll roads linking major ports on both coasts to the inland population centers of Mexico City, San Luis Potosi, and Guadalajara are also being developed to address the geographic access problem. The Central region has a well developed northern transportation corridor with access to

[15]Op. Cit. , Bancomext Trade Directory (1994).

the United States via road and rail (including double-stack trains) from inland population centers of Monterrey and Mexico City.

Many well known U.S. corporations such as Ford Motor Company, General Electric, Kellogg, Motorola, Nabisco, Celanese, and Kimberly Clark have established large industrial plants and distribution facilities in Mexico's Central region. Key commodities produced in the region for export include automobiles and vehicle engines, machinery and electrical parts, fruits and vegetables, synthetic textiles, sugar, paper, fertilizers, limestone, and petrochemical products. Except for fertilizers, limestone, and petrochemical products, most of these commodities tend to move via rail or truck modes into the United States.

Louisiana's leading exports into the Central region include plastic resins, forest products, industrial and agricultural chemicals, rubber, rice, soybeans, coal, gasoline and aviation fuels, flour products, and industrial/electrical machinery. Of these product categories, plastic resins, rubber, rice, and machinery tended to move via land based modes while gasoline/aviation fuels, flour products, soybeans, coal, and chemicals tended to move via water transportation to Mexican Gulf Coast ports and then inland via truck or rail to final destinations in the Central region. These destinations are primarily concentrated in the Mexico City, San Luis Potosi, and Guadalajara population centers. *Figure 20* shows the deep sea Gulf ports of Mexico and the United States that currently serve as major gateways for water transportation to and from the eastern and central regions of both countries.

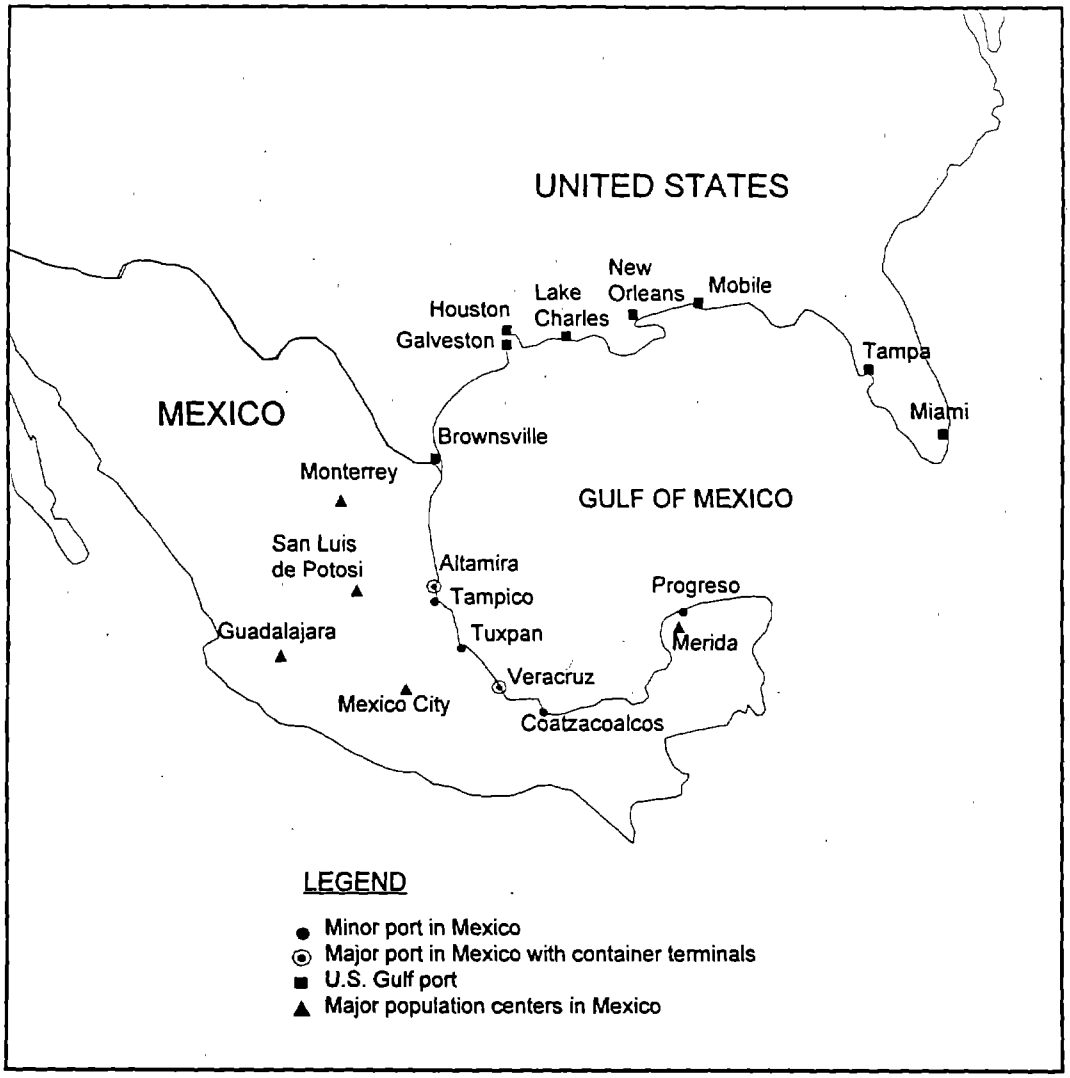


Figure 20. Gulf ports of Mexico and United States

Opportunities for Louisiana ports to expand the utilization of water transportation to and from this region appear most likely to succeed because of: (a) introduction of more intermodal services calling between U.S. and Mexican Gulf coast ports, (b) privatization and efficiency improvements currently evolving for both Mexican ports and the Mexican national railway system, Ferrocarriles Nationales de Mexico (FNM), which is due to be privatized during 1996, © improvement in Customs clearing procedures being worked out through NAFTA mandates and meetings with transportation and government staff groups responsible for developing pre-clearance and electronic sampling and overall efficiency improvements, and (d) existing and

planned highway and rail improvements linking Mexican Gulf coast ports to Mexico's inland population centers mentioned previously (Mexico City, San Luis Potosi, and Guadalajara).

Existing and Emerging Market Opportunities for Maritime Services at Louisiana Ports

Existing Maritime Opportunities for Mexican Imports and Exports Through Louisiana Ports

For calendar year 1995, approximately three million tons of cargo were exported to Mexico via Louisiana ports.[16] The Port of New Orleans accounted for approximately 60 percent or 1.8 million tons, of this export cargo with major deep-sea commodity movements of gasoline/aviation fuels, grains and flour products, soybeans, coal, and chemical products. The Port of South Louisiana accounted for approximately 33 percent, or 1 million tons, during 1995. It primarily moved grains, flour products, and carbonic acids. The remaining seven percent of tonnage to Mexico was processed through the Port of Baton Rouge (119,000 tons of primarily soybeans and petrochemicals), and the Port of Lake Charles (51,000 tons of primarily petrochemicals and rice).

Imports from Mexico utilizing Louisiana's public ports totaled over 20.6 million tons of cargo during 1995.[17] The Port of New Orleans accounted for approximately 23 percent of import tonnage with about 4.8 million tons of cargo. Petroleum and related fuel oil products dominated this activity followed by limestone, steel, and organic chemical cargos. The Port of Gramercy handled 32 percent or 6.7 million tons, of waterborne cargo concentrated in petroleum and crude oil products, steel, limestone, and molasses bulk cargos. The Port of Lake Charles processed almost six million tons, of waterborne import cargos from Mexico during 1995 or 29 percent of total waterborne imports. The majority of this cargo was petroleum and petrochemical products with limestone chips as a third major commodity. The Port of Baton Rouge handled 2.9 million tons of Mexican imports during 1995, or about 14 percent of the total waterborne import volume. Major commodity categories included petroleum, crude, and fuel oil products, steel, molasses,

---

[16]Port Import/Export Reporting System (PIERS), Journal of Commerce Data Tapes; supplied to NPWI by the Port of New Orleans.

[17]Ibid., Journal of Commerce Data Tapes.

kerosene, and organic chemicals. The Port of Morgan City recorded over 370,000 tons of Mexican import cargos during 1995, all of which were petroleum-related products. *Figure 21* summarizes the relative port shares of import/export Mexican tonnage shipped through Louisiana during 1995.

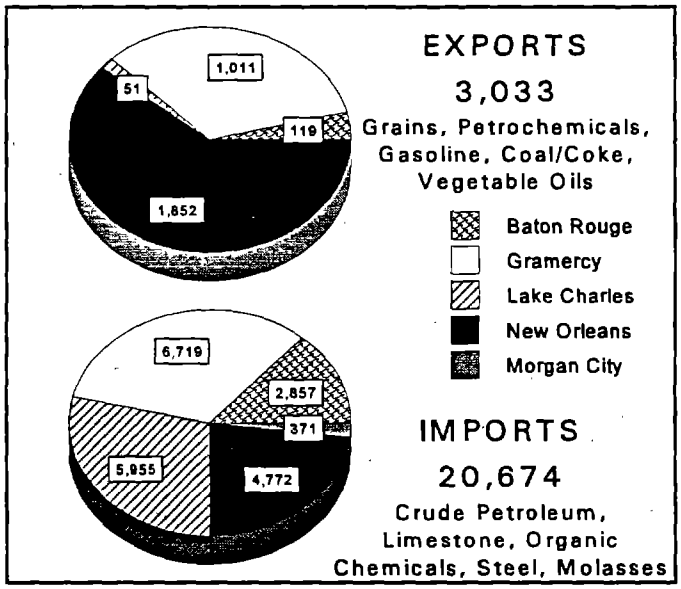


Figure 21. Mexican Export and Import Tonnage Shipped Through Louisiana Ports in 1995 (in 000 short tons) Source: PIERS

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,

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.

Cross-Gulf Trailer Ferry

Previous research by NPWI has established that approximately a seven percent market share (or about 50,000 trailers annually) of general cargo currently moving into the central and eastern regions of Mexico via truck from the central and eastern regions of the United States would be needed to sustain such an emerging service.[18] Research recommended the use of roll-on/roll-off vessels deployed in high frequency service (three times per week) that targets higher volume truck equipment (i.e. 48-foot. and 53-foot. trailers eventually). Rail car equipment and marine containers would generally be excluded from such a service. Previous attempts at rail/barge service (i.e. Burlington Northern-Protexa operation from Galveston, Texas to Coatzacoalcos, Mexico.) and short sea roll-on/roll-off service (i.e. Mexus Line from Houston to Tuxpan, Mexico) are noted as the most recent (1994) maritime service offerings to utilize a similar concept. These services, however, were eventually terminated after brief service histories. They have contributed to a service reliability/credibility problem for future maritime service providers.[19]

The history of such services, and their demises were useful to our research and recommendations. Earlier ferry service to Mexico such as the BN/Protexa service from Galveston to Coatzacoalcos focused on lower paying commodities (i.e. grains) and on movement of rail equipment. American Marine Express (AME), a failed River/Ocean service provider during 1984, focused only on the movement of containers. Mexus Line Ro/Ro service from Houston to Tuxpan, Mexico was underfunded and experienced market resistance after changing voyage times on a frequent basis.

In order to address the current market perception/credibility problem despite any potential cost savings provided from such a service, the research team believes that a new consortium of interested parties must act in unison to provide and endorse such a new service. This consortium should include the respective U.S./Mexican state governments and the public ports within their jurisdictions chosen to participate, as well as the private service provider(s) selected to operate

[18]Maritime System of the Americas Study : Intermodal Operation of Ocean Going Vessels and the Feasibility of Short Sea Vessel Operation, pg. 171. Research performed by NPWI for U.S. Maritime Administration (MARAD), 1994.

[19]NPWI interviews (April,1996) with users of these maritime services have confirmed a reluctance to utilize such services in the future due to reliability and longevity of previous services/providers.

such a trailer ferry service. To the extent that new buildings are necessary to provide the proper vessel design and service speeds required, shipyards with Louisiana and Mexico business interests should also be recruited to participate in vessel development and investment, if necessary, along with the chosen service provider(s). The ports selected should have well developed intermodal connections and existing infrastructure (both landside and waterside) to accommodate relatively large roll-on/roll-off vessels drawing 28-30 feet of water fully loaded. Existing terminal facilities in New Orleans (i.e. France Road Terminal-Berth 6) would be an excellent choice for implementation of such a service from Louisiana to Mexico. New Orleans port management has expressed interest in such a location for this emerging maritime service.

The service should be targeted to trucking companies providing current drayage services to and from Mexico, to and from the central and eastern U.S. states and Canada, to larger shippers utilizing their own trailer fleets, and to intermodal divisions of railroads currently without existing border crossing points/intermodal yards (i.e. Illinois Central, CSX Transportation, Norfolk Southern). The research team recommends a public-access type of operation that would allow for the largest potential usage and customer base for the facility.

Perishable Cargo Markets and Services

Total U.S. imports of fresh and frozen fruits and vegetables from Latin America, the Caribbean, and Mexico increased from 3.5 million tons to 5.7 million tons during the last 10 years. Agricultural imports from Mexico alone have averaged $2.7 billion annually in recent years, according to the U.S. Department of Agriculture (USDA), with fresh and frozen fruits/vegetables accounting for approximately 55 percent of the total.

Major perishable products shipped to the United States from Mexico include fresh tomatoes, cucumbers, melons, peppers, squash, onions, cauliflower, mangoes, frozen broccoli, and strawberries. As shown in *Figure 22.*, Mexico's exports of these products to the U.S. have doubled over the 10 year period of 1983-93 from about 1.2 million tons to over 2.4 million tons, and Mexico's market share of U.S. imports of fresh/frozen fruits and vegetables increased from about 35 percent to 42 percent during the same period .

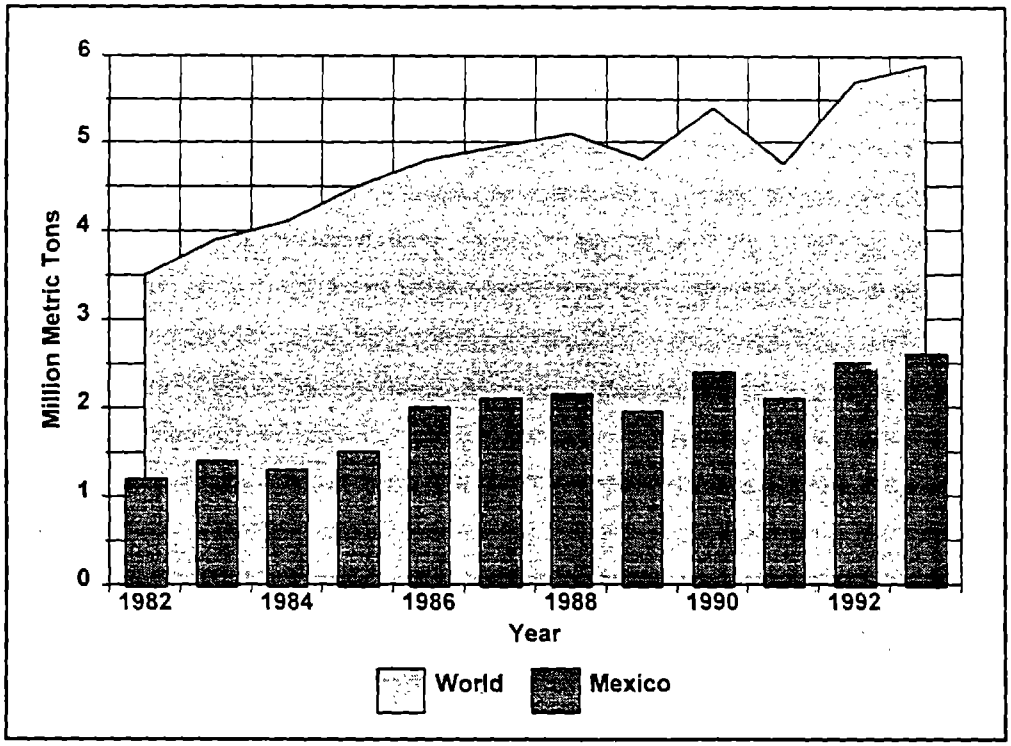


Figure 22. U.S. Total Fresh & Frozen Fruits and Vegetable Imports

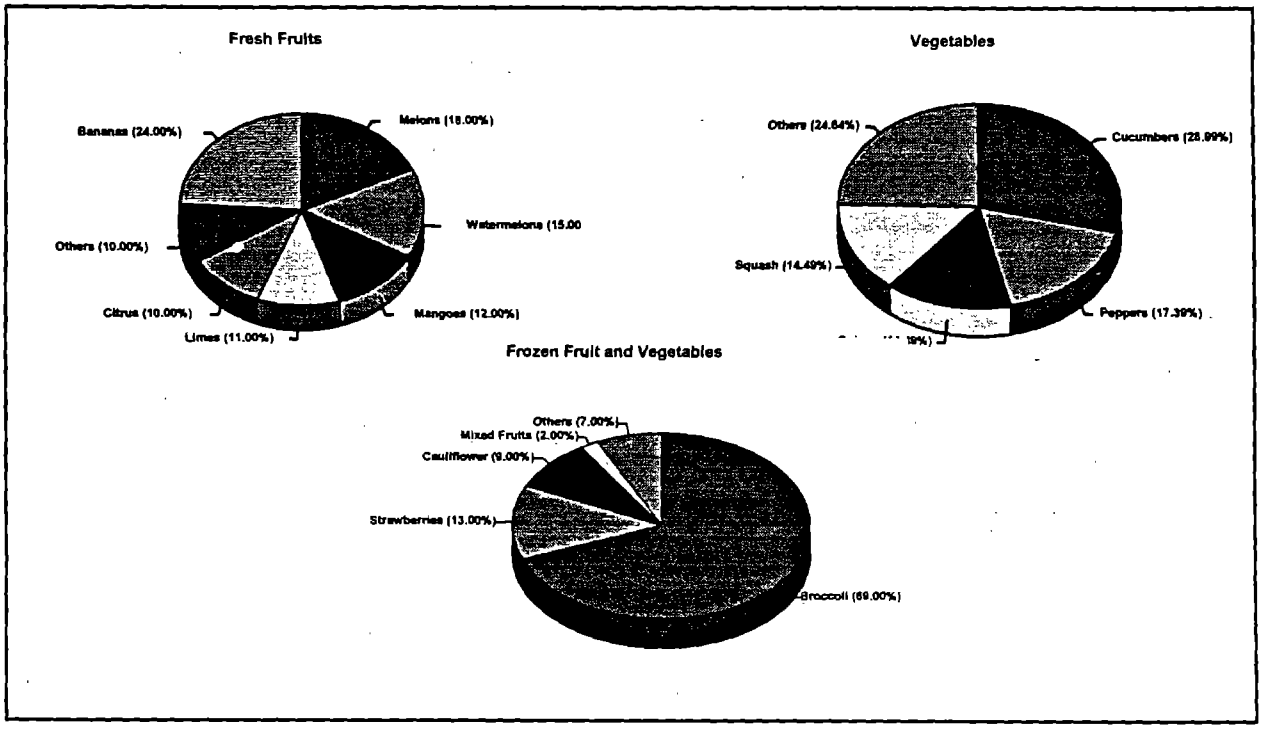


Figure 23. U.S. Imports of Fresh and Frozen Fruits and Vegetables from Mexico, by commodity, 1992-93. Source: R. Krajewski, USDA

The commodity structure by major type of U.S. imports of fresh and frozen fruits and vegetables is highlighted for the 1992-93 period in *Figure 23*.

According to the USDA, significant changes in perishable trade patterns between the U.S. and Mexico have also emerged during the last decade. During the 1980s, the import of Mexican fresh and frozen fruits/vegetables consisted primarily of winter vegetables such as tomatoes, bell peppers, and cucumbers from the Western region of Mexico (i.e. Sinaloa). Since the late 1980's, specialty fruits and vegetables such as strawberries, bananas, watermelons, broccoli and cauliflower have shown particularly strong export growth.[20]
Mexico's vegetable production is concentrated in the Mexican states of Sinaloa, Zacatacas, Guanajuato, Chihauahua, and Mexico. Vegetables for export are produced mostly in the Northern Pacific and Central states of Sinaloa, Sonora, Baja California, Baja California Sur, Michoacan, and Guanajuato. Non-citrus fruit production centers around the states of Michoacan, Chihauahua, Durango, Zacatecas, and Sonora. Citrus production is located in the Mexican states of Veracruz, Colima, Michoacan, San Luis Potosi, Hidalgo, Oaxaca, and Sonora. Sinaloa is Mexico's principal state for the export of fresh winter vegetables to the U.S. (i.e. tomatoes, squash, cucumbers, eggplant) accounting for about 50 percent of Mexico's entire horticultural exports. Second in significance is the state of Sonora which accounts for approximately 15 percent of Mexican horticultural exports to the U.S. (i.e. lettuce, broccoli, cauliflower, and asparagus).

Mexican citrus production is concentrated primarily in the Northern, Central and Eastern regions of Mexico while non-citrus production is centered in the Northern region of Mexico. Vegetables for export are cultivated primarily in the Northern and Western regions of Mexico. This geographic concentration of Mexican fruit and vegetable production limits the market potential for Gulf Coast water transportation since the majority of production occurs in the Northern and western regions of Mexico and would involve relatively long-distance truck movements to Mexican Gulf Coast ports. For example, truck shipments from Sinoloa and Sinora to land border crossing points in Arizona and Texas involve hauls of 300-500 miles while similar shipments to the port of Veracruz would be 900-1200 miles. Additionally, shipments to the ports on the Gulf Coast would require crossing the Sierra Madre mountains, increasing delivery times.

---

[20]U.S. Imports of Fresh/Frozen Fruits and Vegetables from Mexico, 1982-1993. R. Krajewski. USDA, Agricultural Marketing Service (1994).

Shifts in modal movement of Mexican perishables has also occurred over the years from rail to primarily truck movements. According to the USDA, with the exception of some limited water movements, virtually all current fresh and frozen fruits/vegetables move to the U.S. from Mexico via truck.[21] In the Gulf, water shipments from Mexico have been limited primarily to the import of bananas through the ports of Galveston and Gulfport by vertically integrated international fruit companies such as Dole Fresh Fruit and Chiquita Brands.

Border Points of Entry and U.S. Destinations for Mexican Produce

The majority of Mexican perishables is shipped via truck to the U.S. market through border crossing points in Arizona, Texas, and California. Arizona border crossings account for about 45 percent of Mexico's produce exports to the U.S. Texas border crossing points account for about 38 percent. California entry points account for about 13 percent of Mexican export volume of perishables to the U.S. Nogales (Arizona) is the largest border crossing point for Mexican perishables, and this border crossing point alone accounts for almost 40 percent (900,000 tons annually) of the entire current U.S. import volume of perishables from Mexico. Hidalgo and Laredo are the two major entry points via Texas. Hidalgo is the main entry point for Mexican citrus and frozen strawberries, while Laredo handles the majority of broccoli and cauliflower shipments imported from Mexico. California's share of the U.S. imports of Mexican produce accounts for about 13 percent with San Diego as the main entry point for tomatoes and peppers.

Since no detailed data was available from secondary sources on U.S. destination points for Mexican produce, the study team relied on information received from interviews with the USDA, cold storage facility operators, and trucking companies specializing in hauling Mexican produce to the U.S. These sources provided corroborative support for the following observations:

- The majority of Mexican imports via the California border are destined for the western and northwestern regions of the U.S. and account for approximately 400,000 tons annually. Arizona and Texas entry points account for approximately 1,000,000 additional tons annually into both regions.

[21] R. Krajewski, Op. Cit.

- Shipments entering the United States via Arizona and Texas are evenly split between the western and midwest/eastern regions of the U.S. Thus, approximately 40 percent of Mexico's fresh and frozen fruit and vegetable exports (about 960,000 tons annually) are trucked to the midwestern and eastern regions of the U.S.

- According to respondents interviewed, midwest/south and northeastern shipments/destinations were about equal in volume annually. Therefore, it is estimated that the U.S. northeastern region accounts for between 400,000 and 500,000 tons annually of Mexican exports of fresh and frozen fruits/vegetables.

- The U.S. midwest and south regions combined account for about 500,000 tons annually of Mexican produce exports.

A summary of estimated distribution of imports of fresh and frozen fruits and vegetables from Mexico to the United States by U.S. region is shown below.

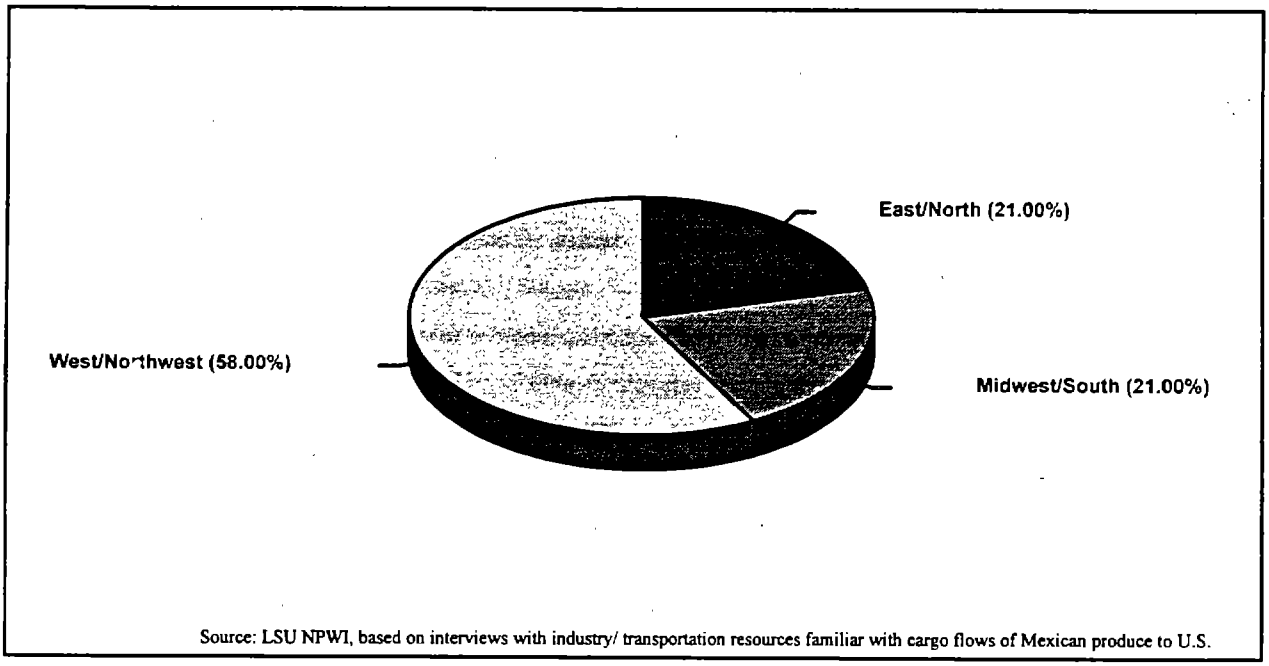


Figure 24. Estimated Distribution of Imports of Fresh & Frozen Fruits and Vegetables from Mexico to the United States, by U.S. regions, 1993

From this projection of annual Mexican produce volumes available to each U.S. region, one could conclude that future water services targeting Mexican and U.S. Gulf ports of call would probably have to add additional ports of call in Central America (i.e. Santo Tomas/ Guatemala, Puerto Cortes/Honduras, Puerto Limon/Costa Rica, Santo Domingo/Dominican Republic) in order to attract the kind of volumes necessary to justify dedicated vessel services for the region.

Typical refrigerated vessels that would be deployed for water services include 3,000 Dead-Weight-Ton (DWT) vessels with capacities for about 2,000-2,200 pallets each and larger 6,000 DWT vessels with capacities for about 4,000-4,500 pallets each. Vessel travel speeds are approximately 20 knots and could provide weekly service, for example, between New Orleans, Veracruz, and another Central American port of call such as those mentioned above.

In order for water transportation to succeed in capturing any significant amounts of perishable cargo from Mexico, port improvements in both Mexico and Louisiana will be required. On-dock cold storage facilities for the storage and transfer of perishable cargos will be necessary to attract the maritime and transportation distribution service providers necessary for overall efficiency. The importance of this emerging market is evidenced by the fact that major ports in both Mexico (Veracruz) and Louisiana (New Orleans) are actively evaluating major cold storage projects for development in 1996-97. Chapter 7 provides further details of this joint development and also evaluates the impact of transportation and port infrastructure on the future success of water movements for this type of cargo from Mexico to Louisiana.

Surveys, Databases, and Interviews Utilized in Market Analysis

The Institute utilized several existing databases such as the U.S. Directory of Manufacturers CD ROM, Harris Infosource International (1996), and the LA META (Louisiana-Mexico Trade Association) database files (1995) to identify Louisiana producers/shippers and their locations in the state. These database sources were useful in identifying companies with either Louisiana plant locations currently doing export/import activity with Mexico or Louisiana production facilities involved with selected products that were currently traded between the U.S. and Mexico.

Product categories selected for analysis included grains (rice and soybeans), steel (coils and pipe), forest products (paper, newsprint, wood chips, wood pulp, logs, and finished lumber),

chemicals (agricultural and industrial), petroleum products, plastic resins, crude rubber, gypsum/limestone/aggregates, industrial/electrical machinery, foodstuffs and perishables, and general merchandise. Shipper and producer survey forms were mailed to several hundred identified companies to further define their current Mexican import/export products, volumes, origins and destinations, method of transportation currently utilized, and related transportation costs. The survey also asked for future volume projections over the next 1-3 years and certain qualitative assessments such as would they consider utilizing/switching to a maritime/intermodal service (and under what cost and service parameters). Response rates from the mailed surveys were predictably low (about 1 percent) and incomplete in certain areas. Additional follow-up actions were performed that resulted in complete multiple shipper responses for each of the chosen product categories.

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

for specific maritime services/cargos between Mexico and Louisiana, highlighted in the following section, were also based on plant locations and port choices received from shippers.

Sample Maritime Service Routings and Itineraries

The following maritime service routings are based on adequate existing or anticipated port infrastructure requirements, highlighted in Chapter II, and Louisiana sources of production that could use various ports for the intermodal movement of commodities currently imported and exported between the United States and Mexico. Other vessel itineraries are possible depending on changing demand and market conditions. The routings highlighted below are only meant to represent current and anticipated market conditions.

Routings for river/ocean services suggest that production centers and inland river ports outside of Louisiana may be required to provide the necessary annual cargo volumes needed to sustain the on going operation of such a service to and from Mexico. This conclusion is consistent with the Institute's previous research, and from interviews recently conducted with potential shippers for such services within Louisiana. Preliminary demand assessment for water services targeting the perishables market in the Gulf between Mexico and Louisiana suggests that an additional port call in Central America may be required to sustain regular vessel service routings to compete with all land movement via trucks.

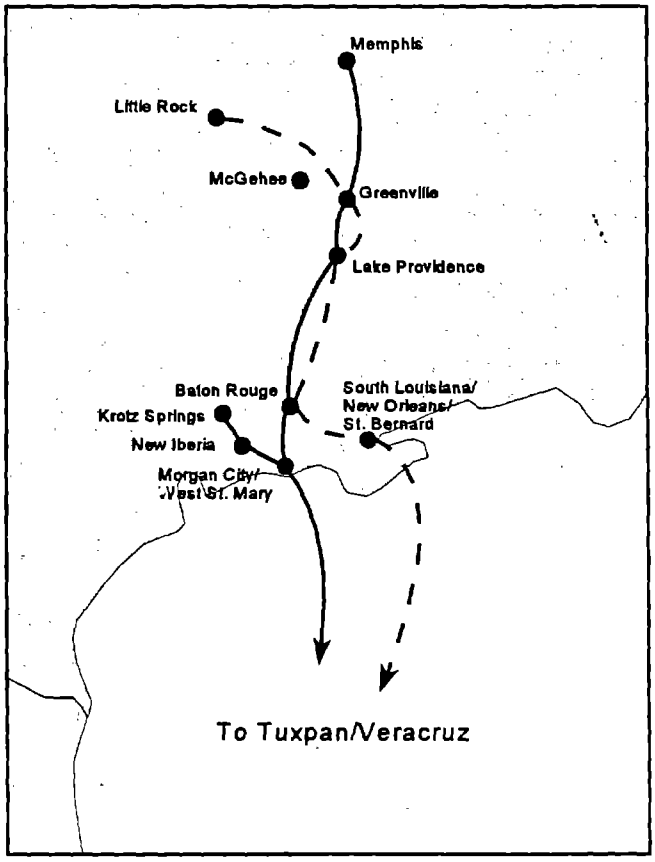


Figure 25. River/Ocean routes

River/Ocean Service

Routing #1 - From Little Rock via the Arkansas River down through McGehee/Greenville into the Mississippi River south to Lake Providence Port, continue down to Baton Rouge, and the lower Mississippi to the ports of South Louisiana, St. Bernard, and New Orleans, then out to the Gulf. Across the Gulf of Mexico to the Mexican Gulf port of Tuxpan.

Routing #2 - From Memphis, Tennessee. down the Mississippi River to Lake Providence, Baton Rouge, then bear west along the Atchafalaya River to the ports of Krotz Springs, Iberia, and Morgan City/West St. Mary, and then out to the Gulf and across to the Mexican Gulf ports of Tuxpan/Veracruz.

Northbound cargos- steel coils, pipe, fertilizers, coffee beans, petroleum products, limestone, gypsum, stone aggregates, plastic products, grains and flour products, containerized cargos such as general merchandise/auto parts/toys/machinery.

Southbound cargos - grains (rice, wheat and soybeans), plastic resins (bulk and palletized), forest products such as paper, newsprint, wood chips, wood pulp, logs and finished plywood, agricultural and industrial chemicals (dry bulk, bagged), steel wire, industrial machinery, vegetable oils, containerized consumer goods, and petroleum/coal products.

Short Sea Coastal Service

Routing #1 - From Lake Charles to the Mexican Gulf ports of Veracruz, Tampico, and Progreso.

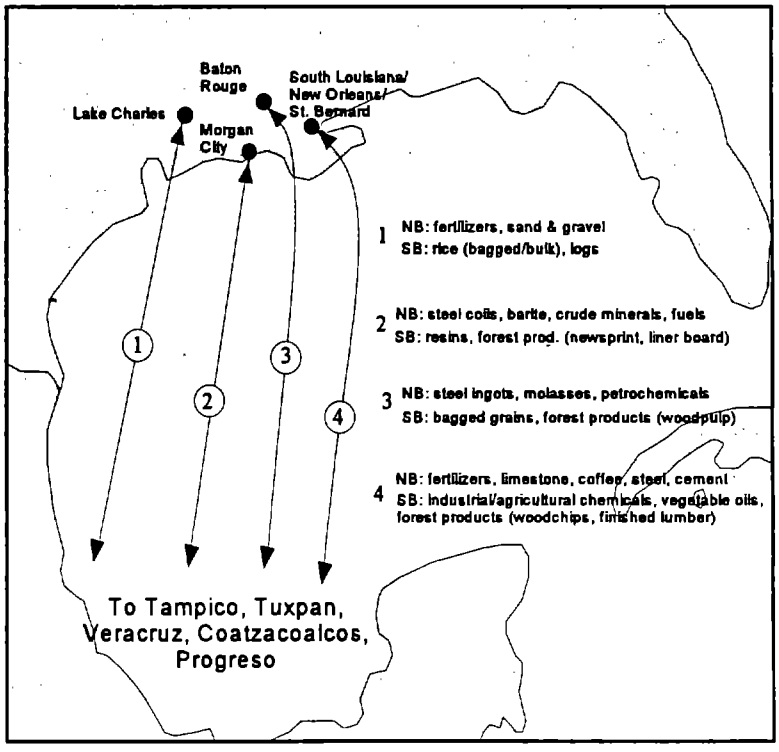


Figure 26. Short sea coastal services

Routing #2 - From Morgan City to the Mexican Gulf ports of Veracruz and Tuxpan.

Routing #3 - From Baton Rouge to the Mexican Gulf ports of Veracruz, Coatzacoalcos, and Progreso.

Routing #4 - From South Louisiana/St. Bernard ports to the Mexican Gulf ports of Veracruz, Coatzacoalcos, and Progreso.

Northbound cargos - petrochemicals, steel coils, limestone chips, fertilizers, sand and gravel, molasses, barite (drilling mud), ferrous scrap, crude minerals and fuels.

Southbound cargos - bagged and bulk grains (rice, soybeans, corn), animal feed, gasoline and aviation fuels, agricultural and industrial chemicals, steel pipe, wood chips, logs, newsprint, finished lumber, and refined coke/carbon products.

Specialized Short-Sea/Deep-Sea Services

Perishables/Reefer service from New Orleans to Veracruz as well as *Trailer Ferry service* to and from the ports of New Orleans and Veracruz.

Reefer service to and from Veracruz/New Orleans could have another port of call (i.e. Limon, Costa Rica, or Puerto Cortes, Honduras) as possible triangular service for perishable cargo movements/routings.

For Perishables -
Northbound cargo: citrus, melons, broccoli, cauliflower, cucumbers, and frozen strawberries
Southbound cargo: chicken and beef, vegetables/tubers.

For Trailer ferry -
Both directions: general merchandise, consumer goods, auto parts, apparel/clothing.

COMPARATIVE ANALYSIS OF TRANSPORTATION NETWORKS, LOGISTICS, AND COSTS

Methodology

An established transportation services market currently exists between the United States and Mexico as provided by steamship lines, railroads, and trucking firms serving the region. The study team utilized market rates and current tariff schedules provided by these transportation service providers and also obtained travel times and service frequencies for their respective services. Major firms with high volume operations geared to U.S. Mexico movements such as J.B. Hunt, Schneider International, and M.S. Carriers were contacted along with U.S. railroads such as Union Pacific, Southern Pacific, and Burlington Northern/Sante Fe. Mexican rail rates were obtained from the Mexican national railway system Ferrocarriles Nacionales De Mexico (FNM). Rates were obtained from all sources during the spring of 1996 (March/April) and assumed border crossing at Laredo, Texas. Border crossing fees were incorporated into the rate per mile comparisons provided by land transportation companies surveyed. Rates in a competitive environment are continuously changing in response to supply and demand conditions and competitive actions. Therefore, comparative analysis of rates as provided in this study reflect temporary market conditions and could change in the future.

Maritime rate comparisons for services currently provided (i.e. River/Ocean, short sea coastal, and deep sea) were based upon market rates quoted during the spring of 1996. Intermodal rates were developed within Louisiana utilizing the average intrastate-per-mile trucking rate of $1.45 per mile to a Louisiana port location. Sensitivity analysis incorporated three variables for cost/distance comparisons. The first variable was shipper location/distance from a Louisiana port capable of handling their cargo. Using increments of 25 miles up to a maximum of 200 miles from deep and shallow draft Louisiana port locations was considered sufficient to cover virtually all potential shipper scenarios within the state. Secondly, distances from the Louisiana plants/shipper locations to the Texas border crossing point at Laredo were varied to reflect statewide coverage. Thirdly, market rates per metric ton for certain maritime services were varied to reflect changing market demand conditions and contract prices. The range of $25 to $50 per metric ton for R/O service from points in Louisiana to the Mexican Gulf coast was consistent with the Institute's previous River/Ocean rate analysis and also within the range of current market

rates. Market/contract rates also varied by commodity for large short sea coastal movements and were incorporated into our analysis.

Mexico City and its vicinity were chosen as major origin/destination points in Mexico for intermodal rate comparisons with all land movements to the same destination. Laredo was selected as the land border crossing point of entry into Mexico, and the Port of Veracruz was chosen as the principal port of entry for intermodal service comparisons. Trucking and rail rates to and from Veracruz to Mexico City were obtained from local drayage companies in Mexico and the FNM railway system.

For maritime services that do not currently exist such as the proposed Cross-Gulf trailer ferry and refrigerated vessel services to and from Louisiana and Mexico, the study combined previous cost modeling results from the Maritime System of the Americas Study (MSA Phases II & III) with market rates previously offered by similar services such as the case of Mexus/trailer ferry service from Houston to Tuxpan. Cost comparisons for trailer ferry operations versus all-land routings to Mexico were performed for selected inland points within the U.S. (ten points including Atlanta, Charlotte, Chicago, Indianapolis, Memphis, New Orleans, New York, Pittsburgh, St. Louis, and Tampa) which were consistent with the Institutes' previous research for the MSA program. Mexico City and vicinity were chosen as the inland points for Mexico.

Refrigerated vessel service rates were developed from proposed per-pallet volume rates provided by shipping and trading companies interested in eventually providing such services to and from Mexico and Louisiana. The ports of New Orleans and Veracruz were utilized for the analysis because of existing plans at each of those ports to establish cold storage facilities.

The analysis does not explicitly consider border congestion costs, delays affecting turnaround of U.S. carrier equipment (rail and truck), or inventory in-transit carrying costs associated with differences in transit times of rail, truck and water transport options. Wide variations exist for such cost variables due to commodity volume, value, or uncertainty factors; consequently, they were excluded from the analysis. Ad valorem taxes were also excluded because of the refundability provision that currently exists for these charges.

Maritime Rate Comparisons with All-Land Movement

River/Ocean Service

Shipment profile for comparison was based upon a movement of 1,500 metric tons of dry bulk cargo palletized, with industrial origin being Plaquemine, the Louisiana loading port as Morgan City, the discharging port in Mexico as Veracruz, and the ultimate inland destination as Mexico City. *Table 11* shows the river/ocean rate comparison, with all-truck movement based upon a $25 per-metric-ton rate from Morgan City to Veracruz for the R/O service and a 100 mile distance from the Louisiana plant location to the loading port of Morgan City. The location of the plant from the Laredo land border crossing point was calculated at about 544 miles. Sensitivity analysis as shown in *Table 12* summarizes per-metric-ton cost savings based upon various distances from the Louisiana port of loading and River/Ocean per-metric-ton rates of $25, $35, and $50. Distances from the Laredo border crossing point are also included for comparison with all land routings. Quoted metric ton rates include coverage for all related port costs.

For the Plaquemine shipments to Mexico City, shown in Table 11 at a R/O rate of $25 per metric ton, the total intermodal cost to Mexico City is calculated at $54.75 per metric

TABLE 11. RIVER/OCEAN RATE COMPARISON

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	Steel	
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	$	20.00	
Total Cross Gulf Service	$	200,000	
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	$	422,500	

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	422,500	42.25
All Truck	863,500	86.35
Difference	441,000	44.10

TABLE 12. SENSITIVITY ANALYSIS OF RIVER/OCEAN RATES

For River/Ocean Vessel Freight of $25/mt between a LA Port and Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	33.19	37.56	41.94	46.31	50.69	55.06
	50	31.38	35.75	40.13	44.50	48.88	53.25
	75	29.56	33.94	38.31	42.69	47.06	51.44
	100	27.75	32.13	36.50	40.88	45.25	49.63
	125	25.94	30.31	34.69	39.06	43.44	47.81
	150	24.13	28.50	32.88	37.25	41.63	46.00
	175	22.31	26.69	31.06	35.44	39.81	44.19
	200	20.50	24.88	29.25	33.63	38.00	42.38

For River/Ocean Vessel Freight of $35/mt between a LA Port and Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	23.19	27.56	31.94	36.31	40.69	45.06
	50	21.38	25.75	30.13	34.50	38.88	43.25
	75	19.56	23.94	28.31	32.69	37.06	41.44
	100	17.75	22.13	26.50	30.88	35.25	39.63
	125	15.94	20.31	24.69	29.06	33.44	37.81
	150	14.13	18.50	22.88	27.25	31.63	36.00
	175	12.31	16.69	21.06	25.44	29.81	34.19
	200	10.50	14.88	19.25	23.63	28.00	32.38

For River/Ocean Vessel Freight of $50/mt between a LA Port and Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	8.19	12.56	16.94	21.31	25.69	30.06
	50	6.38	10.75	15.13	19.50	23.88	28.25
	75	4.56	8.94	13.31	17.69	22.06	26.44
	100	2.75	7.13	11.50	15.88	20.25	24.63
	125	0.94	5.31	9.69	14.06	18.44	22.81
	150	-0.88	3.50	7.88	12.25	16.63	21.00
	175	-2.69	1.69	6.06	10.44	14.81	19.19
	200	-4.50	-0.13	4.25	8.63	13.00	17.38

Note:
Tables represent cost savings (losses) utilizing river/ocean services at various rates per metric ton versus all truck transportation.

ton versus $86.35 per metric ton for all-land shipment via truck. This represents a potential savings of $31.60 per metric ton, or about a 36 percent potential total savings over all truck movement to Mexico City. At the $25 rate per metric ton for R/O service, per-ton savings decline to about $20.50, or 23 percent, if the plant/shipper location is 200 miles from the port of loading.

With R/O service priced at $35 per metric ton from Morgan City to Veracruz, potential cost savings per metric ton versus all-land drops to about $17.75 per metric ton or about 20 percent savings if the shipper is 100 miles from the port and 500-550 miles from the land border crossing point at Laredo. A 12 percent savings over truck movement is projected if the shipment is 200 miles from the port. Varying cost savings per ton could range from $10.50 to over $40 depending on the actual plant distance from the Louisiana port of loading and the plant distance from the Mexican border crossing point (Laredo).

Cost sensitivity analysis at $50 per metric ton for R/O service where the plant/shipper location is 100 miles from the loading port and 500-550 miles from land border crossing point at Laredo suggests that cost savings of only three percent would be obtained from the use of this maritime service compared to all land movement to Mexico City. This small amount of savings may not be adequate to attract sufficient volumes to sustain this type of operation. Shipper interviews within Louisiana indicate that a per ton cost savings of at least 5-10 percent would be necessary to encourage switching from reliable point-to-point trucking services to a new maritime service never before utilized by them. At distances more than 150 miles from a Louisiana port, the R/O service becomes unattractive if priced at $50 per metric ton or higher versus using all-land.

Short Sea Coastal Service

Shipment profiles for comparison were based upon monthly unit volume movements of 10,000 metric tons of cargo from the Louisiana coastal ports of Morgan City and Lake Charles. Both have existing infrastructure and water depth sufficient to accommodate larger short-sea coastal movements/vessels. Four typical commodities (steel, chemicals, rice, and forest products/paper) currently or potentially moving in trade between Louisiana and the central and eastern regions of Mexico were selected for comparison in movements with all land routings. Rice and forest products/paper were assigned to the Port of Lake Charles because of actual shippers of such products relatively close to the port. Steel and chemical cargo comparisons were assigned to the

Port of Morgan City for similar reasons. Mexico City was once again selected as the inland destination point in Mexico because of the concentration of current and potential importers/exporters of the chosen commodities.

Cross Gulf rates per metric ton vary by commodity for vessels and shipments of this size. Rates utilized were based upon average market prices received from brokers/vessel operators currently handling the shipment of such commodities with similar vessels but not necessarily involved in Mexican trades at this time. *Tables 13-16* present the selected point-to-point cost comparisons for these commodities and coastal ports selected in comparison with all land movements. *Table 17* summarizes the cost sensitivity analysis performed for each commodity selected.

For steel shipments through the Port of Morgan City with an intermodal movement using short sea coastal service for the movement of 10,000 metric tons and where the distance from the shipper to the port is about 100 miles, potential savings are estimated to be about $44.10 per ton compared to movement via truck. Savings over rail on a per ton basis would be much lower and would approximate about six dollars per ton.[1] Sensitivity analysis indicates that at current market rates of about $20 per metric ton for short sea coastal movements of steel to and from Louisiana to the Mexican Gulf coast and eastern regions of Mexico, substantial savings of between $35 to $60 per ton are possible using water transportation versus all land transportation via truck.

[1]Maritime System of the Americas : River/Ocean Operations (Phase I), Rail rate comparisons included in Appendix B.

TABLE 13. SHORT SEA / COASTAL COST COMPARISON: PLAQUEMINE-MORGAN CITY-VERACRUZ-MEXICO CITY (STEEL)

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	Steel	
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	$	20.00	
Total Cross Gulf Service	$	200,000	
3. Inland Mexico:			
Flat rate per truck (FNM)	$	300.00	Actual market rate reflecting lane/volume im
Number of trucks		500	
Total Inland Mexico	$	150,000	
Grand Total	$	422,500	

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 im
Number of trucks		500	
Total Inland Mexico	$	387,500	
Grand Total	$	863,500	

III. Modal Comparison:

	$	$/mt
Intermodal (using Coastal vs	422,500	42.25
All Truck	863,500	86.35
Difference	441,000	44.10

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
All Truck	863,500	86.35
Difference	491,000	49.10

TABLE 15. SHORT SEA / COASTAL COST COMPARISON: DERIDDER/ABBEVILLE-LAKE CHARLES-VERACRUZ-MEXICO CITY (RICE)

I. Shipment Profile

Routing Characteristics:

Origin	DeRidder/Abbeville, LA	
Destination	Mexico City, Mexico	
Using Water Service:		miles
From Origin	DeRidder/Abbeville, LA	0
To Loading Port	Lake Charles, LA	50
To Discharging Port	Veracruz, Mexico	860
To Destination	Mexico City, Mexico	250
TOTAL MILEAGE		1,160
All Land:		miles
From Origin	DeRidder/Abbeville, LA	0
To Border Crossing	Laredo/Nvo. Laredo	500
To Destination	Mexico City, Mexico	720
TOTAL MILEAGE		1,220

Cargo Characteristics:

Commodity	Rice	
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	50	
Rate per mile per truckload	$	1.45	Reflects lower intrastate rate structure.
Number of trucks		500	
Total Inland US	$	36,250	
2. Cross Gulf			
Typical cargo volume	tons	10,000	
Rate per ton	$	14.00	
Total Cross Gulf Service	$	140,000	
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	$	326,250	

All Truck

Description	Unit	Value	
1. Inland US (Louisiana/Texa			
Distance	miles	500	
Rate per mile per truckload	$	1.75	Reflects higher interstate rate structure.
Number of trucks		500	
Total Inland US	$	437,500	
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	$	825,000	

III. Modal Comparison:

	$	$/mt
Intermodal (using Coastal vs	326,250	32.63
All Truck	825,000	82.50
Difference	498,750	49.88

TABLE 16. SHORT SEA / COASTAL COST COMPARISON: DERIDDER/ABBEVILLE-LAKE CHARLES-VERACRUZ-MEXICO CITY (PAPER)

I. Shipment Profile

Routing Characteristics:

Origin	DeRidder/Abbeville, LA	
Destination	Mexico City, Mexico	
Using Water Service:		miles
From Origin	DeRidder/Abbeville, LA	0
To Loading Port	Lake Charles, LA	50
To Discharging Port	Veracruz, Mexico	860
To Destination	Mexico City, Mexico	250
TOTAL MILEAGE		1,160
All Land:		miles
From Origin	DeRidder/Abbeville, LA	0
To Border Crossing	Laredo/Nvo. Laredo	500
To Destination	Mexico City, Mexico	720
TOTAL MILEAGE		1,220

Cargo Characteristics:

Commodity	Paper	
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	50	
Rate per mile per truckload	$	1.45	Reflects lower intrastate rate structure.
Number of trucks		500	
Total Inland US	$	36,250	
2. Cross Gulf			
Typical cargo volume	tons	10,000	
Rate per ton	$	16.00	
Total Cross Gulf Service	$	160,000	
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	$	346,250	

All Truck

Description	Unit	Value	
1. Inland US (Louisiana/Texa			
Distance	miles	500	
Rate per mile per truckload	$	1.75	Reflects higher interstate rate structure.
Number of trucks		500	
Total Inland US	$	437,500	
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	$	825,000	

III. Modal Comparison:

	$	$/mt
Intermodal (using Coastal vs	346,250	34.63
All Truck	825,000	82.50
Difference	478,750	47.88

TABLE 17. SENSITIVITY ANALYSIS OF SHORT SEA / COASTAL RATES

Freight of $14/mt for RICE shipped from a LA Port to Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	51.69	56.06	60.44	64.81	69.19	73.56
	50	49.88	54.25	58.63	63.00	67.38	71.75
	75	48.06	52.44	56.81	61.19	65.56	69.94
	100	46.25	50.63	55.00	59.38	63.75	68.13
	125	44.44	48.81	53.19	57.56	61.94	66.31
	150	42.63	47.00	51.38	55.75	60.13	64.50
	175	40.81	45.19	49.56	53.94	58.31	62.69
	200	39.00	43.38	47.75	52.13	56.50	60.88

Freight of $15/mt for CHEMICALS shipped from a LA Port to Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	50.69	55.06	59.44	63.81	68.19	72.56
	50	48.88	53.25	57.63	62.00	66.38	70.75
	75	47.06	51.44	55.81	60.19	64.56	68.94
	100	45.25	49.63	54.00	58.38	62.75	67.13
	125	43.44	47.81	52.19	56.56	60.94	65.31
	150	41.63	46.00	50.38	54.75	59.13	63.50
	175	39.81	44.19	48.56	52.94	57.31	61.69
	200	38.00	42.38	46.75	51.13	55.50	59.88

Freight of $16/mt for PAPER shipped from a LA Port to Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	49.69	54.06	58.44	62.81	67.19	71.56
	50	47.88	52.25	56.63	61.00	65.38	69.75
	75	46.06	50.44	54.81	59.19	63.56	67.94
	100	44.25	48.63	53.00	57.38	61.75	66.13
	125	42.44	46.81	51.19	55.56	59.94	64.31
	150	40.63	45.00	49.38	53.75	58.13	62.50
	175	38.81	43.19	47.56	51.94	56.31	60.69
	200	37.00	41.38	45.75	50.13	54.50	58.88

Freight of $20/mt for STEEL shipped from a LA Port to Veracruz, Mexico

		Distance from LA inland point to border (miles)					
		500	550	600	650	700	750
Distance from LA Inland Point to Loading Port in LA (miles)	25	45.69	50.06	54.44	58.81	63.19	67.56
	50	43.88	48.25	52.63	57.00	61.38	65.75
	75	42.06	46.44	50.81	55.19	59.56	63.94
	100	40.25	44.63	49.00	53.38	57.75	62.13
	125	38.44	42.81	47.19	51.56	55.94	60.31
	150	36.63	41.00	45.38	49.75	54.13	58.50
	175	34.81	39.19	43.56	47.94	52.31	56.69
	200	33.00	37.38	41.75	46.13	50.50	54.88

Note:
Tables represent cost savings (losses) utilizing river/ocean services at various rates per metric ton versus all truck transportation.

Similar cost patterns are seen for chemicals, mostly dry bulk or palletized, with a Cross-Gulf short sea coastal rate of about $15 per metric ton to Veracruz, Mexico. Since Morgan City offers shippers 30 days free time storage, shipment consolidation is possible as well as shipper cooperatives to combine shipments going to and from the same regions.

Rice and forest products shipped from the Port of Lake Charles to the central and eastern regions of Mexico via short sea coastal service could also provide potentially significant savings of over $30 per ton to Mexico City from plant locations as far as 200 miles from the port shipping via truck. Savings over rail on a per ton basis would be much lower and approximate about four dollars per ton for rice and about five dollars per ton for forest products such as paper.[2] Interviews with current shippers such as Boise Cascade, who has four plants in the region (DeRidder, Florien, Fisher, and Oakdale) indicate that they would utilize such coastal services out of Lake Charles to Mexico if cost and service parameters were competitive. Current rail shipments take about 11-12 days to get to Mexico City with total point-to-point estimated loaded rail car costs per metric ton of about $38-$40. Assuming a per metric ton point-to-point cost of about $34 utilizing coastal short sea service through Veracruz to Mexico City, savings per metric ton could approximate between 10-15 percent over rail car movement.

Sensitivity analysis for shipments of rice and forest products (paper) to Mexico City via truck versus intermodal shipment utilizing short sea coastal service indicates that significant per ton savings of over $40 per metric ton could be generated for most small to medium sized shippers currently using trucks for shipments to the central and eastern regions of Mexico. Since the Port of Lake Charles offers free storage time as do other Louisiana ports, shipment consolidation is possible. Smaller volume shippers could also form cooperatives and use consolidation with others as a means of obtaining lower short sea coastal rates to and from the same shipment regions.

Cross-Gulf Trailer Ferry/Waterbridge

Rate comparisons focused on inland points in the U.S. and Mexico that were deemed to be in the contested regions for such a service, as identified in the Institutes' previous research for the Maritime System of the Americas Study (Phases II & III). Rate and service comparisons were

[2]Op. cit. , Maritime System of the Americas Study (Phase I), Cost Appendix B.

updated during the spring of 1996 to reflect existing land and maritime services to and from 10 U.S. population centers, including : Atlanta, Georgia., Charlotte, North Carolina., Chicago, Illinois., Indianapolis, Indiana., Memphis, Tennessee., New Orleans, Louisiana. , New York, New York, Pittsburgh, Pennsylvania, St. Louis, Missouri., and Tampa, Florida.

The updated cost analysis also assumed the following additional transfer points :

- U.S. ports for deep sea service - Norfolk, Charleston, Jacksonville, Miami, New Orleans and Houston
- Mexican Gulf port for trailer ferry service - Veracruz
- U.S. Gulf port for trailer ferry service - New Orleans
- Mexican inland point - Mexico City
- Mexican border crossing point - Nuevo Laredo

Routing options and ports chosen as transfer points for deep sea services in comparison for each inland point/city reflected the lowest possible point-to-point costs based upon published steamship line rates and sailing schedules available as of the spring of 1996. A Cross-Gulf rate of $1,000 per trailer including port costs was added to inland intermodal movement costs and used for the *proposed maritime* comparisons with existing land and maritime options. This rate is consistent with the Institute's previous cost analysis for the required freight rate range and market rates that were charged by Mexus for a similar maritime service to Mexico from the Gulf (Houston to Tuxpan).

Shown in *Table 18* are three of the selected U.S. inland points, namely Chicago, Atlanta, and Tampa. Additional inland U.S. ports are evaluated and presented in *Appendix II.*

From Chicago, proposed maritime cost point-to-point is estimated at $2,317 per trailer, or $103 per ton, versus $2,872 ($128 per ton) for an all-land routing through Laredo. Existing maritime service is lower at $2,230 for a 40-foot. container but higher on a unit volume basis at $121 per ton than the proposed maritime services. Service time for existing maritime service is also

inferior at an estimated 10 days with only a seven day frequency of sailing. Proposed trailer ferry service could save an estimated 15-19 percent over existing land and maritime service options to Mexico City.

Proposed maritime service from Atlanta to Mexico City through New Orleans is estimated to cost $1,858, or $83 per ton, versus $2,514 ($112 per ton) via an all-land mode. The existing maritime cost of $1,967, or $106 per ton is calculated under current steamship line rates. Proposed trailer ferry service is competitive with land service schedules and cuts existing maritime service times in half. Savings on a per ton basis are estimated to be about 21 percent.

Movements to and from Tampa are estimated at $2,219 or $99 per ton, via an all-land option to Mexico City versus $2,100 ($114 per ton) via 40-foot container through Miami. Proposed trailer ferry service through New Orleans is estimated at $1,823 per trailer ($81 per ton). Estimated cost savings would be about 18 percent over the all-land option with about the same estimated service times and 14 percent over the existing maritime service; but, the proposed service is twice as fast (five days versus 10 days) in service time to Mexico City as the existing maritime option.

A summary of rate and service comparisons for all selected inland U.S. points compared to existing land and maritime options is summarized in *Table 19.* In general, the proposed trailer ferry service provides estimated cost savings of between 18-22 percent over existing land and maritime options while providing comparable service times to all land routings to Mexico City. Previous institute research indicates that this level of savings is sufficient to get existing shippers to consider switching to this type of service. However, the previous short history of the recent Mexus service and other Cross-Gulf services (i.e. Mexican Gulf Lines, American Marine Express) would suggest some market resistance to the introduction of a new Cross-Gulf service to Mexico. This potential impediment might be overcome with a joint-port development and concession sponsorship between the state of Louisiana and the Mexican state of Veracruz, with their respective ports of New Orleans and Veracruz nominated for such a service. Such an initiative would signal a longer-term commitment by the states and ports to these types of services and may mitigate some of the initial skepticism from potential shippers.

TABLE 18. RATE COMPARISONS FOR CROSS-GULF TRAILER FERRY SERVICE

Origin: **Chicago**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	4.0	1,947	Laredo	Truck	JB Hunt	1	150	Truck	JB Hunt	2	775	7.0	2,872	128

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	Lykes (D-D)	2.0	630	Norfolk	Deep S.	Lykes (D-D)	7.0	1,150	Rail	Lykes (D-D)	1.0	450	10.0	2,230	121

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,017	New Orleans	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1	300	6.5	2,317	103

Origin: **Atlanta**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,589	Laredo	Truck	JB Hunt	1	150	Truck	JB Hunt	2	775	5.0	2,514	112

Land & Conventional Water (40' container)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Lykes (D-D)	1.0	350	Charleston	Deep S.	Lykes (D-D)	7.0	1,150	Truck	Lykes	2.0	467	10.0	1,967	106

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	1.0	556	New Orleans	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	5.5	1,858	83

Origin: **New Orleans**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt Trans.	1.0	987	Laredo	Truck	JB Hunt Trans.	1.0	150	Truck	JB Hunt	2.0	775	4.0	1,912	85

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	Lykes (D-D)	1.0	included	Houston	Deep Sea	Lykes (D-D)	3.0	1,500	Truck	Lykes (D-D)	1.0	450	5.0	1,950	105

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	0.0	0	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	4.5	1,300	58

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.

A Refrigerated Maritime Service for Perishables

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

---

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

TABLE 20 : VIA ALL TRUCK TRANSPORTATION SCENARIO, ESTIMATED TOTAL TRANSPORTATION COST PER TON, IMPORT OF FRESH FRUITS AND VEGETABLES FROM MEXICO

1. Truck Distance from Mexico's Origin Points to Border Crossings (in Miles)

Sonora to Nogales	400
Mexico Eastern Region (MER) to Laredo	500

2. Truck Distance from Border Crossings to Selected U.S. Destinations (in Miles)

	U.S. Destinations							
Border Crossings	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Nogales	1,846	2,656	2,676	1,520	1,700	1,450	960	1,660
Laredo	1,403	2,146	2,214	664	1,059	882	428	1,016

3. Total Truck Distance from Mexico's Origin Points to Selected U.S. Destinations (in Miles)

	U.S. Destinations							
	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Sonora via Nogales	2,246	3,056	3,076	1,920	2,100	1,850	1,360	2,060
MER via Laredo	1,903	2,646	2,714	1,164	1,559	1,382	928	1,516

II. Truck Transportation Cost Estimates

1. Assumptions

Truck Rate Per Ton	$1.44	
Average Load	24	tons
Truck Rate Per Ton Per Mile	$0.06	

2. Total Truck Transportation Cost

	U.S. Destinations							
	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Sonora via Nogales	$135	$183	$185	$115	$126	$111	$82	$124
MER via Laredo	$114	$159	$163	$70	$94	$83	$56	$91

TABLE 21 : TRUCK/OCEAN TRANSPORTATION SCENARIO, ESTIMATED TOTAL TRANSPORTATION COST PER TON, IMPORT OF FRESH FRUITS AND VEGETABLES FROM MEXICO

I. Truck Transportation To/From Ocean Port

1. Truck Distance From Mexico's Origin Points to Port of Veracruz (In Miles)

Sonora to Veracruz	1,000
Mexico Eastern Region to Veracruz	100

2. Truck Distance From U.S. Port of Entry to U.S. Destination (to Port of Veracruz and from U.S. Port of Entry to U.S. Destination)

U.S. Port of Entry	U.S. Destinations							
	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Philadelphia	772	121	0	1,230	902	1,017	1,471	888
Tampa	1,181	1,150	1,053	658	1,020	825	1,114	580
Charleston	913	775	678	781	858	756	1,052	478
New Orleans	1,028	1,497	1,230	0	678	393	499	342
Houston	1,085	1,662	1,559	352	780	567	246	671

3. Total Truck Distance Involved In Water Transportation (In Miles)

Shipments Originating in Sonora:

U.S. Port of Entry	U.S. Destinations							
	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Philadelphia	1,772	1,121	1,000	2,230	1,902	2,017	2,471	1,888
Tampa	2,181	2,150	2,053	1,658	2,020	1,825	2,114	1,580
Charleston	1,913	1,775	1,678	1,781	1,858	1,756	2,052	1,478
New Orleans	2,028	2,497	2,230	1,000	1,678	1,393	1,499	1,342
Houston	2,085	2,662	2,559	1,352	1,780	1,567	1,246	1,671

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	872	221	100	1,330	1,002	1,117	1,571	988
Tampa	1,281	1,250	1,153	758	1,120	925	1,214	680
Charleston	1,013	875	778	881	958	856	1,152	578
New Orleans	1,128	1,597	1,330	100	778	493	599	442
Houston	1,185	1,762	1,659	452	880	667	346	771

TABLE 21(CONTINUED) : TRUCK/OCEAN TRANSPORTATION SCENARIO, ESTIMATED TOTAL TRANSPORTATION COST PER TON, IMPORT OF FRESH FRUITS AND VEGETABLES FROM MEXICO.

1. Assumptions

Truck Rate Per Ton	$1.44
Average Load	24 tons
Truck Rate Per Ton Per Mile	$0.06

2. Total Truck Cost Involved in Water Transportation Scenario (To Port of Veracruz and from U.S. Port of Entry to U.S. Destinations)

Shipments Originating in Sonora:

U.S. Port of Entry	U.S. Destinations							
	Chicago	New York	Philadelphia	New Orleans	St. Louis	Memphis	Dallas	Birmingham
Philadelphia	$106	$67	$60	$134	$114	$121	$148	$113
Tampa	$131	$129	$123	$99	$121	$110	$127	$95
Charleston	$115	$107	$101	$107	$111	$105	$123	$89
New Orleans	$122	$150	$134	$60	$101	$84	$90	$81
Houston	$125	$160	$154	$81	$107	$94	$75	$100

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	$52	$13	$6	$80	$60	$67	$94	$59
Tampa	$77	$75	$69	$45	$67	$56	$73	$41
Charleston	$61	$53	$47	$53	$57	$51	$69	$35
New Orleans	$68	$96	$80	$6	$47	$30	$36	$27
Houston	$71	$106	$100	$27	$53	$40	$21	$46

atlas. Subsequently, the total cost of truck transportation involved in each water transportation scenario was estimated. The results of these estimations are also shown in *Table 21.*

The calculated rates do not consider a variety of other factors that may significantly impact truck transportation rates such as truck or backhaul cargo availability. Although a detailed evaluation of these factors extends beyond the scope of this report, several additional interviews were conducted to estimate the possible impact of these factors on the competitiveness of New Orleans for Mexican fruit and vegetable trade. They revealed that truck rates for fruits and vegetables in the Philadelphia-Midwest corridor are lower than the national average due to higher truck availability and intense cargo flows from the Midwest to the East. This situation is reflected in lower backhaul rates to inland destinations compared to rates paid by shippers in other regions. Interviews indicated that rates from Philadelphia are 40 percent lower than the average national rates. This significantly improves the competitive position of the Port of Philadelphia for FFFV imports from Mexico. Interviewed trucking companies and shippers indicated that currently rates from and to New Orleans are at the average national level[5].

Ocean Freight

The evaluation of ocean freight for breakbulk shipments of FFFV from Mexico to the United States is difficult since currently there are no water breakbulk shipments of refrigerated perishable cargo from Mexico to the United States. As a result, the analysis was based on ocean freight estimates received from shipping lines that have expressed interest in water shipments of FFFV from Mexico to the United States.

Ocean freight for FFFV shipments from Mexico will depend on many factors such as cargo volumes, vessel size, number of vessels deployed per route, number of port calls, the efficiency of cargo handling at port, the availability of backhaul cargo, etc. The ocean freight estimates for shipments between Veracruz and U.S. ports of entry were developed for 1,500 to 2,000 pallet vessels, assuming biweekly service, and 75-percent backhaul cargo. According to the interviewed shipping lines, these are the most likely features of the Mexico-U.S. FFFV service.

---

[5] For more information on FFFV shipments via Philadelphia see: Raymond Lawler, Fruit Import Markets, Assessment of the Competitive Advantages of the Ports of Philadelphia, Delaware River Port Authority.

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.

Figure 27. Total Transportation Cost of Fresh Fruits and Vegetables from Sonora Region to U.S. destinations

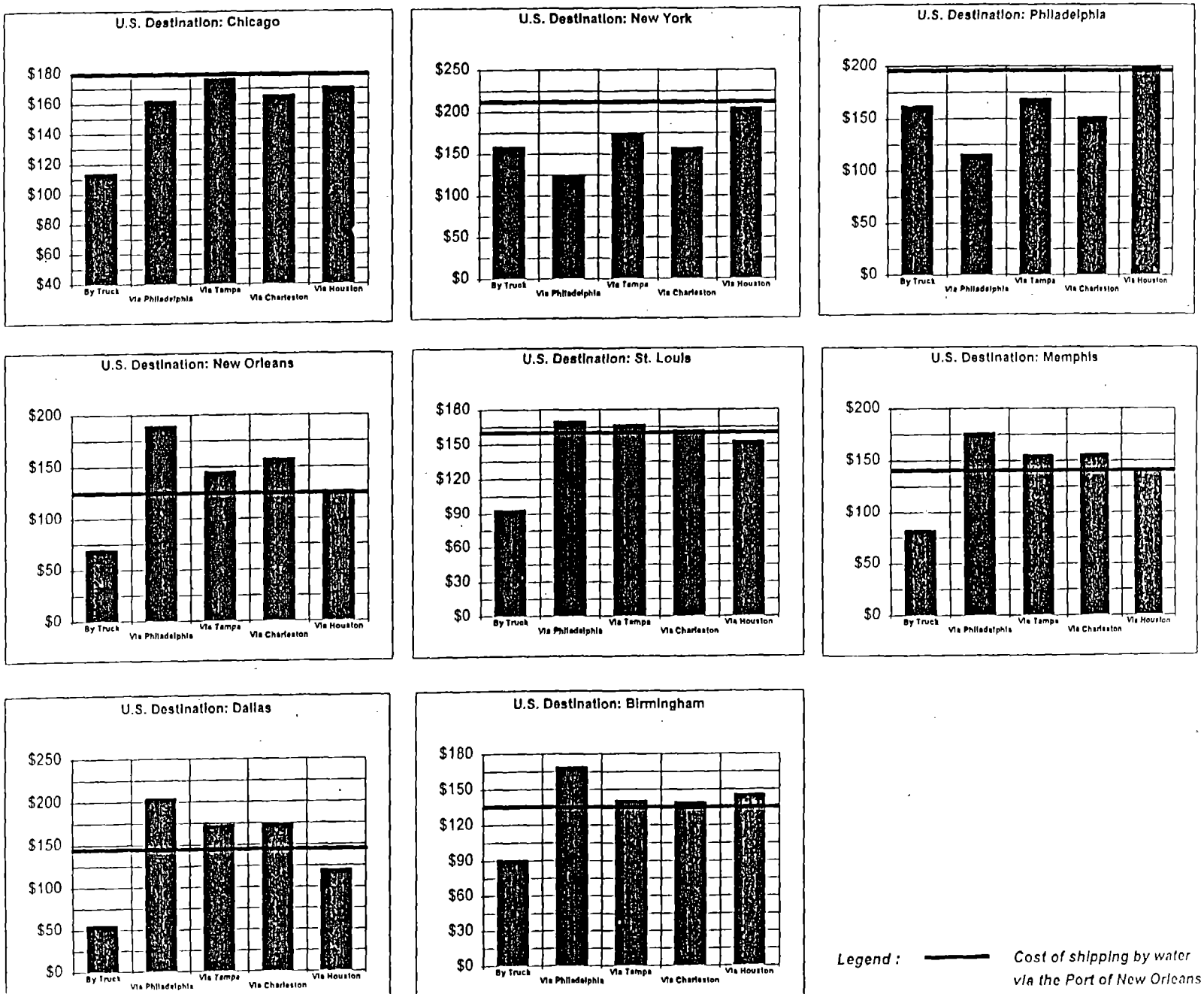
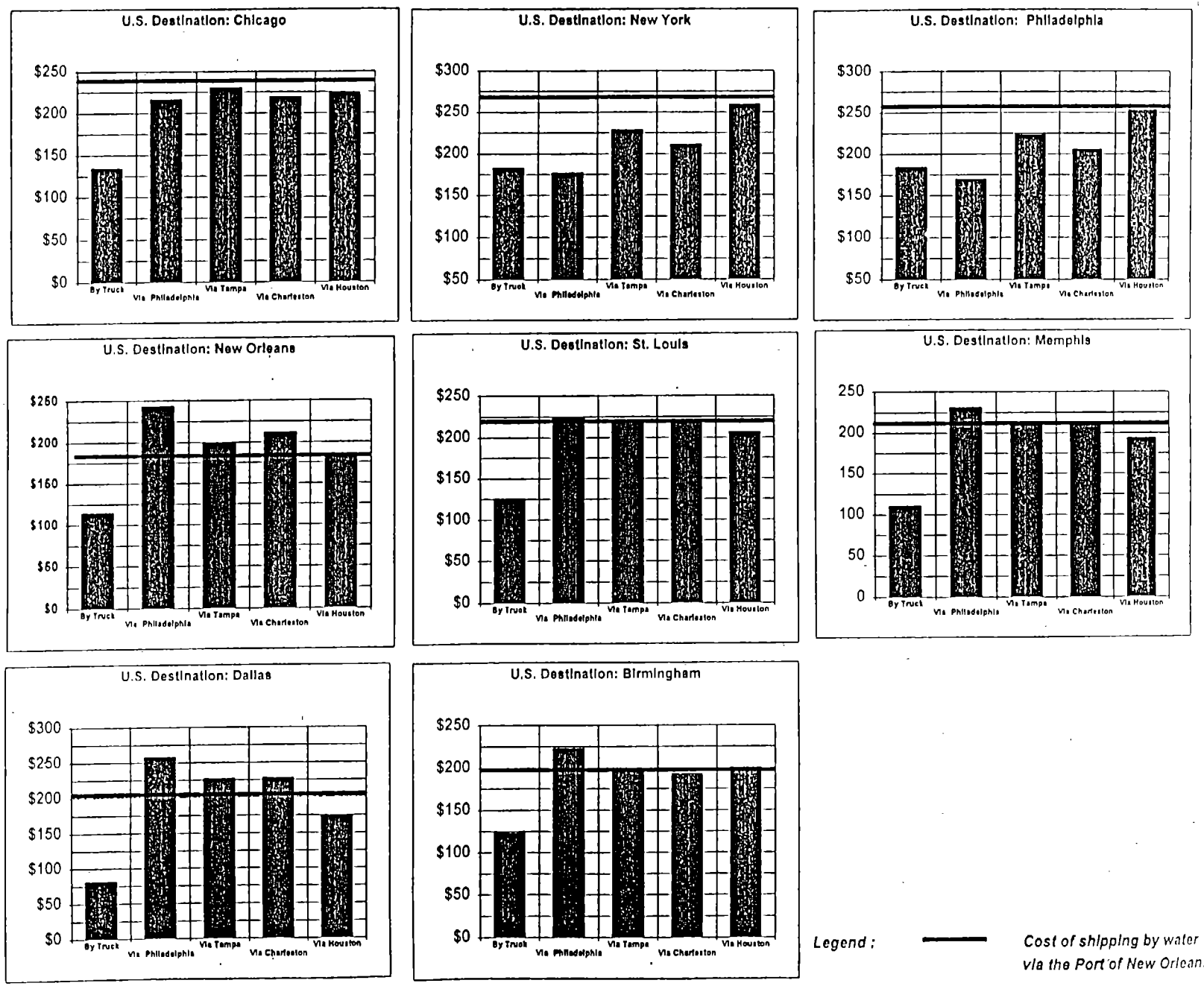


Figure 28. Total Transportation Cost of Fresh Fruits and Vegetables from Mexico Eastern Region to U.S. destinations



Delivery Time

The shipments of perishables are time sensitive due to the limited storage life for fruits and vegetables. *Table 25* presents approximate storage lives for selected fruit and vegetables imported from Mexico.

To evaluate the impact of delivery time of perishables shipments from Mexico to U.S. , it was assumed that truck transportation can move cargo 500 miles a day, and vessels can move 360 miles a day (20 knots for 24 hours a day).

TABLE 25. APPROXIMATE STORAGE LIFE FOR FRUITS AND VEGETABLES

Product	Approximate Storage life (Days)
Bananas, green	7-28
Broccoli	10-14
Cauliflower	21-28
Cucumbers	7
Eggplants	14
Melons, Crenshaw	21
Peppers, Sweet	14-21
Tomatoes, mature-green	7-21
Tomatoes, firm-ripe	4-7

Source : "Agriculture Export Transportation Workbook", United States Department of Agriculture, Agricultural Marketing Service February 1993.

TABLE 26. ESTIMATED GULF DISTANCES BETWEEN VERACRUZ AND U.S. SELECTED PORTS, IMPORTS OF FRESH & FROZEN FRUITS AND VEGETABLES FROM MEXICO (MILES)

	Destination in USA			
Port of Origin	**New Orleans**	**Gulfport**	**Charleston**	**Philadelphia**
Veracruz	907	920	1,651	2,254

Source: Compiled by LSU National Ports and Waterways Institute from "Distances Between Ports", Pub. 184 1995

Table 26 provides information on ocean distances between Veracruz and the selected U.S. ports of entry. For shipments originating in Mexico's eastern region, the difference in delivery time is insignificant and amounts to 1-3 days for shipments destined to the most remote inland markets such as Chicago and New York, while times to other locations such as Memphis, St. Louis, and Birmingham are generally less than one day of travel time. The comparison of approximate storage life and delivery times indicates that, although important, the time factor for delivery should not have a critical impact on decisions regarding the choice of transportation mode. For the majority of perishables imported from Mexico, storage life is much longer than the estimated delivery time. The only product that may be impacted by increased transportation time is ripe tomatoes. Interviews with tomato shippers indicate that regardless of delivery time, ripe tomatoes will probably continue to be shipped by truck due to the fragility of this product and its sensitivity to the transfer between modes of transportation.

Market Potential Based upon Cost Comparisons

River Ocean Service

The cost analysis for River/Ocean service indicates potential savings per metric ton over all land movement via truck of between $10.50 to over $25 per metric ton if the market cost of such services is kept between $25-$35 per metric ton from points in Louisiana to the Gulf Coast of Mexico. This rate range seems reasonable, particularly if as with the current service offered by Nafta Marine Express, the vessel operator has a loaded fronthaul of cargo into the region from Mexico priced at about $50 per metric ton. Back haul discounts of 50 percent are not unreasonable to attract cargo for these types of services.

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).

Damage rates of less than one percent are being achieved by major fruit terminal ports such as Philadelphia.

The projected growth of trade between the U.S. and Mexico should result in an increased cargo base of Mexican fresh/frozen fruits and vegetables for both truck and water shipments. Current volumes going to the Midwest and southern U.S. locations are estimated at between 400,000-500,000 tons annually.

For development of a major on-dock cold storage complex such as the Harvest terminal project at New Orleans (estimated by the port to cost about $40 million at completion), its feasibility should be thoroughly evaluated in terms of available cargo and the very competitive environment for such cargos that currently exists in the Gulf and on the East Coast. Based upon results of evaluation of similar projects in the United States and overseas, a minimum of 300,000-400,000 tons of cargo must be attracted annually to justify such a facility. Market assessment of Mexican cargo potential currently for the Gulf indicates that current levels are insufficient to provide this volume. Thus, other cargo sources should be considered and targeted for this facility such as perishable import cargos from Central and South America and regional Midwest and southern export commodities like frozen poultry, meat, and meat products to various world markets.

Other Cost and Competitive Logistics Factors Influencing Success

While overall point-to-point transportation costs may be reduced via the introduction of new maritime services included in this analysis, there are other logistics and market factors that may limit the market success of these services. One such factor is the ability of Mexican importers and exporters to accept the larger unit volumes usually associated with water transportation. This factor could be somewhat mitigated by ports in both countries offering creative storage arrangements (i.e. free time storage incentives in exchange for increasing cargo volumes/port revenues) to attract water services. A second factor mentioned with services like R/O and trailer ferry operations is their credibility in the marketplace after a history of short lived and generally underfunded service failures. This can only be overcome by time and the selection of the right supporters/operators for the service. There are technological factors that may play a pivotal role in the ultimate success of these services. With trailer sizes increasing and service times critical for the success of these maritime services as the proposed "water bridge" to Mexico, vessels will have to be redesigned to provide the necessary trade offs between size, capacity, and operating

speeds that will allow these vessels to be competitive with all land transport modes. The Louisiana ship building industry should be encouraged to take a leadership position in such technological advances for NAFTA trade potential.

Another competitive factor that could influence the success of water transportation for the perishables market from Mexico is the planned reduction of border crossing costs envisioned under the NAFTA treaty. Currently, land border crossing costs averaging $100-$150 per trailer for documentation fees, tolls, and other transborder transactions should be reduced by 50-70 percent over the next few years. The anticipated reductions will improve the cost competitiveness of trucks.

The cost competitiveness of truck transportation between the U.S. and Mexico should also improve as a result of accessibility to backhaul cargos. NAFTA provisions scheduled to be in place by the end of 1996 will give trucking companies in the U.S. and Mexico the opportunity to move consumer goods to Mexico, for example, and get frozen or chilled fruits/vegetables as backhaul freight commodities. By the year 2000 motor carriers in Canada, the U.S., and Mexico will be granted full access to the interiors of all three nations. The treaty also calls for uniform safety regulations regarding trucks and drivers which should contribute to an increase in quality and a reduction truck delivery times.

EVALUATION OF THE COMPETITIVE POSITION OF LOUISIANA PORTS IN TRADE BETWEEN THE UNITED STATES AND MEXICO

Competitive Assessment of Ports

The competitive assessment of ports in Louisiana relative to ports in other states most likely to compete for cargo in similar hinterlands was divided into two basic categories. The first category is composed of existing port handling rates (ship to shore) for different commodities such as containers, steel, forest products, and dry bulk commodities. The second category relates to comparative costs of calling at the port including not only port tariff costs such as dockage, wharfage, and equipment rentals but also other related costs such as pilotage and tug costs, ship-to-shore stevedoring costs, harbor fees, storage costs, agency fees, and vessel operating costs (steaming time) in making port calls. The institute recently completed analysis for a working paper presented to LADOTD[1] related to the development of Louisiana's first statewide intermodal plan. The material in this chapter is based on the methodology and findings of this analysis. In addition to productivity and port cost factors, certain qualitative assessments were necessary for competitive evaluation of maritime services/projects that either do not currently exist in Louisiana (i.e. trailer ferry operations) or were still in the planning phase (e.g. the Harvest Terminal project proposed by the Port of New Orleans).

Methodology

In order to adequately represent comparisons at each port, three typical vessels were selected based on ship size and lot size of cargo loaded or unloaded. Cost comparisons for general cargo were limited to containers because of the cargos's uniform nature of the cargo and associated handling costs. Cost comparisons are based on a port call as a single event, and do not take into account special discounts for-long term lease agreements or volume discounts/incentives based upon annual tonnage or number of ship calls per year at the port. While such special arrangements do exist for certain port customers, they are generally limited to only a few of the largest port users.

---

[1]Working Paper on Water, Rail, and Intermodal Freight Transportation, National Ports and Waterways Institute. Presented to the Louisiana Department of Transportation and Development (July 1995).

Vessels selected for port call comparisons provided a spectrum for the existing trade in New Orleans and included a small-sized vessel (300 TEU capacity), a medium-sized vessel (1,000 TEU capacity), and a larger size ship (2,400 TEU capacity) that made calls at the Port of New Orleans public facility at France Road. Selected lot sizes were typical of loaded/unloaded volumes appropriate to the selected vessels. A box composition of 60 percent 40-foot and 40 percent 20-foot containers was used to determine total TEU's handled. A nine ton-per-TEU volume measure was considered typical for area port comparisons, and was used to calculate total tonnage. Vessel operating costs were calculated based on a per-hour estimate consistent with the Corps of Engineers Deep Draft Vessel Cost Guide (1993 edition).

Labor and stevedoring costs were developed from actual gang sizes and labor rates in force at each port combined with actual container handling rates provided to the Institute by port stevedoring companies operating in selected ports. All handling rates for commodities reviewed were calculated and reported on a per gross gang hour basis. Multiple gang use was not incorporated into the analysis to avoid complications in port comparisons and final costs (i.e. minimum gang guarantees vary at each port). Overtime costs were calculated at time and a half after eight hours of gang work. Continuous work was assumed until all containers were interchanged. Gantry crane costs assumed a one hour period for start-up and securing of the equipment that is typical to the industry and standard tariff rates for crane usage (i.e. no volume discounts) were utilized. Dockage and wharfage costs were calculated from standard port tariffs applied to each vessel, and cargo volume interchanged and assumed no volume discounts.

For specialized maritime services/cargos (i.e. handling of perishables, trailer ferry) market rates were obtained from land transportation companies and vessel operators either currently providing or willing to provide such services. As summarized previously in Chapter 5 for these services, all land movements from Mexico to selected U.S. destinations were compared with intermodal movements utilizing Veracruz (Mexican Gulf port) to selected U.S. ports including trucking costs from the various U.S. ports to selected U.S. destinations. Cargo handling charges at competitive U.S. ports were also included in the comparisons in order to make qualitative and quantitative assessments of Louisiana ports' potential in capturing these specialized cargos.

Comparison of Port Cargo Handling Efficiency

Port cargo handling rates were compiled through interviews and operating reports received from various stevedoring companies operating in South Atlantic and Gulf Coast ports. Ports surveyed outside of Louisiana included Charleston, Savannah, Jacksonville, and Miami in the South Atlantic region, and Tampa, Gulfport, and Houston in the Gulf region. Louisiana ports included the ports of New Orleans, Baton Rouge, and Lake Charles.

The cargo handling comparisons encompassed five basic commodity groupings that included (1) containers (handled by either ships' gear or gantry/mobile cranes), (2) steel (pipe and coil related cargos), (3) dry bulk cargos that were mainly grains (bagged and conveyor fed), (4) lumber (finished sheets and logs) and (5) paper-related cargos (wood pulp, liner board, newsprint and computer paper).

Cargo handling comparisons focused only on ship-to-shore transfer rates of the various cargos identified at public marine terminal facilities. There are other elements of port productivity and related areas of port performance such as berth utilization, gate throughput rates, net crane productivity (includes allowances for crane downtime), and storage area throughput/utilization rates; however, data limitations prevented comparisons of these items from investigated ports. Comparisons did segregate ship-to-shore handling rates by the method or type of operation (i.e. type of crane handling for containers; conveyor or bagged operations for dry bulk cargos, etc.).

Factors influencing cargo handling rates can also be quite complex and varied. The ship type and configuration such as the number of hatch covers and "wings" or side area hold extensions can influence hourly gang handling rates particularly with steel and containerized cargos. The equipment utilized is a major determining factor in ship-to-shore transfer rates. Container crane/gantry crane handling rates are typically two to three times faster than the use of ships' gear. Dry bulk transfer rate comparisons are likewise affected by the type of conveyor system installed. Terminal characteristics (i.e. layout and design) can also influence overall port performance. For example, aprons on the dock may not be wide enough to permit the rapid removal of cargo from the transfer area under the hook of the crane. Ship-to-shore transfer rates would thus be directly and negatively affected.

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.*

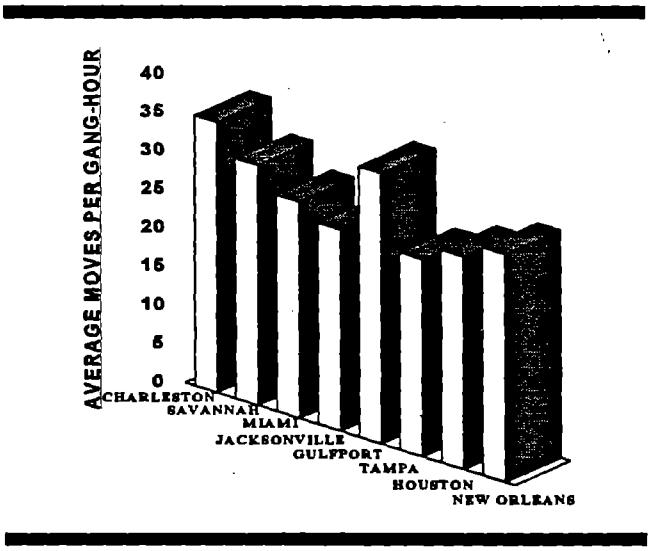


Figure 29
Container Handling Rates

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.*

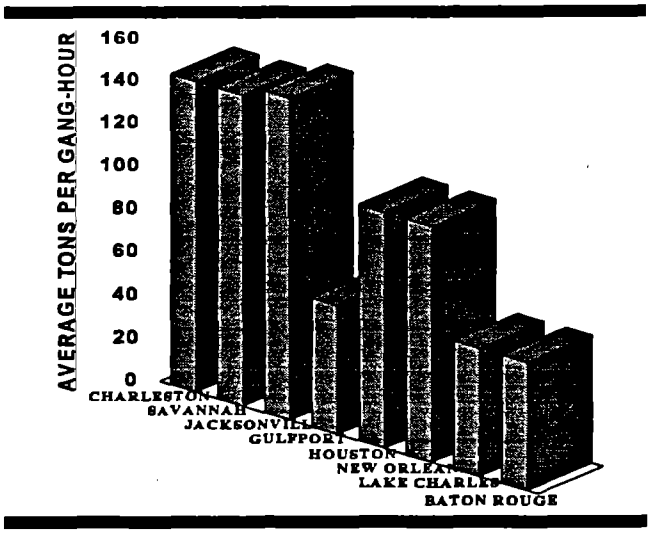


Figure 30.
Steel Handling Rates

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.

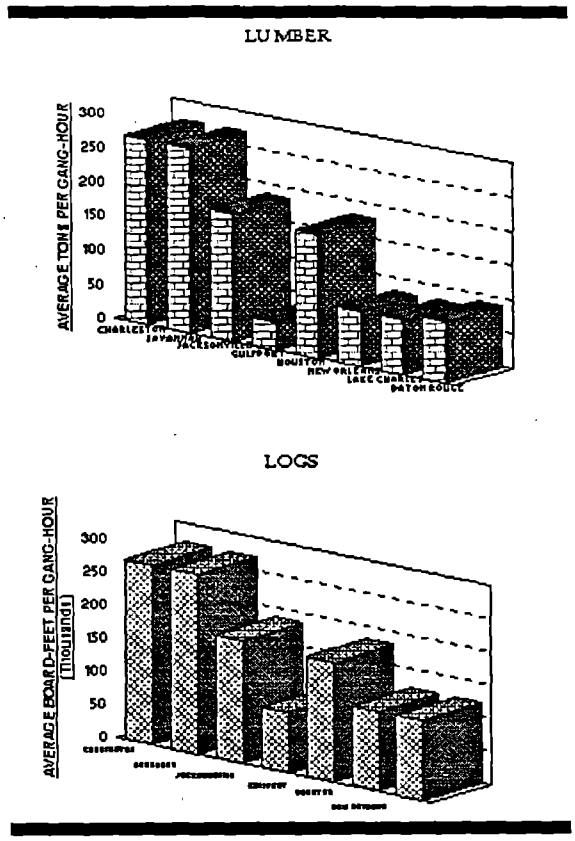


Figure 31.
Lumber and Log Handling Rates

Dry Bulk Cargo

Louisiana public ports, especially Lake Charles, compare extremely well for handling both bagged dry bulk cargos and dry bulk cargo via conveyor fed systems. For bagged grain cargos such as rice, flour and animal feed products, Lake Charles was reported to have handling rates of 50-55 tons per gang hour. This figure is 36 percent higher than rates recorded for Gulfport and over 20 percent more than handling rates reported at Houston, the next highest port after Lake Charles, which reported rates of about 40-45 tons per gang hour. Other ports were reported to have

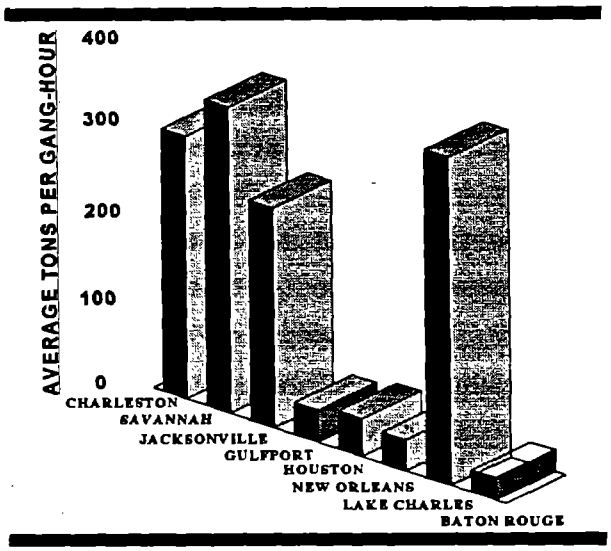


Figure 32.
Dry Bulk Cargo Handling Rates

handling rates of 25-35 tons per-gang-hour for bagged cargos. Lake Charles was also reported to have the highest bulk conveyor rates of about 350-400 tons of dry bulk product processed per hour versus other ports reporting handling rates of about 270-300 tons of product handled per hour. This does not allow for downtime related to mixing and cleaning. Port handling systems and gang experience are variables identified as primary contributors to Lake Charles' relatively high handling rates for handling these types of cargos. *Figure 32* summarizes port handling rates for dry bulk cargos.

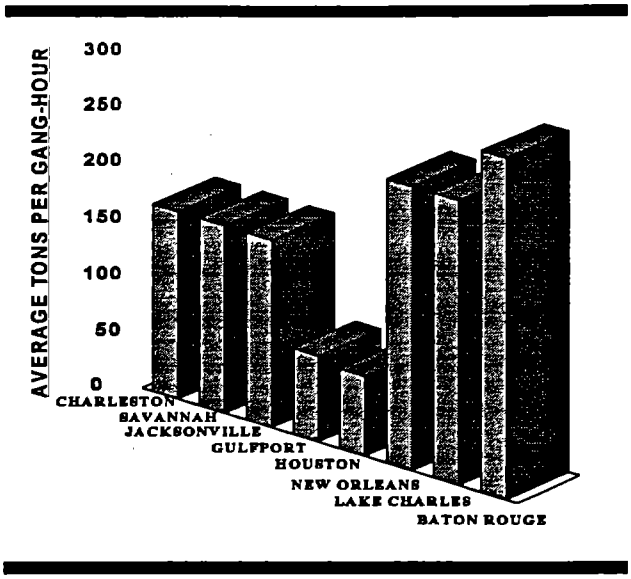


FIGURE 33.
Paper Products Handling Rates

Paper and Related Products

Cargos in this grouping generally include liner board, newsprint, computer paper and wood pulp products. Louisiana ports once again compare very favorably in cargo handling rates for paper and paper related products in relation to the other ports surveyed. Baton Rouge reported the highest ship-to-shore handling rates for all types of paper related products. Liner board rates were reported at up to 400 tons per gang hour, wood pulp handled at 150-200 tons per gang hour and newsprint handled at 60-90 tons per gang hour. Lake Charles and New Orleans reported similar handling rates of about 300 tons per gang hour for liner board, 100-150 tons per gang hour for wood pulp, and about 50-80 tons per gang hour for newsprint. Other ports such as Houston and Gulfport reported significantly lower handling rates of about 70 -75 tons per gang hour for liner board and 30-35 tons per gang hour for the other paper-related products. A graphical summary of port-related productivity rates for paper products is presented in *Figure 33.* An overall summary comparison of all product categories at the 10 ports surveyed is shown in *Table 27.* Overall, Louisiana ports compare favorably for ship-to-shore handling rates in all product categories, with dry bulk and paper related commodities showing the strongest performance relative to other ports. Favorable handling rates are an important factor for port users but may not be the overriding determinant in selecting a port call. Total port calling costs (not just port charges), trade routes served, specific steamship line itineraries, and the size of the local market

TABLE 27.
SUMMARY OF CARGO HANDLING RATES BY COMMODITY

Port	Containers	Steel	Paper/Pulp	Lumber/Logs	Dry Bulk
Charleston	34-36 moves/hr (gantry) 12 move/hr (ship's gear)	140-150 tons/hr (coils) 65 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: 100-130 tons/hr newsprint: 50 tons/hr	270,000 board-ft/hr	300 tons/hr grains (conveyor) 270 tons/hr clay ("super sacks")
Savannah	30-32 moves/hr (gantry) 10-12 moves/hr (ship's gear)	140-150 tons/hr coils 65 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: 100-130 tons/hr newsprint: 50 tons/hr	270,000 board-ft/hr	350 tons/hr grains (conveyor) 270 tons/hr clay ("super sacks")
Miami	26-30 moves/hr (gantry) 12 moves/hr (ship's gear)	N/A	N/A	N/A	N/A
Jacksonville	25-27 moves/hr (gantry) 10-12 moves/hr (ship's gear)	150 tons/hr (coils) 60 tons/hr (pipe)	liner board: 150-180 tons/hr wood pulp: — newsprint: 40-45 tons/hr	185,000 board-ft/hr	250 tons/hr grains (conveyor)
Gulfport	32-38 moves/hr (gantry) 15-18 moves/hr (ship's gear)	60 tons/hr (coils only)	liner board: 75 tons/hr wood pulp: 37 tons/hr newsprint: 30 tons/hr computer paper: 35 tons/hr	35-40 tons/hr finished lumber 65,000-90,000 board-ft/hr logs	35-37 tons/hr (bagged: barley, peas, popcorn)
Tampa	20-25 moves/hr (gantry) 10-12 moves/hr (ship's gear)	N/A	N/A	N/A	N/A
Houston	25-30 moves/hr (gantry) 10 moves/hr (ship's gear)	150-200 tons/hr (large coils) 100-120 tons/hr (coil) 60 tons/hr (pipe)	liner board: 70 tons/hr wood pulp: 45 tons/hr	180,000 board-ft/hr (mostly plywood)	40-45 tons/hr (bags: animal feed, grains, etc.)
Louisiana Ports:					
New Orleans	26-33 moves/hr (gantry only)	100-120 tons/hr (coil) 60 tons/hr (pipe)	[2]liner board: 150-350 tons/hr wood pulp: 100-150 tons/hr newsprint: 50-80 tons/hr	80 tons/hr finished lumber 80,000-120,000 board-ft/hr logs	35 tons/hr (bagged)
Lake Charles	8-10 moves/hr (mobile) 4-6 moves/hr (ship's gear)	60 tons/hr (coils only)	[2]liner board: 150-350 tons/hr wood pulp: 100-150 tons/hr newsprint: 50-80 tons/hr	80 tons/hr finished lumber 80,000-120,000 board-ft/hr logs	350-400 tons/hr (spout/unbagged) 50-55 tons/hr (bagged: rice, flour, etc.)
Baton Rouge[3]	8-10 moves/hr (mobile) 4-6 moves/hr (ship's gear)	60 tons/hr (coils only)	[2]liner board: 200-400 tons/hr wood pulp: 150-200 tons/hr newsprint: 60-90 tons/hr	90 tons/hr finished lumber 90,000-130,000 board-ft/hr (50-65 tons)	25 tons/hr (bagged)

[1] All rates are measured per-gang/per-hour (gross basis)
[2] 150 - 200 tons/hr ship's gear; 200-250 tons/hr with gantry crane; and 300-400 tons/hr with RoRo vessels/forklifts
[3] Baton Rouge has emphasis on paper handling.

Sources:
Cooper T. Smith; Stevedoring Services of America Lake Charles Stevedoring Services (Louisiana Ports); Fairway Terminal Operators (Houston/Gulfport); Continental Stevedoring (Miami/Tampa); New Orleans Marine Contractors, Inc.

(e.g. Houston has over five million people in its surrounding area versus a little over 1.1 million people in the New Orleans area) are mitigating factors that cerainly affects port call selection. In an additional attempt to quantify differences between ports, an analysis and comparison of port calling costs was undertaken. The results of this investigation are summarized in the next section.

Comparative Port Costs

Comparative port costs were developed from published tariffs for five major container ports, including New Orleans, Houston, Gulfport, Miami and Jacksonville. The cost analysis was limited to containerized freight because of ease of direct cost comparisons for unit sizes and volumes involved. Comparative costs included not only port charges such as dockage, wharfage, and equipment rentals but also pilotage, tug costs, ship-to-shore stevedoring costs, harbor fees, storage costs, agency fees, and vessel operating costs (i.e. steaming time) involved in making a port call. Port call comparisons were treated as single events and did not consider special allowances/discounts for annual tonnage volumes or number of ship calls. Such arrangements do exist and can lower the overall cost of a port call to steamship lines but they are usually limited to only a few of the largest port users. Comparisons were also limited to larger ports, since most of the smaller ports in Louisiana and in other states do not publish tariff rates that could be obtained for direct evaluation.

Two major variables allowing for detailed cost comparisons were controlled. These included lot size (the number of containers interchanged per port call) and vessel size (small, medium, and large vessels) based on the TEU-rated capacity and other vessel related characteristics such as gross and net registered tonnages and vessel length. Furthermore, it was assumed for practical purposes that lot size was directly related to vessel size so that small lot exchanges were handled by smaller vessels and large lot interchanges were done with large vessels. The practical limits of lot sizes were defined based on discussions with operations personnel at the Port of New Orleans and terminal operators at other ports.

Port of New Orleans

Table 28 summarizes total charges for a 300-TEU-size vessel (small), a 1000 TEU size vessel (medium) and a 2,400 TEU-size vessel (large) calling at the Port of New Orleans. Lot sizes of 100 containers for the small vessel, 350 containers loaded/unloaded for the medium-sized vessel, and 600 containers interchanged for the largest vessel call were calculated from port tariffs and operating rates provided to the Institute by the Port of New Orleans and other port service providers. Stevedoring costs were calculated based on ship-to-shore transfer costs only and did not include detention factors and yard and gate costs. Vessel steaming costs for all size vessels assumed an eight hour transit time to and from the Gulf to the France Road public facility, and the Corps of Engineers Deep Draft Vessel Cost Manual (1993) was used to estimate hourly ship operating costs. It was also assumed that all labor gangs would work until the cargo was completely loaded/unloaded and thus overtime rates applied to the medium and large lot size and vessel size comparisons. Pilotage costs included both Bar and River pilot charges provided by New Orleans port operations personnel and later were verified for accuracy with tariff rates received from the respective pilot organizations.

NEW ORLEANS	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$3,235	$10,429	$17,396
Crane Rental Cost	$2,250	$5,850	$9,900
Stevedoring Cost (ship-to-shore)	$3,360	$11,760	$23,100
Other Costs *	$5,326	$8,005	$9,974
Port Related Subtotal	$14,172	$36,045	$60,371
Steaming Cost	$10,016	$13,344	$18,720
Pilotage and Tug Hire Costs	$5,071	$8,192	$11,560
Vessel Related Subtotal	$15,087	$21,536	$30,280
TOTAL CHARGES	**$29,259**	**$57,581**	**$90,651**
Total Cost Per Move (inclusive)	**$292.59**	**$164.52**	**$151.09**

* Include cost such as harbor fee, U.S. Govt.,. fee, mooring/unmooring, steamship assessment, owners' items, agency

TABLE 28.
VESSEL AND CONTAINER CHARGES IN NEW ORLEANS

Total port call costs ranged from just over $90,000 for a large vessel interchanging 600 containers to $57,000 for a medium-sized container vessel interchanging 350 containers, and $29, 000 in total charges for a small vessel interchanging only 100 containers. Respective total cost per move ranged from about $151 per container move for the large vessel to $164 per move for the medium sized vessel and $292 for the small vessel.

Port of Houston

Table 29 presents the same summary of comparison for the Port of Houston. Houston's estimated total charges per ship call are about five percent lower than New Orleans for the large vessel, about seven percent lower for the medium size vessel and an estimated 19 percent lower for the small vessel. The higher costs associated with New Orleans are primarily the result of increased vessel steaming times to reach the port through the Mississippi River Gulf Outlet. Estimated stevedoring costs are higher for Houston because of lower overall cargo handling rates. Pilotage and tug hire costs are about 15 percent lower in Houston than for the Port of New Orleans.

HOUSTON	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$4,441	$13,848	$22,831
Crane Rental Cost	$2,140	$5,992	$10,272
Stevedoring Cost (ship-to-shore)	$3,360	$13,020	$25,620
Other Costs *	$5,326	$8,005	$9,974
Port Related Subtotal	$15,331	$40,929	$68,761
Steaming Cost	$3,756	$5,004	$7,020
Pilotage and Tug Hire Costs	$4,400	$7,054	$9,711
Vessel Related Subtotal	$8,157	$12,059	$16,732
TOTAL CHARGES	**$23,488**	**$52,988**	**$85,493**
Total Cost Per Move (inclusive)	**$234.88**	**$151.39**	**$142.49**

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

TABLE 29.
VESSEL AND CONTAINER CHARGES IN HOUSTON

Port of Gulfport

Table 30 presents a similar summary comparison for Gulfport. Gulfport has the lowest estimated total cost per ship call and related cost per move of all the ports surveyed. Its location almost directly on the Gulf results in virtually nominal additional steaming time. Port charges for pilotage and tug hire are also lower than other ports in the region, and average container handling rates were among the highest in the region thus reducing estimated overall stevedoring costs.

GULFPORT	Small Vessel	Medium Vessel	Large Vessel
Dockage and Wharfage Cost	$3,449	$9,858	$15,879
Crane Rental Cost	$1,800	$5,400	$8,550
Stevedoring Cost (ship-to-shore)	$2,520	$10,500	$19,320
Other Costs *	$5,189	$7,868	$9,837
Port Related Subtotal	$12,959	$33,627	$53,587
Steaming Cost	$0	$0	$0
Pilotage and Tug Hire Costs	$2,960	$5,586	$6,596
Vessel Related Subtotal	$2,960	$5,586	$6,596
TOTAL CHARGES	**$15,919**	**$39,213**	**$60,183**
Total Cost Per Move (inclusive)	**$159.19**	**$112.04**	**$100.30**

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

TABLE 30.
VESSEL AND CONTAINER CHARGES IN GULFPORT

Ports of Miami and Jacksonville

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

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.

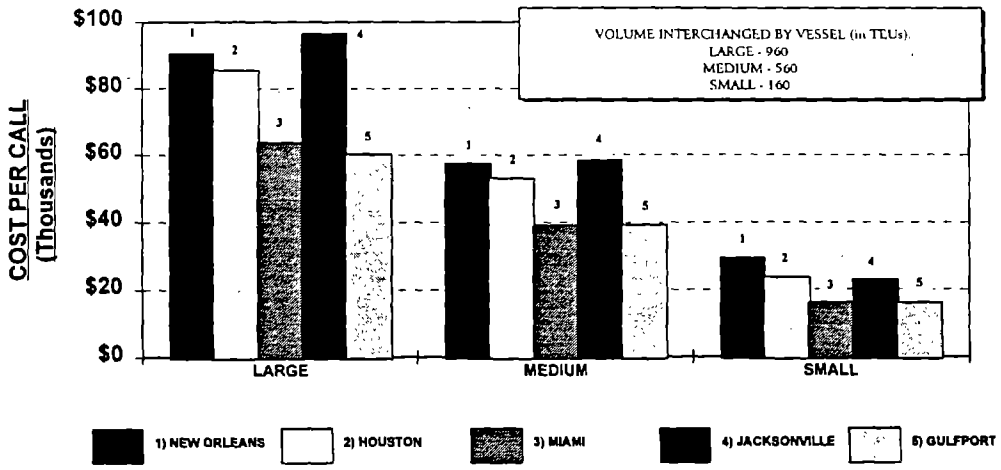


FIGURE 34.
Cost/call Comparison of Ports (Vessel Size and Volume Interchanged)
Inclusive Comparison

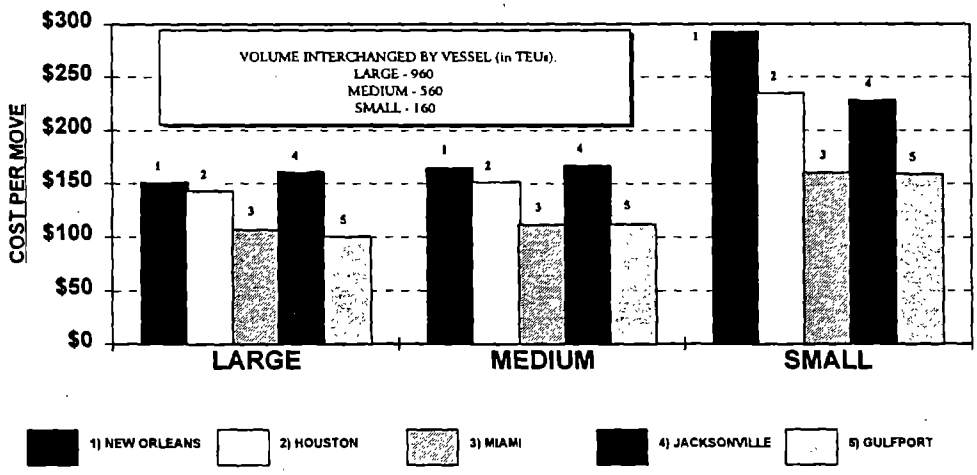


FIGURE 35.
Cost/move Comparison of Ports (Vessel Size & Volume Interchanged)
Inclusive Comparison

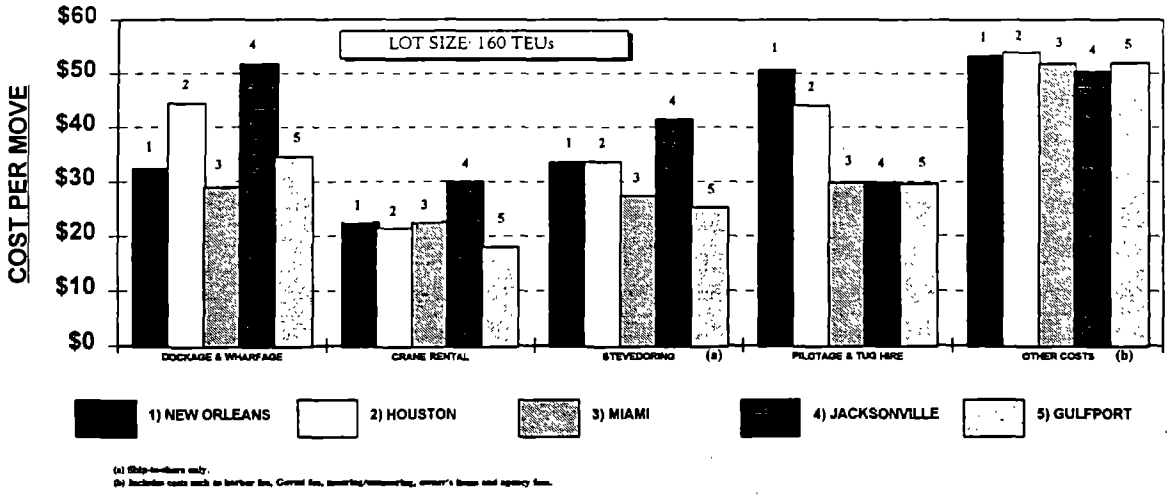


FIGURE 36.
Cost/move Comparison of Ports (Small Vessels - 300 TEU Size)

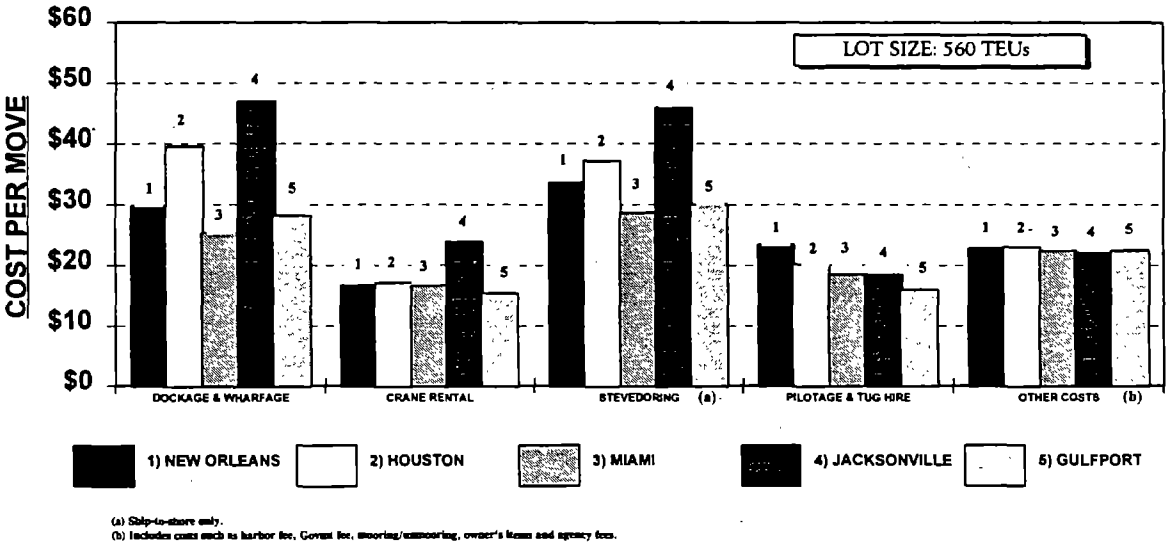


FIGURE 37.
Cost/move Comparison of Ports (Medium Vessels - 1000 TEU Size)

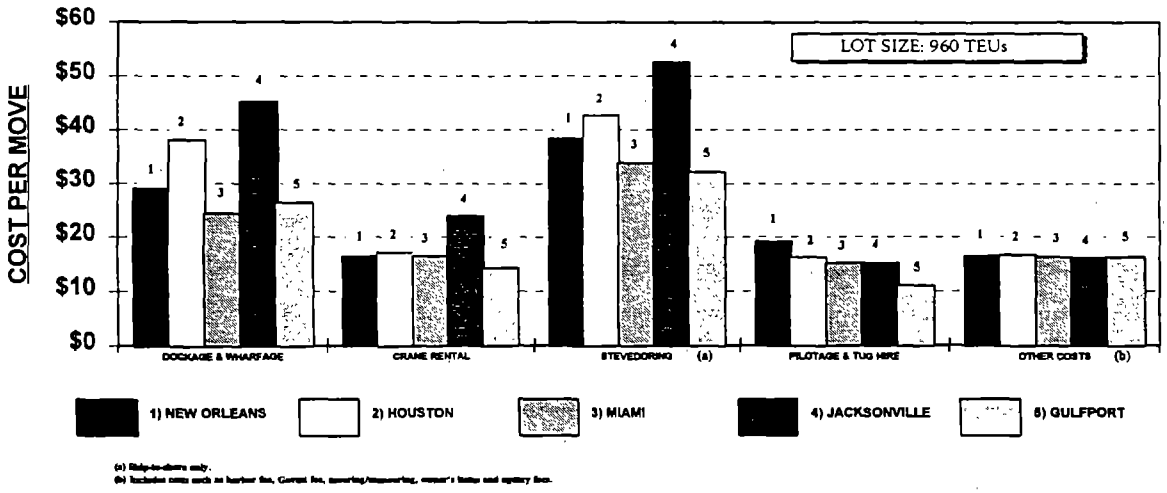


FIGURE 38.
Cost/move Comparison of Ports (Large Vessels - 2400 TEU Size)

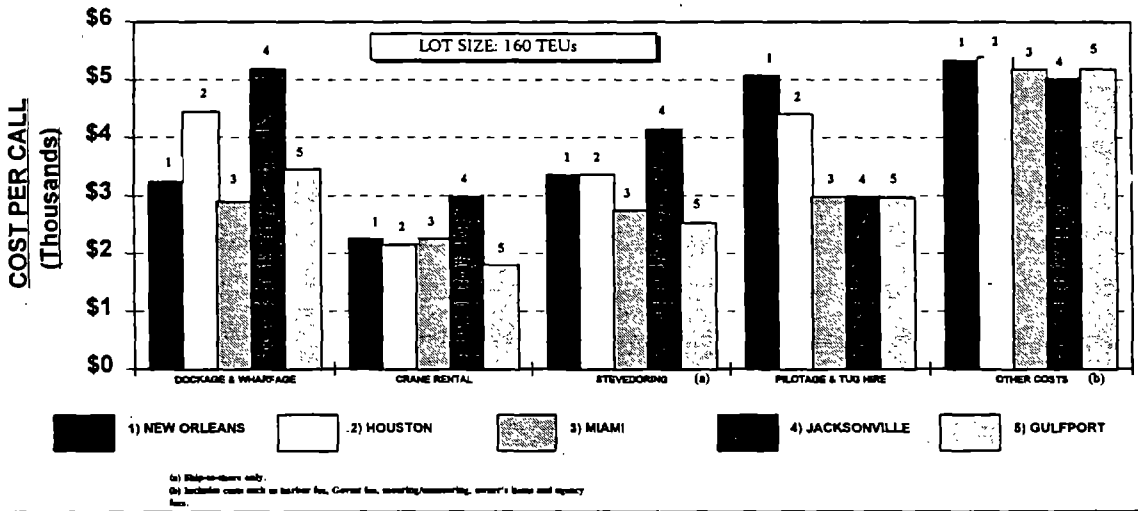


FIGURE 39.
Cost/comparison of Ports (Small Vessels - 300 TEU Size)

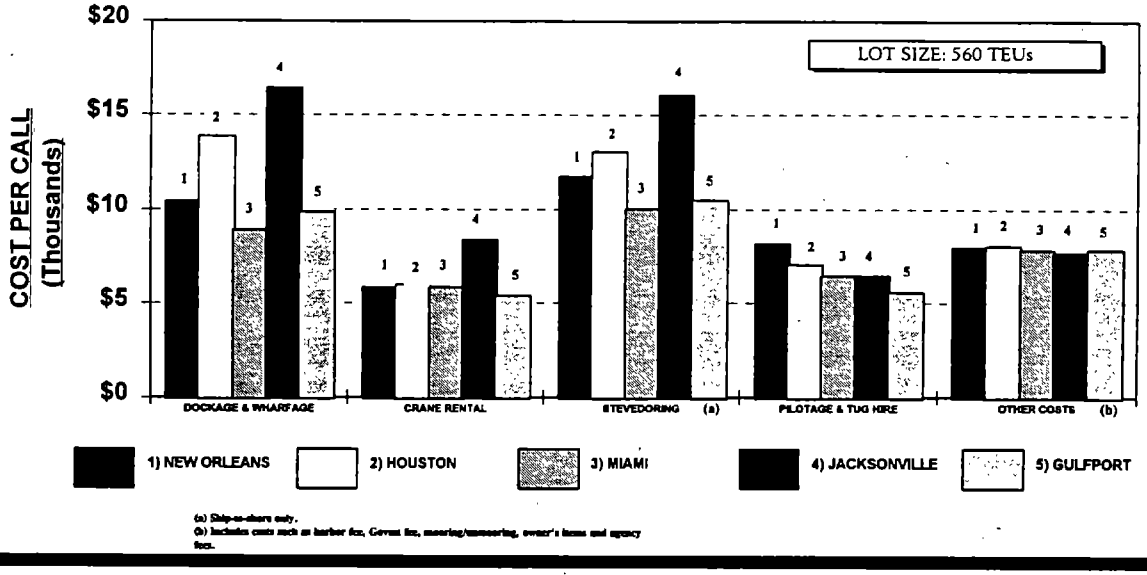


FIGURE 40.
Cost/call Comparison of Ports (Medium Vessels - 1000 Teu Size)

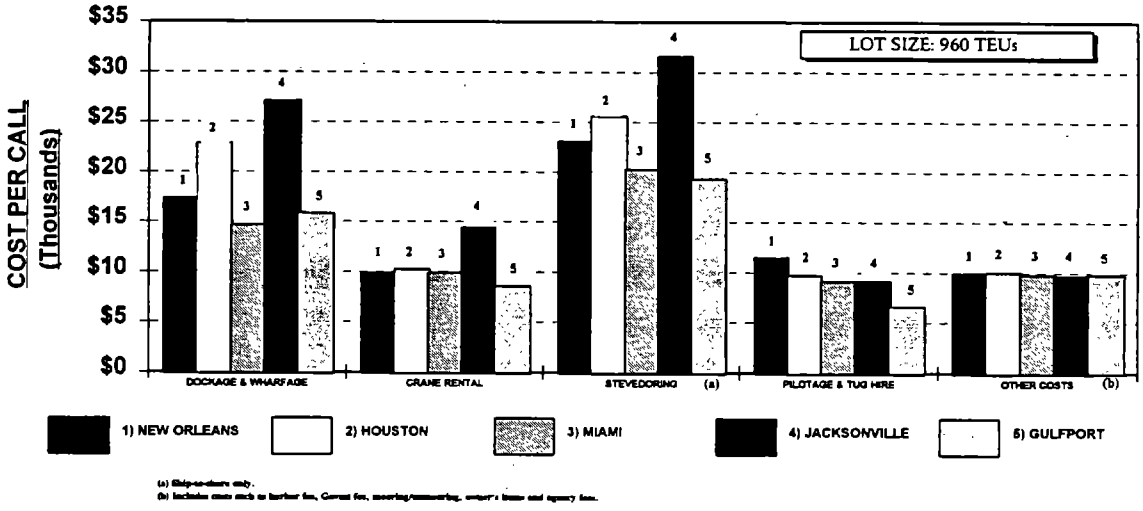


FIGURE 41.
Cost/call Comparisons of Ports (Large Vessels -2400 Teu Size)

Identification of Success Factors and Conclusions

Louisiana ports appear to be competitive in handling/output rates for general cargo commodities such as bagged agricultural products, paper products, steel-related commodities, and containers. When compared to a major port competitor like the Port of Houston, all-inclusive costs for handling cargos in New Orleans are higher due to additional vessel steaming time. If this additional cost is excluded, operation costs in New Orleans are lower than those in Houston. Operation and cargo handling costs in Gulfport and Miami are lower than in both New Orleans and Houston. However, the cost of cargo handling in New Orleans lies between the two sets of ports, about 10 percent lower in comparison with Houston and about 10 percent higher than in Gulfport or Miami.

As it is known, ports in Louisiana are in a difficult competitive position to expand current container volumes within the close proximity of modern high-volume container facilities at both Houston and Miami. However, the handling of niche cargos such as perishables and steel or providing emerging maritime services such as trailer ferry operations or river/ocean services from the state's ports as alternatives to land based transportation systems may provide the most effective means of maintaining a competitive advantage for Louisiana's ports with trading partners such as Mexico.

The state's deep-draft ports such as New Orleans, Baton Rouge, South Louisiana, St. Bernard and Lake Charles seem well positioned to concentrate on short sea coastal services for general cargos such as steel, bagged rice and other agricultural commodities, and forest products such as paper, woodpulp, woodchips, newsprint, and lumber products.

The introduction of new point-to-point services such as a "Gulf trailer ferry," suggested as an emerging general cargo NAFTA opportunity with Mexico, may help Louisiana's ports to enjoy a growing market share of containerized and trailerized North/South general merchandise cargo movements between the U.S. and Latin America. For example, Louisiana has superior intermodal connections (rail and highway) from the Port of New Orleans, that would provide a Gulf region "gateway" to the Central and Eastern portions of the U.S. for cargos going to and from Mexico and the U.S., the Caribbean Basin, Puerto Rico, Central America, and the rest of Latin America.

The handling of perishable cargos such as fresh and frozen fruits and vegetables, meats, and poultry requires specialized port infrastructure that currently does not exist either in Mexico or Louisiana. Shipping and trading companies involved in the movement of such commodities indicated that the availability of state-of-the-art port facilities is critical for the success of water shipments of these perishable commodities from Mexico to the United States.[2]

[2]For detailed description of refrigerated cargo facilities in the Gulf see : Technological and Economic Factors in Landing Latin American Perishables, R. Hinson, D. Piecha, and B. Lambert; LSU Agricultural Center.

RECOMMENDATIONS FOR MARKET OPPORTUNITIES, STRATEGIES, AND NECESSARY INFRASTRUCTURE

NAFTA Growth Markets for Louisiana Maritime Services

Forecasted trade growth resulting from the North American Free Trade Agreement (NAFTA) will present cargo handling opportunities to Gulf Coast states such as Louisiana and their respective ports. Louisiana's extensive port and inland waterway system, main highway connections to and from major population centers, and six major rail lines connecting the state to the rest of the United States provide Louisiana with a significant strategic advantage over other states for capturing intermodal traffic moving North/South resulting from NAFTA. States such as Texas, California, Arizona, Illinois, and Michigan that have also seen NAFTA trade growth via land transportation routes are looking to land based solutions (i.e. expansion of interstate highways such as the I-35 Corridor project) for improving North/South trade between Mexico and their respective states. In contrast, Louisiana trade data suggests that emphasis should be placed on water-based transportation solutions as a means of improving existing and future trade movements between Louisiana and Mexico.

Maritime systems have been identified that can take advantage of the Maritime System of the Americas, an extensive waterway network that connects the U.S. with Mexico, Canada, Central America, the Caribbean Basin countries, and the northern rim of South America. Previous NAFTA research by NPWI has suggested that existing maritime systems serving U.S. Mexican trade including deep sea and feeder services, might grow as the general level of trade expands, but would not significantly advance water transportation's market share of general cargos moved between the U.S. and Mexico.

This research has identified four specific types of maritime services that can contribute to market opportunities and the growth of maritime activity for Louisiana's ports and waterways resulting from NAFTA-induced trade. These services included the following:

1. Short sea inland river direct service between the lower Mississippi and Mexican Gulf coast utilizing shallow-draft "river/ocean" vessels that can navigate inland waterways as well as operate in open sea

2. Short sea coastal services that provide direct regional service from the U.S. Gulf coast to the Mexican Gulf coast utilizing smaller vessels of multipurpose design providing for the capability of hauling a variety of bulk, breakbulk, and containerized cargos

3. Ferry/water bridge service that would target truck trailers going to and from the central and eastern regions of Mexico and the United States and utilize roll-on/roll-off (RoRo) type vessels capable of fast operating speeds (22-24 knots) and high frequency of departure (every other day)

4. Refrigerated vessel/reefer service that would target Mexican/Central American fresh and frozen fruits/vegetables northbound and poultry/meat products southbound

Mexico has historically been considered an extension of the U.S. land mass by traffic managers and freight forwarders both in the United States and Mexico. With the exception of large bulk movements of lower-value products such as crude petroleum, natural gas, gasoline, coal, and coke, water transportation has generally not participated in the growth of cargo volumes between the two countries.

There is, in general, competition not only between ports but between competing modes of transport on basic criteria such as distance and routing parameters, transportation costs of the total transport chain, transit times and reliability of schedules, and the number and quality of value-added services provided by ports such as free time for storage of cargos, availability of specialized cargo handling equipment, and landside improvements such as roll-on/roll-off ramps.

The feasibility of operating a vessel service at any port is subject to physical, operational, and institutional constraints. Availability of port facilities is only a prerequisite for feasible vessel operations. Various other constraints such as port location, competition from other transportation modes, and limited market opportunities may constrain cost competitive vessel services.

Port Locations for Selected Maritime Services

All 16 ports surveyed, both deep and shallow draft, can accommodate river/ocean vessels in terms of channel access and other physical infrastructure requirements. However, operational constraints such as longer voyage times, lack of a regular cargo supply, or smaller required shipment sizes may result in these services not being economically feasible at some locations. Isolated port locations can also prevent efficient vessel itineraries encompassing several ports of call. For these ports in Louisiana, developing adequate volumes to attract such services will be a major challenge. It may be feasible for isolated ports to operate barge-vessel transshipment operations in collaboration with other Louisiana ports.

Implementation of new river/ocean service by Mexican owned/operated Nafta Lines (May, 1996) has already begun, and has utilized the Louisiana ports of St. Bernard and Morgan City in routings to and from Mexico to as far north as Little Rock, Arkansas. The deployed vessel-the MV "Gulf Viking"-has a carrying capacity of about 1,500 metric tons and can load 400 tons with less than nine feet of water needed alongside berth. Targeted northbound cargo is fertilizers and southbound cargos are palletized/bagged cargos as well as other general, minor bulk and containerized cargos. Potential routings for river/ocean services suggest that production centers and inland river ports outside of Louisiana may be required to provide the necessary annual cargo volumes needed to sustain ongoing operations to and from Mexico.

The potential for short sea coastal maritime services has been identified for seven Louisiana ports nearest to the coast, including the ports of New Orleans, Baton Rouge, South Louisiana, Lake Charles, St. Bernard, Morgan City, and Fourchon. Targeted commodities would vary by port location but those recommended for future pursuit in trade with Mexico are as follows:

- Lake Charles: southbound-- rice (bagged and bulk), forest products (logs/paper/linerboard), northbound--sand & gravel, fertilizers

- Morgan City: southbound--plastic resins, forest products (newsprint/paper/finished lumber); northbound--steel coils, barite, crude minerals, fuels

- Baton Rouge: southbound--bagged grains, woodpulp, industrial/agricultural chemicals (bagged and dry bulk); northbound--steel ingots, molasses, petrochemicals

- Fourchon : southbound--rice, plastic resins, aluminum; northbound--limestone, fertilizers, petrochemicals

- Lower Mississippi (New Orleans, St. Bernard, South Louisiana): southbound--industrial/agricultural chemicals (bagged and dry bulk), vegetable oils, forest products (woodchips, plywood); northbound--steel, cement, limestone, gravel, petroleum, fertilizers, coffee

The two specialized vessel services identified as having NAFTA trade potential-waterbridge ferry service and refrigerated vessel service to handle perishable cargos are both deemed to be best developed in Louisiana at the Port of New Orleans. The port has historically been a gateway/load center located near the mouth of the Mississippi River with superior intermodal connections (road and rail) that has enabled New Orleans to act as a major connecting point for deep draft vessels and inland system traffic that is needed for the ultimate success of both of these maritime services. New Orleans has existing roll-on/ roll-off facilities (France Road Terminal) that could provide immediate handling of trailer-ferry services without the need for added capital outlays for infrastructure.

Strategies and Measures Needed to Attract Targeted Maritime Services

The central and eastern regions of Mexico will present cargo opportunities and markets that would most likely utilize the maritime transportation services previously identified between Louisiana ports and Mexico. As a result, Louisiana's ports and their respective management need to target shippers and trade/commodity activity located in the central and eastern states of Mexico. This region of Mexico includes most of Mexico's major population centers, with the Federal District alone accounting for over 25 million in population. The ten states in the Central region account for about 50 percent of Mexico's GNP and almost 55 percent of the country's import/export trade activity with the United States.

Cost modeling suggests that river/ocean service, if priced between $25-$45 per metric ton northbound/southbound from ports along the Mississippi and related tributaries to the Mexican Gulf, could save Louisiana shippers between 12-20 percent on intermodal shipments utilizing river/ocean service to and from the central and eastern regions of Mexico. Ideal shipper

candidates in Louisiana for such a service would be those importing or exporting 200-1,500 tons per month of bulk, bagged, or containerized cargos currently utilizing truck transportation to Mexico. Plant location should be 150 miles less from a Louisiana port offering free storage and consolidation services to attract R/O customers.

Short sea coastal services should focus on existing bulk and break-bulk commodities moving in trade between Louisiana and the central and eastern regions of Mexico. This would include southbound commodities such as plastic resins; forest products (newsprint, woodchips, liner board, paper, woodpulp, and finished lumber); bagged and bulk grains such as rice, corn and soybeans; industrial and agricultural chemicals, vegetable oils, and canned food products. Northbound commodities from Mexico would include fertilizers, sand and gravel, steel (coils, pipe, ingots), molasses, barite, crude minerals and fuels, petroleum products, limestone, coffee, and cement.

Cost modeling suggests that for commodities such as rice, chemicals, forest products, and steel products currently moving via land modes to the central and eastern regions of Mexico, intermodal movement utilizing short sea coastal services could save 25 percent or more over truck movements and 10-15 percent versus rail carload shipments to major Mexican origins/destinations such as Mexico City. Since larger unit volumes are generally required for shipment with this type of service, ports may want to emphasize free time storage, combined shipments, and encourage shipper cooperatives for cargos going to and from the same regions of Mexico.

Previous research by NPWI has established that a cross-Gulf waterbridge/ferry service focusing on the movement of truck equipment to and from the central and eastern regions of Mexico could capture cargo movements from a broader market covering the central and eastern regions of the U.S. and Canada. Cost modeling and market analysis confirm potential savings of 15-20 percent using water bridge ferry service. Equal or better service times can be achieved over current all-land and existing maritime options, depending on specific geographic and modal selection parameters. Such a service out of the Gulf would require approximately 50,000 trailers annually, or a seven-percent market share of current traffic, to remain viable.

Vessels recommended for use in this type of service are roll-on/roll-off (RoRo) vessels capable 22-24 knot service speeds, that should be deployed in a high-frequency service (three times per

week). Port requirements for this service include well-developed intermodal connections (rail and road) and infrastructure-landside and waterside-necessary to accommodate relatively large RoRo vessels drawing 28-30 feet or more of water fully loaded. Existing terminal facilities in New Orleans (France Road Terminal-Berth 6) would be an excellent choice for implementating this service from Louisiana to the Mexican Gulf Coast.

The waterbridge service should be offered as a public operation targeted to trucking companies providing drayage services to and from Mexico and the central and eastern portions of the U.S. and Canada. Additional potential users such as larger shippers who utilize their own fleets, and intermodal divisions of railroads who do not have existing U.S./Mexican border crossing intermodal yards (i.e. Illinois Central, CSX Transportation, Conrail, Norfolk Southern) should also be targeted. A public access type of operation would allow for the largest potential usage and customer base for the service.

Port Facility Improvements Needed to Handle NAFTA Maritime Services

The vessel services identified require widely different port infrastructure in terms of physical facilities and levels of institutional capabilities. Typically each type of service would have basic criteria relating to depth of access channel, required docking facility, storage yards and warehousing requirements, and land transportation gates and connections. Physical parameters and capacity requirements of these basic elements are strictly dictated by the market potential in terms of cargo that could be generated at individual terminals.

Realistic assessment of NAFTA opportunities at individual ports is important not only for planning market strategies but also for capital investment planning in port infrastructure. Generally, as NAFTA trade opportunities are likely to be smaller compared to domestic port opportunities, capital investments based solely on NAFTA trade opportunities may not be warranted.

Virtually all ports surveyed had sufficient infrastructure or planned port improvements to meet the minimum requirements for the handling of river/ocean vessels. However, the availability of facilities may not be as important to the success of such services as a strategic port location or a sufficient local market base from which to build and sustain cargo volumes necessary for regular service schedules as offered by competing land transportation modes. For this type of service,

collaborative marketing efforts to locate and consolidate shipments at strategically located Louisiana ports is more important than individual facility improvements.

A similar assessment is made for the introduction of short sea coastal services. While there are expanded infrastructural requirements needed to handle the larger 5,000-10,000 DWT vessels utilized in this type of service, the seven near-coast Louisiana ports identified all have the necessary current or planned minimum infrastructure requirements necessary to handle such services. The major challenge will be to develop a strong customer base for NAFTA-related cargo movements. Ports should plan for sufficient covered/uncovered storage areas to allow for consolidation of shipments from smaller shippers.

Introduction of waterbridge/ trailer ferry operations in New Orleans (France Road Terminal-Pier 6) would not require any major port infrastructure improvements since a roll-on/roll-off ramp is already available, and sufficient operating/storage yard and berthing requirements are deemed sufficient for initial ferry operations.

The Port of New Orleans has proposed the construction of a $40 million on-dock cold storage facility (Harvest Terminal Project) as part of their capital improvement program needed to bolster and attract larger volumes of fruits/vegetables from Latin America. While additional market analysis is needed and is beyond the scope of this report, the project holds considerable promise and potential for the expansion of water transportation opportunities in NAFTA and Latin American trade with Louisiana.

Funding of Facility Improvements

Maritime investment benefits in terms of increased port revenues and increased jobs created from expanded port activity are basic reasons to fund port facility improvements. Assuming that current commodity flows and trading patterns continue, Louisiana's annual volume of exports to Mexico in terms of dollars is forecasted to double by the year 2000 to $1.5 billion annually versus about $750 million recorded in 1994.

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. If these estimates on economic growth and current job creation by mode continues, and no further diversification of

maritime services occurs, approximately 17,000 direct jobs (i.e. 70 percent of total direct jobs created resulting from increased exports) could be attributed to increased Louisiana water-bourne trade with Mexico by the year 2000. An additional 1,700-2,000 jobs could be added to this total through the growth of new maritime services highlighted in this research.

The current annual funding level is set by legislative mandate at $15 million but has been proposed, under current legislative initiatives, to expand to over $24 million annually. Such initiatives are also being linked to the state's Capital Outlay Program (COP).

Of the maritime services reviewed for implementation under NAFTA trade, only the refrigerated vessel service requiring on-dock cold storage facilities such as those proposed by the Port of New Orleans (Harvest Terminal Project) present any large-scale near-term infrastructure improvement funding requirements. The NAFTA services do, however, present a possible need for shipbuilding investments to the extent it will be necessary to have river/ocean, short sea and roll-on/roll-off vessels meeting specific operating requirements. These funds could be provided from private sources and supported, if needed, by federal funding programs seeking to assist deployment of new vessels in NAFTA and Latin American trade.

Requirements and Conditions for Partnerships to Establish/Operate Maritime Services

River/ocean and short-sea coastal maritime services will generally be provided by smaller vessel operators servicing more localized markets. Requirements in terms of annual volumes and shipment unit volumes may dictate regional shipper cooperatives or cargo consolidation partnerships that could be forged by local port authorities supporting such services. Vessel operators of these types of services do not generally have dedicated marketing and administrative staffs to expand services or gain local operating concessions such as lower pilotage costs, expanded loading/unloading hours of port labor operation, or special permit approvals often needed for inland movement of large or heavier cargos targeted by such services. The local port management handling these services can often provide the local marketing, value-added services (i.e. free cargo storage time) and follow-up support needed to insure long-term success of such maritime services to and from Louisiana ports.

Previous attempts to provide short-sea ferry services (i.e. BN/Protexa service from Galveston to Coatzacoalcos, Mexus service from Houston to Tuxpan) have contributed to a perceived

reliability/credibility problem in the marketplace for future maritime service providers. In order to address the current market perception problem, despite any potential cost savings provided from such a service, it is recommended that a new consortium of interested parties in Louisiana and Mexico act in unison to provide and endorse such a new service.

This consortium should include the respective U.S./Mexican state governments and the public ports within their jurisdictions chosen to participate by providing appropriate terminal facilities, as well as a vessel operator selected to operate the trailer ferry or other services on a public concession basis and chosen through a competitive selection process. The vessel operator would probably select the stevedoring companies on both ends of the service unless specified by the ports in the operating concession agreement. To the extent that new buildings are necessary to provide the proper vessel design and operating parameters required, shipyards with business interests in Louisiana and Mexico should also be recruited to participate in vessel development, and in investment if necessary, along with the chosen vessel operator.

Introduction of competitive water services for perishable cargos will require construction of new refrigerated cargo facilities in Louisiana. State transportation organizations may want to consider support of additional feasibility and market analysis to better define the cost and service parameters needed for implementation of this specialized type of maritime service in New Orleans via the Harvest Terminal Project or other suitable port project.

APPENDIX I

LOUISIANA PORTS PROFILES

Louisiana Port Profiles - Physical and Operational Parameters, Lake Providence

Facility Type	Physical / Operational Parameters
Location	On the Mississippi R. mile 484 AHP. East Carroll Parish, LA. Monroe, LA. 70 miles West; Greenville, MS. 50 miles North; Vicksburg, MS. 50 miles South; Baton Rouge, LA. 180 miles South.
Channel Access	Channel Length: 8,200'; Width: 150'; Depth: 9'. Turning basin radius 400'x800. Channel depth is normally 12' plus.
Land Access	Highway: 0.3 miles to US 65; 30 miles to I-20; Rail: Direct rail to ship transfer available; Total track 6.600' on 4 tracks. Operator: Delta Southern Railway Company of Tallulah, LA.
Docking	General cargo dock: Length 250' Width 50'. Bulk terminals for grain, liquid and dry fertilizer.
Intermodal Transfer (on dock)	Fork lifts, trucks and trailers available on hire. 75-ton crawler crane with a 4 cu. yd. clamshell bucket. Conveyor belt 36" x 690 ' with radial stacker connection to the storage pad. 8" liquid fertilizer pipeline from dock to storage.
Warehouse Storage	44,800 sq.ft. of covered storage with rail tracks and truck bays.
Yard Storage	72,000 sq.ft. concrete pad and 3 acres of auxiliary storage area.
Inland Transport	Dry bulk loading/ unloading between barge and warehouse/yard 150-200 tons/hr; Dry-bulk loading/unloading from/to trucks/rail 100-150 tons/hr.
Cargo Throughput (per hour)	Break-bulk cargo loading/unloading 60-80 tons/hr.
	Planned Expansions/ Dates
Bulk Warehouse	21,000 sq.ft warehouse for cottonseed storage; expected completion August 1996. Bulk liquid fertilizer storage facility in design stage.
	Constraints/ Impediments
	Present port activities are confined to handling dry-bulk and liquid-bulk cargo. Working out operational details to handle general cargo and market development for such cargo remains a major challenge to the port.
	Potential Vessel Services
	River/Ocean vessel service

Source: LSU National Ports and Waterways Institute and Lake Providence Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Morgan City

Facility Type	Physical / Operational Parameters
Location	On Lower Atchafalaya River 18 miles from the open waters of Gulf of Mexico at the intersection of Gulf Intra-Coastal Waterway in St. Mary Parish, LA.
Channel Access	Channel width: 400' Depth: 20' ; minimum channel depth to the Gulf of Mexico is 20'. Gulf of Mexico is 18 miles to the South; Access East-West through Gulf Intra-Coastal Waterway.
Land Access	Highway: 1.1 miles to US. 90; Lafayette 71 miles to the West on U.S. 90 and New Orleans 90 miles East Rail: Rail access to the port is in planning stage. 2,000 linear feet of rail spur and 1,500 L. feet of sidings will connect the port warehouses with SP mainline. Daily rail service by LA Delta Railroad.
Docking	Dock Length: 500' Width 50' with water frontage of 839' on the Bayou Boeuf. Suitable to handle container, general and bulk cargo.
Intermodal Transfer (on dock)	Dock side Mobile crane capable of lifting fully loaded (70,000 lb) 40 foot container Two forklifts: 8,000 lb forklift for warehouse use and one 15,000 lb for the yard.
Warehouse Storage	3.75 acres of yard space on-dock. 20,000 sq. ft warehouse with rail access and truck bays in construction stage.
Yard Storage	In addition to 3.75 acres of on-dock yard storage , about 12 acres of auxiliary yard storage is available. Future yard expansion includes construction of six acre paved truck marshaling yard.
Inland Transport	Bulk cargo loading/unloading from/to barge 150-200 tons/hr. Bulk cargo transfer from/to yard from trucks and rail 100-150 tons/hr.
Cargo Throughput (per hour)	Break bulk cargo transfer rate 60-80 tons/hr
	Planned Expansions/ Dates
Warehouse	20.000 sq. ft. warehouse under construction
Yard Expansion	Six-acre truck marshaling yard in planning stage
Rail Connection	Rail connection to the warehouse in planning stage
Equipment	8,000 lb.. fork-lift, two tractors and two flat bed trailers in planning stage.
	Constraints/ Impediments
	Relatively a new port with some facilities under construction
	Break-bulk cargo transfer between warehouse and dock needs use of tractors and trailers
	Bulk cargo transfer facilities not available
	Potential Vessel Services
	Short-Sea Vessel Services
	River/Ocean Vessel Services

Source: LSU National Ports and Waterways Institute and Morgan City Harbor & Terminal District.

Louisiana Port Profiles - Physical and Operational Parameters, New Orleans

Facility Type	Physical / Operational Parameters
Location	On the Mississippi River between mile 81.5 AHP and mile 114.9 AHP. On the Industrial Canal on Mississippi River Gulf Outlet (MRGO)
Channel Access	Deep draft 45' in main river channel with a minimum width of 2,000 feet. 36' in Mississippi River Gulf Outlet with a bottom width of 500 feet.
Land Access	Highway access to I-10 and I-55. Rail: CSX; KCS; Illinois Central; Norfolk Southern; SP; UP; and New Orleans Public Belt Railroad. Rail yards and container Marshaling areas.
Docking	334 piers, wharves and docks on 22 miles of water frontage. For containerized cargoes, the multi-berth, container crane-equipped France Road Container Terminal. 10,000 linear feet of continuous bulkhead on Mississippi River facilities for break-bulk cargo.
Intermodal Transfer (on dock)	Modern container cranes and all cargo handling equipment to handle container cargo. Dockside cranes and cargo handling equipment to handle break-bulk cargo at general cargo terminals.
Warehouse Storage	The port offers more than 22 million sq.ft of cargo handling area within its various facilities.
Yard Storage	All cargo handling areas are served by rail, and adequate open yard areas.
Inland Transport	Advanced container cargo handling system with dockside cranes and handling at marshaling areas. Break-bulk and neo-bulk cargo handling equipment.
Cargo Throughput (per hour)	
	Planned Expansions/ Dates Harvest Cargo Facility for handling fresh fruits and vegetables in planning stage. Various other capital improvements to meet port needs to year 2010 are in planning stage.
	Constraints/ Impediments Market development in terms of improved services, networking with Mexican businesses, attention to small shippers.
	Potential Vessel Services Fast-Ferry Trailer Service; River/Ocean vessel service; Short-sea Coastal service and Refrigerated vessel service.

Source: LSU National Ports and Waterways Institute and Port of New Orleans

Louisiana Port Profiles - Physical and Operational Parameters, St. Bernard

Facility Type	Physical / Operational Parameters
Location	On the Mississippi River 90.5 miles from the Gulf of Mexico.
Channel Access	The main channel is 45' in depth and draft alongside docks is 36'. The chalmette Slip is 1,700 ft. long channel and 300ft wide.
Land Access	Highway: Located on LA Highway 46. Two miles to I-510 to the east and I-10 five miles. Rail: Served by Norfolk Southern.
Docking	Dock No.1: 1,300 ft. long and 150 ft. wide and is served by three rail spur lines. Dock No. 2: 1,680 ft. long and 150 ft. wide and is served by rail lines and a marshaling yard.
Intermodal Transfer (on dock)	Port does not own any cargo handling equipment. Independent operators can supply floating cranes and other equipment.
Warehouse Storage	100,000 sq.ft. of covered storage with rail access and truck bays.
Yard Storage	12 acres of yard storage at the waterfront and one acre of paved yard storage. 124.5 acres of additional land available for leasing at the port premises.
Inland Transport	Dry- bulk loading/discharging by conveyor systems.
Cargo Throughput (per hour)	Dry-bulk cargo throughput 150 tons/hr. Break-bulk cargo 50-100 tons/hr.
	Planned Expansions/ Dates Rehabilitation of Dock No. 1&2, expected to be complete in Fall 1996 and 1997 respectively.
	Constraints/ Impediments Present port activities are confined to dry-bulk, container, and direct transfer of break-bulk cargo to barge, rail and trucks. A full service package to serve the expected vessel services has to be develope
	Potential Vessel Services River/Ocean vessel services and Shortsea Coastal services.

Source: LSU National Ports and Waterways Institute and St. Bernard Port, Harbor and Terminal District.

Louisiana Port Profiles - Physical and Operational Parameters, Lake Charles

Facility Type	Physical / Operational Parameters
Location	34 miles inland from the Gulf of Mexico on the Calcasieu Ship Channel in the Southwestern corner of the state.
Channel Access	Access to the Gulf of Mexico is through Calcasieu Ship Channel maintained by the U.S. Army Corps of Engineers at 40' draft and 400' bottom width.
Land Access	Access to 9' draft Gulf Intracoastal Waterway through the Calcasieu Ship Channel. Access to I-210 within 2 miles from the port. Other major highway links are I-10 and State Highway 90. Union Pacific serves the general cargo docks and KCS serves the Bulk Terminal No.1.
Docking	The Port owns and maintains 32 miles of rail trackage, and a rail engine for switching railcars. The City Docks has 11 general cargo berths (depth 40') with nearly 2 miles of continuous dockage. Shipside on-dock rail tracks available for handling cargo direct from rail to ship. 1,200 ft. bulk terminal dock with 40' draft.
Intermodal Transfer (on dock)	Stevedoring services are provided by ILA labor. Cargo handling equipment necessary to handle break-bulk and neo-bulk cargo is provided by the terminal operators. Can handle container cargo on request.
Warehouse Storage	871,000 sq.ft. of warehouse storage capacity adjacent to the wharf. Additional 600,000 sq.ft. storage behind the waterfront.
Yard Storage	12 acres of paved yard storage available adjacent to docks.
Inland Transport	Dry-Bulk cargo (coke) handling capacity 1,000 tons/hr. 100-ton railcar roll over facility with 1,200 ton capacity.
Cargo Throughput (per hour)	Grain loading rate:25,000 bushels/hr. Break-bulk and neo-bulk cargo 100-150 tons/hr.
	Planned Expansions/ Dates
	600 ft. berth at the bulk terminal is under construction, expected completion 1998.
	Constraints/ Impediments
	Developing a strong customer base for cargo remains the major challenge.
	Potential Vessel Services
	River/Ocean vessel service and Shortsea Coastal service.

Source: LSU National Ports and Waterways Institute and Lake Charles Harbor & Terminal District

Louisiana Port Profiles - Physical and Operational Parameters, Port Fourchon

Facility Type	Physical / Operational Parameters
Location	On the Gulf of Mexico, at the mouth of Bayou Lafourche, Lafourche Parish, LA. About 60 miles south of New Orleans.
Channel Access	Channel Entrance: 300' width, 24' depth; Interior Channel: 300' width, 20' depth; E-Slip 400' wide 20' depth; turning basin 800' wide X 20' deep.
Land Access	Highway: LA 3090 2 miles to LA 1, 40 miles to U.S. 90.
Docking	600' public dock suitable for handling general cargo.
Intermodal Transfer (on dock)	A large number of privately leased docks with crane service and loading/unloading equipment.
Warehouse Storage	A large number of privately leased warehouses. One.8,000 sq.ft. refrigerated warehouse.
Yard Storage	Paved yard storage available for lease. 400 acres of improved and unimproved sites available for lease.
Inland Transport	
Cargo Throughput (per hour)	Estimated general cargo throughput: 80-100 tons/hr.
	Planned Expansions/ Dates E-Slip expansion, 500' ft. wide and 2,500 ft. length will be completed in 1997. Channel Deepening to 26' will complete in 1997.
	Constraints/ Impediments Two-lane highway access and lack of rail access are major impediments. Location on the Gulf is an advantage, but the port is located away from major metropolitan centers.
	Potential Vessel Services Ocean/River vessel service and Shortsea Coastal service

Source: LSU National Ports and Waterways Institute and Greater Lafourche Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Shreveport-Bossier

Facility Type	Physical / Operational Parameters
Location	At the head of the Red River in Northwest Louisiana, 4 miles south of the City of Shreveport. Between river miles 210-214 on the Red River.
Channel Access	Channel depth 9' and 200' wide
Land Access	Within 0.3.miles to LA 1; 10 miles to I-20 and 8 miles to I-49. Port rail access is in planning stage and will be serves by Union Pacific mainline, with access to KCS & SP.
Docking	600 ft. general cargo wharf with on- dock heavy rail with side track. The general cargo wharf can serve two standard barges simultaneously. 300 ft. liquids wharf.
Intermodal Transfer (on dock)	Shipside cranes: 30 ton Bridge and Truss and crane and 50 ton overhead bridge crane. Forkloaders and other equipment necessary to meet cargo handling needs. Terminal operator: Logistics Services Inc., (Parent company Ryan- Walsh Inc.).
Warehouse Storage	30,000 sq.ft. general cargo warehouse.
Yard Storage	2.5 acre paved yard storage adjacent to wharf and auxiliary yard storage.
Inland Transport	Dry-bulk and liquid-bulk handling facilities are in planning stage.
Cargo Throughput (per hour)	Estimated break-bulk cargo throughput: 80-100 tons per/hr.
	Planned Expansions/ Dates The Port is in the process 2,000 acre development for various maritime related businesses. Road and rail access as well as drainage and utilities are provided for industrial tenants.
	Constraints/ Impediments Longer sailing times involved will be a disadvantage for regular and frequent vessel services. Regular barge movements and towing services are yet to be established on the Red River. Market development and cooperative arrangements with other ports on the Red River may be necessary to ensure adequate loads.
	Potential Vessel Services River/Ocean vessel service.

Source: LSU National Ports and Waterways Institute and Caddo-Bossier Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Baton Rouge

Facility Type	Physical / Operational Parameters
Location	229 miles A.H.P. on the Mississippi River in West Baton Rouge Parish, LA. Furthest inland deep-water port on the Mississippi which is approx. 20 hrs sailing time from the Gulf.
Channel Access	Gulf Intracoastal Waterway System passes directly through the port east-west. On the Mississippi River with channel depth of 45'. Access to Intracoastal Waterway with Channel depth 12'
Land Access	Highway: I-10 within one mile to port; Other major highways which serve the port are I-12; I-55 and I-59. Rail: Union Pacific; Illinois Central and Kansas City Southern; UP switches cars once a day at the port. 17 miles of rail track; 96 shipside railcar capacity and additional 250 car storage capacity within port.
Docking	Two general cargo docks 3,000 feet long capable of berthing four to six ships. Docks are equipped with double marginal rail tracks and wide aprons for direct cargo transfer to ships Dry bulk (grain) dock, midstream buoy system and liquid-bulk terminals available.
Intermodal Transfer (on dock)	Shipside cranes between 150-250 tons are available. Fork loaders and other equipment necessary to meet operational requirements are available. Stevedoring is by ILA labor, and the port has a reputation for damage-free handling of cargo.
Warehouse Storage	462,500 sq.ft. of shipside covered transit shed space with alongside rail and truck bays for loading/unloading.
Yard Storage	50,000 sq.ft. of shipside open yard space and 50 acres of off- dock yard space within port premises.
Inland Transport	Dry bulk (grain) handling rate is 1,000-1,500 tons/hr. Liquid bulk handling rate between 200-700 tons/hr.
Cargo Throughput (per hour)	Break-bulk cargo 100-150 tons per hour. Container cargo: handled on request.
	Planned Expansions/ Dates 58,250 sq.ft. of additional covered storage planned and expected to be complete in 1998. 21,600 sq.ft. warehouse at the Inland Rivers Barge Terminal planned and expected to be complete in 1997.
	Constraints/ Impediments Market development and suitable cargo to sustain regular services remain a challenge.
	Potential Vessel Services River/Ocean vessel service and Shortsea Coastal vessel services.

Source: LSU National Ports and Waterways Institute and Greater Baton Rouge Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, South Louisiana

Facility Type	Physical / Operational Parameters
Location	Globalplex Terminal located on the Lower Mississippi River at river mile 138.5 between New Orleans and Baton Rouge.
Channel Access	Channel depth and depth alongside 45'. Panamax vessels can be accommodated.
Land Access	Highway access: Seven miles to I-10, and I-55. Two miles to Highway 61. Rail access to Kansas City Southern and Illinois Central is available supported by a 24,000 ft. rail spur.
Docking	General cargo dock: Length 420', Width 44'. The dock can be accessed via a dock-to-terminal access road which overpasses the Mississippi River levee.
Intermodal Transfer (on dock)	General cargo transfer between dock and terminal is by trucks and trailers. Dry-bulk cargo transfer is by shiploader and a conveyor system
Warehouse Storage	100,000 sq.ft of warehouse space available with rail connections and loading/unloading bays for trucks.
Yard Storage	Paved and unpaved yard storage available for break-bulk and dry-bulk cargo storage.
Inland Transport	Dry- bulk cargo: ship unloader 1,200 tons/hr. Conveyor system with 2,500tons/hr capacity. Break-bulk cargo transfer between dock and terminal by trucks and trailers.
Cargo Throughput (per hour)	Break-bulk cargo 80-100 tons/hr.
	Planned Expansions/ Dates 50,000 sq.ft. warehouse under construction and will be completed in 1996. 800 tons/hr. screw-type ship unloader scheduled for completion in early 1997.
	Constraints/ Impediments Cargo transfer between dock and terminal by trucks will impose constraints in achieving high output. At present the terminal is more geared to handling dry-bulk cargo. Market development remains a major challenge
	Potential Vessel Services River/Ocean vessel services Short-sea Coastal vessel services

Source: LSU National Ports and Waterways Institute and South Louisiana Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Krotz Springs

Facility Type	Physical / Operational Parameters
Location	On the Atchafalaya River, mile 47.5 below the juncture of the Atchafalaya River with the Mississippi River and 76 miles north of the Intracoastal Waterway.
Channel Access	The River is more than 1,000 ft. wide at the dock location
Land Access	Highway: The port access road is connected to LA Highway 105, a truck route. U.S. Highway 190 is within 0.25 miles. Rail:
Docking	A general cargo dock 320' in length and 25' in width with barge loading/unloading capability is under construction.
Intermodal Transfer (on dock)	50 ton pedestal crane at the dockside is planned.
Warehouse Storage	16,000 sq.ft. warehouse is planned and funded.
Yard Storage	Unpaved yard storage available.
Inland Transport	Bunge Corporation operates a grain facility at the port premises. Permian Oil Company operates a petroleum dock, and handles petroleum products, carbon black and feedstock.
Cargo Throughput (per hour)	Estimated Break-bulk cargo throughput: 80-100 tons/hr
	Planned Expansions/ Dates Most of the port infrastructure necessary are in construction stage. General cargo activities at the port are expected to be operational in 1998.
	Constraints/ Impediments Port facilities are presently not available to handle general cargo vessels. Market research and development is necessary to develop a cargo base.
	Potential Vessel Services River/Ocean vessel service.

Source: LSU National Ports and Waterways Institute and Greater Krotz Springs Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Port of Iberia

Facility Type	Physical / Operational Parameters
Location	On Commercial Canal in Iberia Parish, 8.5 miles north of the Gulf of Mexico.
Channel Access	Commercial Canal is 12' deep and 125' wide and is connected to Gulf Intracoastal Waterway.
Land Access	U.S. Highway 90 links the port with I-10 in Lafayette. LA Highways 182, 14, and 83 also serve the port. Rail access to the port is provided by Southern Pacific.
Docking	700' Public barge dock available for handlin general cargo.
Intermodal Transfer (on dock)	Mobile cranes and necessary other cargo handling equipment available.
Warehouse Storage	The port is a 2,000 acre industrial and munufacturing facility with various private tenants.
Yard Storage	Yard storage avalable.
Inland Transport	
Cargo Throughput (per hour)	50-75 tons of break-bulk cargo per hour.
	Planned Expansions/ Dates Water and sewerage services are under construction. Upgrading of public port facitlities are in progress.
	Constraints/ Impediments Longer and slower voyage on inland waterways is an impediment. Market development is a prerequisite to ensure adequate cargo
	Potential Vessel Services River/ Ocean vessel service.

Source: LSU National Ports and Waterways Institute and Port of Ibena Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Port of West St. Mary

Facility Type	Physical / Operational Parameters
Location	On the Gulf Intracoastal Waterway (GIWW) in St. Mary Parish, LA.
Channel Access	Access to GIWW by 16' deep port channel.
Land Access	Highway: LA Highway 83 connects the port with U.S. 90, I-49 and I-10. Rail: LA Delta Railroad connects the port with Southern Pacific mainline.
Docking	1,300 linear feet of bulkhead available to handle general cargo.
Intermodal Transfer (on dock)	Mobile cranes and fork-loaders are available for cargo transfer between warehouse and the vessel.
Warehouse Storage	40,000 sq.ft dockside warehouse available.
Yard Storage	Paved storage and auxiliary yard space available.
Inland Transport	Direct transfer of cargo from vessel to rail and trucks possible.
Cargo Throughput (per hour)	60-80 tons of break-bulk cargo per hour.
	Planned Expansions/ Dates A bulk-cargo terminal and several improvements to port tenants are in progress.
	Constraints/ Impediments Limited market opportunities and longer voyage time.
	Potential Vessel Services River/Ocean vessel service.

Source: LSU National Ports and Waterways Institute and Port of West St. Mary

Louisiana Port Profiles - Physical and Operational Parameters, Port Manchac

Facility Type	Physical / Operational Parameters
Location	Located at North Pass on Lake Ponchatrain, Tangipahoa Parish.
Channel Access	North Pass/ Lake Ponchatrain, Channel draft 9'.
Land Access	On I-55, Exit 15.
Docking	Two general cargo docks 160' ft. each.
Intermodal Transfer (on dock)	Cargo transfer by mobile cranes and fork-loaders.
Warehouse Storage	50,000 sq.ft. of covered storage with rail access.
Yard Storage	32 acres of yard storage at port premises.
	Bulk cargo terminal under construction.
Inland Transport	Handling L.A.S.H. barges, rail to barge cargo transfer and container stripping/stuffing are main activities at present.
Cargo Throughput (per hour)	70-100 tons of break-bulk cargo per hour.
	Planned Expansions/ Dates
	New 12,000 lb. forklift truck 8/96 Dredging of channel to 12' 10/96 New 90' truck scale 12/96 New 60' intermodal bulk terminal dock 4/97
	Constraints/ Impediments
	Need overhead crane for loading/unloading operations, bulk storage shed and industrial canal with mooring structure.
	Potential Vessel Services
	River/Ocean vessel service. Short-sea coastal vessel service.

Source: LSU National Ports and Waterways Institute and South Tangipahoa Port Commission

Louisiana Port Profiles - Physical and Operational Parameters, Port of Alexandria

Facility Type	Physical / Operational Parameters
Location	At mile 91 on the Red River in Rapids Parish, LA.
Channel Access	9 feet channel depth maintained by Corps of engineers. Turning basin radius 300'X600' and width of the river from bank to bank 800'-1,200'.
Land Access	Highway: Port access road connects to U.S. Highway 71. Other major arteries are I-49, LA 1. Rail: Rail access to port industrial park by Union Pacific Rail spur.
Docking	110 feet sheet pile dock for handling general cargo. Petroleum off loading facility operated by private tenant. Bulk fertilizer dock.
Intermodal Transfer (on dock)	40 ton bridge crane with 60 foot radius. Cargo handling equipment available for hire.
Warehouse Storage	20,000 sq.ft. covered storage.
Yard Storage	Approx. 3-5 acres of hard surface open storage.
Inland Transport	Vessel to/from trucks direct transfer or cargo transfers through the warehouse.
Cargo Throughput (per hour)	80-100 tons of breakbulk cargo per hour.
	Planned Expansions/ Dates Bulk-cargo (fertilizer) storage warehouse 13,350 ton capacity. 2,900 ton capacity bulk fertilizer dome structure.
	Constraints/ Impediments Market potential is limited. Longer inland voyage is time-consuming. Needs institutional infrastructure to develop opportunities.
	Potential Vessel Services River/Ocean vessel service.

Source: LSU National Ports and Waterways Institute and Alexandria Regional Port Authority

APPENDIX II

TRAILER FERRY POINT-TO-POINT INTERMODAL

COST COMPARISONS

Origin: **Atlanta**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,589	Laredo	Truck	JB Hunt	1	150	Truck	JB Hunt	2	775	5.0	2,514	112

Land & Conventional Water (40' container)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Lykes (D-D)	1.0	350	Charleston	Deep S.	Lykes (D-D)	7.0	1,150	Truck	Lykes	2.0	467	10.0	1,967	106

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	1.0	558	New Orleans	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	5.5	1,858	83

Origin: **Charlotte**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.5	1,931	Laredo	Truck	JB Hunt	1.0	150	Truck	JB Hunt	2.0	775	5.5	2,856	127

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	Lykes (D-D)	1.0	450	Charleston	Deep S.	Lykes (D-D)	7.0	1,150	Rail	Lykes (D-D)	1.0	450	9.0	2,050	111

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	807	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	6.5	2,107	94

Origin: **Chicago**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	4.0	1,947	Laredo	Truck	JB Hunt	1	150	Truck	JB Hunt	2	775	7.0	2,872	128

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	Lykes (D-D)	2.0	630	Norkfolk	Deep S.	Lykes (D-D)	7.0	1,150	Rail	Lykes (D-D)	1.0	450	10.0	2,230	121

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,017	New Orleans	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1	300	6.5	2,317	103

Origin: **Indianapolis**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,908	Laredo	Truck	JB Hunt	1.0	150	Truck	JB Hunt	2.0	775	5.0	2,833	126

Land & Conventional Water (40' container)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Lykes (D-D)	1.0	834	Norkfolk	Deep S.	Lykes (D-D)	7.0	1,250	Truck	Lykes	2.0	450	10.0	2,534	137

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,000	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	6.5	2,300	102

Origin: **Memphis**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	JB Hunt	2.0	1,228	Laredo	Rail	JB Hunt	1.0	150	Truck	JB Hunt	2.0	775	5.0	2,153	96

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Crowley (D-D)	1.0	695	Jacksonville	Deep Sea	Crowley (D-D)	10.0	1,150	Truck	Crowley (D-D)	1.0	450	12.0	2,295	124

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	1.0	426	New Orleans	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1	300	5.5	1,726	77

Origin: **New Orleans**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt Trans	1.0	987	Laredo	Truck	JB Hunt Trans	1.0	150	Truck	JB Hunt	2.0	775	4.0	1,912	85

Land & Water (40' container)

US Inland - US Port					Water Leg & Ports				Land Leg - Mexico				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	Lykes (D-D)	1.0	included	Houston	Deep Sea	Lykes (D-D)	3.0	1,500	Truck	Lykes (D-D)	1.0	450	5.0	1,950	105

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	0.0	0	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	4.5	1,300	58

Origin: **New York**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	3.0	2,201	Laredo	Truck	JB Hunt	1.0	150	Truck	JB Hunt	2.0	775	6.0	3,126	139

Land & Conventional Water (40' container)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Lykes (D-D)	1.0	1,975	Norkfolk	Deep Sea	Lykes (D-D)	7.0	0	Truck	Lykes	2.0	450	10.0	2,425	131

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	3.0	1,158	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	7.5	2,458	109

Origin: **Pittsburg**
Destination: **Mexico City**

All Land (48' trailer)

US Inland Point - Laredo					Laredo - Nuevo Laredo				N. Laredo - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	2.0	1,848	Laredo	Truck	JB Hunt	1.0	150	Truck	JB Hunt	2.0	775	5.0	2,773	123

Land & Conventional Water (40' container)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Rail	Lykes (D-D)	1.0	1,060	Norkfolk	Deep S.	Lykes (D-D)	7.0	1,250	Truck	Lykes	2.0	450	10.0	2,760	149

Land & Ro/Ro Ferry (48' trailer)

US Inland Point - US Port					US Port - Veracruz				Veracruz - Mexico City				TOTALS		
Mode	Company	days	$ / unit	Link To	Mode	Company	days	$ / unit	Mode	Company	days	$ / unit	days	$ / unit	$/ton
Truck	JB Hunt	3.0	1,124	New Orlean	Coastal	Ro/Ro Ferry	3.5	1,000	Rail	FNM	1.0	300	7.5	2,424	108

This public document is published at a total cost of $1487.00 . Two hundred and five copies of this public document were published in this first printing at a cost of $1082.00. The total cost of all printings of this document including reprints is $1487.00. This document was published by Louisiana State University, Graphic Services, 3555 River Road, Baton Rouge, Louisiana 70802, and Louisiana Transportation Research Center, to report and publish research findings for the Louisiana Transportation Research Center as required in R.S. 48:105. This material was duplicated in accordance with standards for printing by state agencies established pursuant to R.S. 43:31. Printing of this material was purchased in accordance with the provisions of Title 43 of the Louisiana Revised Statutes.