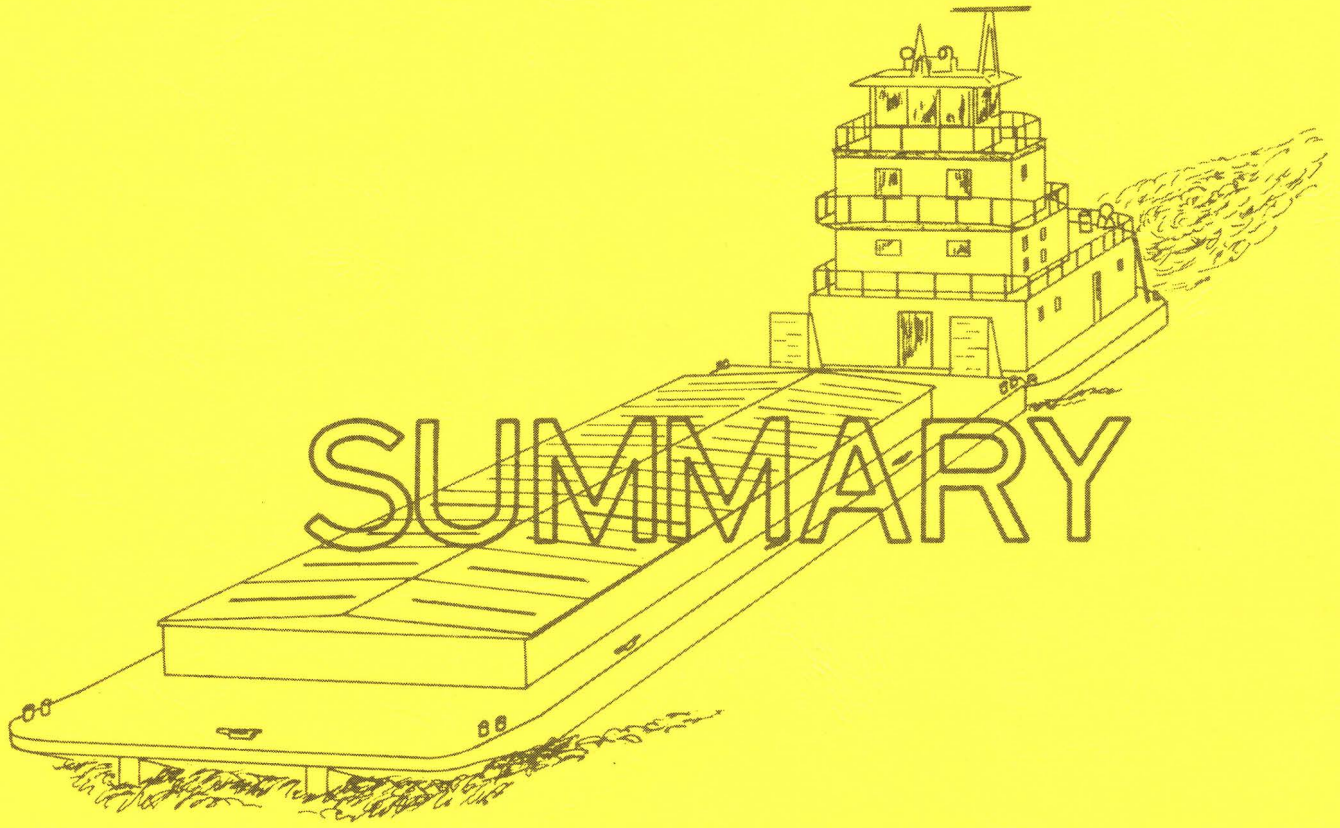
THE GULF INTRACOASTAL WATERWAY IN TEXAS



1978

Prepared By

THE STATE DEPARTMENT
OF
HIGHWAYS AND PUBLIC TRANSPORTATION

THE GULF INTRACOASTAL WATERWAY

IN TEXAS

SUMMARY

PRESENTED IN RESPONSE TO

THE TEXAS COASTAL WATERWAY ACT OF 1975

AND

SUBMITTED TO

THE SIXTY-SIXTH SESSION

OF THE TEXAS LEGISLATURE

PREPARED BY
TRANSPORTATION PLANNING DIVISION

THE STATE DEPARTMENT OF HIGHWAYS
AND PUBLIC TRANSPORTATION

B. L. DeBERRY, ENGINEER-DIRECTOR

1978

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IN REPLY REFER TO FILE NO.

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Lieutenant Governor William P. Hobby

Members of the Sixty-Sixth Legislature

Prior to 1975, the need existed for a single, local nonfederal sponsor of the Gulf Intracoastal Waterway in Texas. The Texas Coastal Waterway Act of 1975 filled that need by appointing the State Highway and Public Transportation Commission to act as agent for the State of Texas as the nonfederal sponsor of the Gulf Intracoastal Waterway in Texas.

The Act also instructed the Commission to evaluate the Gulf Intracoastal Waterway as it relates to Texas, including an assessment of the importance of the Waterway, an identification of principal problems and possible solutions to these problems, an evaluation of the need for significant modifications to the Waterway, and specific recommendations for legislative action, if any.

The evaluation mandated by the Act has been conducted and a report prepared; it represents information based upon available data and reflects the current status of Waterway-related matters as well as the possible future of these matters. It also reiterates the desire of the Commission to foster the growth of shallow-draft navigation in Texas while simultaneously fostering the protection and enhancement of the coastal environment.

The report is hereby submitted to the Sixty-Sixth Legislature in accordance with the Texas Coastal Waterway Act of 1975.

Sincerely yours,

B. L. DeBerry
Engineer-Director

PREFACE

The Texas coast, one of the state's most productive areas, has come under intense pressures since the turn of the century. The demands for development of natural resources, the changes due to the growth of the coastal population, the development of a vast industrial complex in the area, and the alterations required to provide a marine transportation network to serve the state have all contributed to the pressures on the coastal environment. The early alterations of the coastal environment were often justified in the name of progress with too little concern being given to the effects on the fragile environment. In recent years, increased concern for the future of this coastal environment has caused a new appraisal to be made of the relationship between the coastal economy and the coastal environment.

In partial response to these concerns, the Sixty-Fourth session of the Texas Legislature enacted the Texas Coastal Waterway Act of 1975. This Act states the policy of the State of Texas as being to support marine commerce and the economy of the state by providing for the shallow-draft navigation of the state's coastal waters in an environmentally sound fashion, to prevent waste of both publicly and privately owned natural resources, to prevent and minimize adverse impacts on the environment, and to maintain, preserve and enhance wildlife and fisheries.

To aid in accomplishing this policy, the Act designates the State of Texas as the nonfederal sponsor of the main channel of the Gulf Intracoastal Waterway and names the State Highway and Public Transportation Commission to administer the provisions of the Act. The Commission is further directed to continually evaluate the Waterway as it relates to Texas including an assessment of the importance of the Waterway, the identification of principal problem and possible solutions, the evaluation of the need for significant modifications to the Waterway, and specific recommendations for legislative actions to aid in carrying out this policy of the state.

A report of the evaluation was submitted to the Sixty-Fifth session of the Texas Legislature in January, 1977. The second report in this series was presented to the Sixty-Sixth session of the Texas Legislature. This is a summary of that report.

Copies of the full report are available at cost from the State Department of Highways and Public Transportation, Post Office Box 5051, Austin, Texas 78763.

THE GULF INTRACOASTAL WATERWAY IN TEXAS

INTRODUCTION

The Gulf Intracoastal Waterway (GIWW) in Texas was identified in the previous report to the Texas Legislature as an important marine highway for the transportation of the products that are so vital to the Texas economy. The intervening study period has only reinforced the concept that this waterway plays a major role in the Texas transportation system. This waterway provides a connecting link between the deep-water ports of Texas and the industrial complexes that have developed around them. Even more important is the role the waterway plays in connecting these industrial complexes to the trade markets of the Gulf coast and the midwest.

When the waterway was initially constructed in the mid-thirties, the sole function of the waterway was foreseen as commercial navigation. Just as no other purpose was planned for the waterway, little or no concern was given to its effect on the coastal wetlands. Since that early period, concern for the welfare of these natural resources has grown, until today, all navigation projects affecting the coastal wetlands must be carefully evaluated to determine the true value of the projects. Likewise, changes in the lifestyles of coastal residents and others have also placed increasing stress on the wetlands. The industrial development has also brought increases in coastal population, personal and public incomes, and the free-time necessary to enjoy coastal recreational pursuits.

GROWTH OF A MULTI-PURPOSE WATERWAY

Unlike some of the other waterways of the nation, especially those of most recent construction, initially, no provisions were made along the GIWW for recreational purposes. The growth in the usage of the GIWW by fishing vessels, work boats and recreational craft, as well as the growing commercial traffic has introduced safety hazards to navigation. There are few safe mooring facilities provided along the GIWW for recreational craft, except for the commercial or public marinas located near the port or resort cities. As a result, recreational craft travelling long distances on the GIWW are frequently forced to moor overnight in the main channel. Such unsafe navigation practices should be discouraged by the provision of the needed waterside facilities.

The previous report on the status of the GIWW had identified 63% of the traffic on one 43-mile segment of the GIWW as being commercial traffic. The remaining traffic consisted of recreational craft (19%) and fishing vessels and work boats (18%). While these percentages represent an average annual value, more recent analysis indicates that annual or even monthly averages do not truly reflect the problem. It is the day of the week that is really pertinent in the distribution of the vessel types. A complete analysis of the daily traffic at one location for the year 1976 showed that while the number of commercial vessels and workboats remained fairly constant, there were extreme variations in the number of fishing and recreational craft traversing the waterway. The number of fishing vessels recorded varied with the fishing season and variations in the weather. The greatest variation, however, was in the number of recreational craft using the waterway on any given day. For instance, a summer weekend could see the number of these vessels increase by 500% over the daily average for that month. On such a day, over 72% ofall traffic would consist of recreational vessels.

The picture presented by this analysis is, of course, strictly local in its interpretation. A major effort to record the actual number and distribution of vessels using the GIWW along its entirety is badly needed to present the complete traffic picture. Such a study has not yet been attempted, but there can be no true understanding of the GIWW traffic until such a study is completed.

THE CHANGING POLITICAL ENVIRONMENT

In the last few years, a new dimension in the future of all water projects has begun to take form. This new dimension applies particularly to inland navigation projects. In addition to the pressures of increasing concern for the natural environment, other new pressures are forcing changes in the political environment. Any study of a navigation project must consider these changes in both environments. Although the changes in the political environment have not generally been implemented as yet, a review of these proposed changes became necessary so that the proposals can be studied for future effects.

Article 1, Section 9, of the U.S. Constitution and Article IV of the Northwest Ordinance of 1787 set the beginning of federal policy regarding navigation in the United States. This federal policy has evolved into the following two-pronged form: 1) Maintenance, wherever possible, of a competitive equality between ports; and 2) Federal obligation to provide, without charge, a free and unhindered inland waterway network. In recent years, this policy

has resulted in several problems; physical, economic, environmental, organizational. Efforts by the federal government to address these problems has resulted in a drastic change in the overall political environment regarding marine transportation.

More than thirty separate federal agencies influence national water resource/transportation policy. Of the three major economic regulatory agencies dealing with transportation, the two agencies having marine transportation responsibilities are the Federal Maritime Commission and the Interstate Commerce Commission. The former regulates waterborne commerce between the United States and foreign countries and between non-contiguous ports of the U.S. The latter agency regulates all common carriers engaged in domestic surface transportation. However, since less than 15% of domestic inland marine traffic comes under this regulation, the major role played by this agency is in the regulation of the marine modes primary competitors: railroads and pipelines.

A recent study by the U.S. Senate Governmental Affairs Committee found two basic problems with the regulatory structure:

1) There is no unified set of national transportation goals guiding the priorities set up by the regulatory agencies.
2) Although the U.S. Department of Transportation is charged with developing a national policy, the Department has no authority to initiate policy-related proceedings before the regulatory agencies.

The U.S. Coast Guard, the U.S. Army Corps of Engineers and the U.S. Maritime Administration are the principal federal agencies involved in inland marine commerce. The U.S. Coast Guard has responsibilities involving marine safety, navigation aids, environmental protection, research and law enforcement. The U.S. Army Corps of Engineers administers many federal water resource development programs, including constructing and maintaining navigation facilities, flood-control projects, hydroelectric facilities, and port development projects. The U.S. Maritime Administration administers programs to aid in developing, promoting and operating the nation's merchant marine.

Another federal agency affecting all water resource projects is the Environmental Protection Agency, which is responsible for protecting the quality of the environment. The restrictions imposed by this agency have had dramatic effects on all navigation projects. In addition, the economic restrictions imposed on all civil-work projects by the Office of Management and Budget have also influenced all projects in recent years.

Final approval for all civil-work projects has usually rested with the U.S. Congress, which authorizes and funds all projects and approves, modifies, or rejects the budgets of all federal agencies. Such actions are, of course, subject to a presidential veto, but the Congress can override such a veto, if it deems it advisable to do so.

This fragmentation of responsibility has caused serious difficulties in coordinating water resource projects and transportation projects. This, in turn, has led to many other problems. In an attempt to alleviate the problems, there have been many studies of possible reorganization of federal agencies, with as many proposals for the reshuffling of agencies. Since inland navigation is a domestic surface transportation mode, most of these proposals have included a proposed shifting of authority for navigation projects to the U.S. Department of Transportation. The major goal of such a rearrangement of agencies and responsibilities is to enable the formulation and implementation of a national transportation policy. Too many projects have been initiated without any study of the effects of the project on other transportation modes or even on other projects relating to the same mode.

COST-SHARING AND COST-RECOVERY

In the meantime, other studies have taken a look at the role of the federal government in water resource projects. Financial pressures have caused proposals for cost-recovery or cost-sharing to surface. Cost-recovery entails proposals for the recovery of all or some part of the federal costs of all such projects. Generally, this entails the selling of all vendible products or services. Thus, water for public or industrial consumption, water for irrigation, hydroelectric power and flood-control or navigation services would be considered vendible products or services and subject to cost-recovery charges. The means of cost-recovery are designated user-fees.

On the other hand, cost-sharing denotes proposals to

force state or local agencies to share a larger portion of the total costs of all projects. A recent study by the Water Resources Council and the Office of Management and Budget is currently considering the five following proposals:

1) Continuation of current procedures.
2) A minimum cost-sharing floor for all water resource projects.
3) A joint-venture concept where all initial costs would be shared by federal and other entities, with operating and maintenance costs to be borne by local and state sponsors.
4) A block-grant concept where a single grant would be given to each state and the states would select the projects to be built.
5) A full cost-recovery concept wherein the state or local sponsors would repay all costs and expenses to the federal government for all projects built and operated.

While such proposals are only in the initial formulation stage, their implementation would have major effects on all water resource projects. While the cost-sharing proposals were being studied, cost-recovery proposals received increasing attention. The usual cost-recovery means suggested for transportation were of two forms, uniform or system-wide, and localized or segment-specific. Uniform-type recovery mechanisms included fuel taxes, equipment taxes, registration fees, and taxes on the commodities transported. The segment-specific mechanisms included lockage fees and segment tolls.

The application of either type of cost-recovery mechanism presents many difficulties. No two waterways are exactly alike in form or in type of facilities provided. Some waterways are multi-purpose by natural adaptation. Many rivers require locks and dams to provide slack-water pools for navigation, while others only rely on dredged channels for navigation. Many of the dams were constructed with flood control or hydro-electric power production as the primary purpose, while navigation was only incidental to the projects. Incidental benefits such as recreational usage, improved wildlife habitat or stabile water supplies for public or industrial purposes have developed on almost all navigation projects.

The allocation of the benefits of any project, and the costs pertaining thereto, are often impossible to determine due to the accounting methods that have been in use during the life of the project. This prohibits the fair determination of cost-allocation for segments of the inland navigation system, so that cost-recovery for segments is difficult to determine. Some of the same problems of project benefit allocation exist on a systemwide method of cost-recovery. In addition, this method has the disadvantage that low-cost waterways would have to cross-subsidize the high-cost waterways. Cross-subsidization, however, would be advantageous to newer waterways, which have not yet had sufficient time to allow the development of a level of commerce high enough to justify the project cost.

USER FEE MEASURE ENACTED

While the study of the various cost-sharing and cost-recovery proposals continues, a major change in the "free and unhindered" inland navigation network concept took place. The authorization for a replacement of Lock and Dam 26 on the Upper Mississippi River became a battleground for the implementation of some form of user-fee for most waterways.

The replacement of this structure had become critical to navigation interests. Congestion and delays to shipping caused by this antequated facility had already led to increased shipping rates for all shipments transiting it. Its location, just downriver from the entrance to the Illinois Waterway, compounded the effects on shipping in the upper midwest. In addition, erosion had made both the locks and dam unsafe and presented the possibility of failure of either or both of the facilities. Such a failure would halt all shipping to the area and present a catastrophic loss to agriculture and others dependent on the two waterways.

Opposition to the replacement developed from two groups: environmental interests who perceived the project as the first step in deepening the Upper Mississippi River Channel; and, the region's railroads who feared the diversion of more commerce with the completion of a modern facility. While litigation over the project continued, these interests sought to use this project to force the implementation of cost-recovery measures. In effect, the authorization for the replacement of these vital structures was held hostage for some form of cost-recovery.

The battle between the opposing forces was waged during the last two years in the U.S. Congress. Proposals

for user-fees ranged from a fuel tax of 6¢ per gallon to recovery of 50% of construction costs and 100% of operating and maintenance costs. Final agreement was reached during the closing days of the last session of Congress and the first user-fee in history on the inland waterway network was enacted. The provisions were signed into law on October 21, 1978.

The key elements of this legislation included:

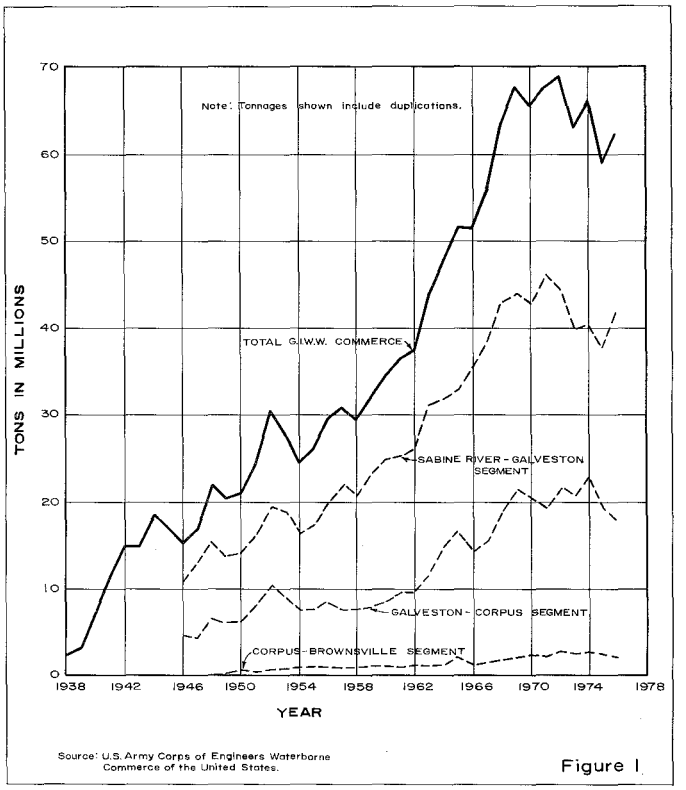
1) Authorization for the replacement of Lock and Dam 26.
2) Authorization for a comprehensive master plan for the management of the Upper Mississippi River System to be prepared by the Upper Mississippi River Basin Commission.
3) Imposition of an inland waterways fuel tax on twenty-six shallow-draft waterways, including the GIWW. The tax is to begin October 1, 1980, at 4¢ per gallon and increase in 2¢ increments to 10¢ per gallon by October 1, 1985.
4) Creation of the Inland Waterways Trust Fund to receive amounts equivalent to the amount of taxes received. Amounts in the Trust Fund are to be available for construction and rehabilitation expenditures for navigation on these waterways.
5) Authorization for a study to make findings and policy recommendations with respect to inland waterway user taxes and charges. The study is to be conducted by the Secretaries of Transportation and Commerce with the final report to be submitted to Congress not later than September 30, 1980.

At this point, the future effects of this measure on Texas and the users of the GIWW are still to be determined. Many questions concerning this tax will have to wait until the implementation guidelines have been published. This measure was a giant step toward cost-recovery. What other measures in this changing political environment will follow, only time will tell.

COMMERCE ON THE GIWW

The total tonnage of commodities moved via the GIWW in Texas showed a drop from the 66 million tons reported in 1974 to 59.3 million tons in 1975. A partial recovery to 61.9 million tons followed in 1976. Figure 1

MARINE COMMERCE ON THE G.I.W.W.



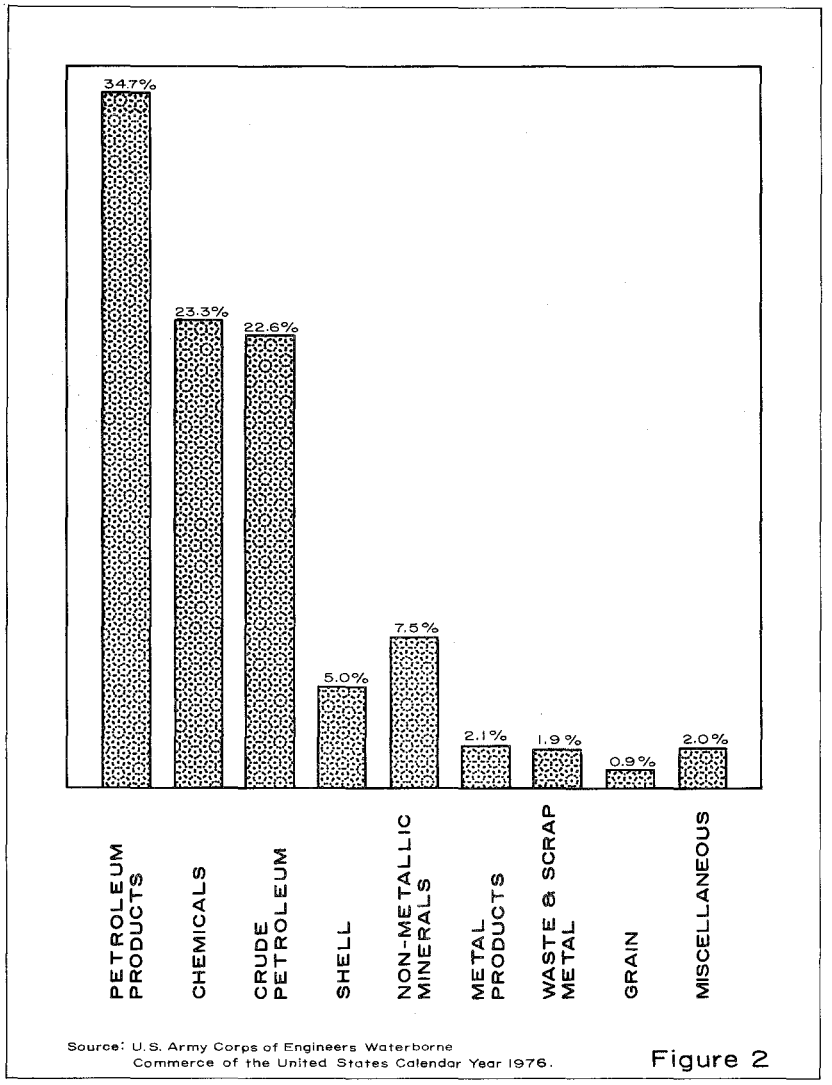
Source: U.S. Army Corps of Engineers Waterborne Commerce of the United States.

Figure 1

shows that most of this traffic loss in 1975 was on the waterway segments from Galveston to Brownsville. Moreover, the losses of these segments continued in 1976, while the Sabine River to Galveston segment recovered in 1976 and produced the highest tonnage record since 1972. Preliminary figures for 1977 indicate that over 66 million tons of goods moved on the total GIWW in Texas, the highest total since the peak tonnage in 1972.

The major products involved in the 1976 movements are shown in Figure 2. These statewide figures show the only major change in the commodities involved was a 3.3% reduction in the percentage of marine shell transported. Minor losses were also recorded in the percentage of metal products and grains transported. These percentage losses were offset by gains in petroleum products (1.4%), chemi-

TOTAL G.I.W.W. COMMODITIES



Source: U.S. Army Corps of Engineers Waterborne Commerce of the United States Calendar Year 1976.

Figure 2

cals (1.4%), crude petroleum (1.0%), and lessor gains in the remaining categories.

TRADING AREAS REDEFINED

The Texas Interstate trade movements, meanwhile, show an 8.3% increase in exports from 19.2 million tons in 1974 to 20.8 million tons during 1976. This increase in exports was partially offset by a 4.2% decrease in imports, where only 11.3 million tons entered the state in 1976, versus a total of 11.8 million tons in 1974. These figures reflect only the movement of selected commodities, but most of these commodities do constitute the majority of the products moving in the Texas Interstate trade.

The trading areas involved in these movements are shown in Figure 3. The imports showed the major changes to be a decrease of 7.7% in the goods entering the state from the GIWW section in Louisiana, but a 6.4% increase in commodities from the eastern Gulf section of the GIWW. Overall, over 82% of the products imported into Texas originate along the Gulf Coast.

MARINE COMMERCE TRADE AREAS FOR SELECTED TEXAS PRODUCTS

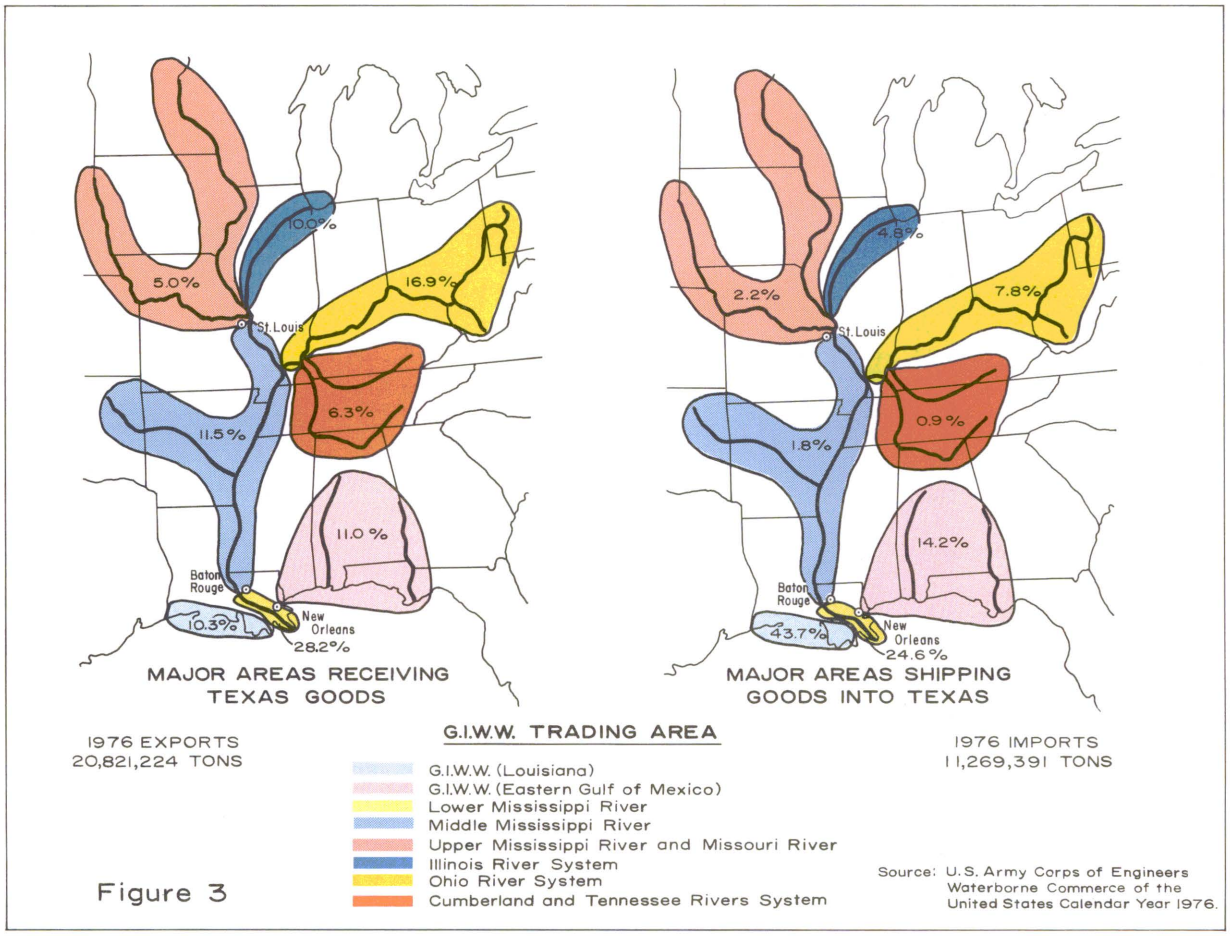


Figure 3

Texas exports in 1976 showed increases in products shipped to the Upper Mississippi River (3.4%), the Lower Mississippi River (2.1%), the Louisiana Section of the GIWW (1.6%), and minor increases in the Cumberland-Tennessee System and the Middle Mississippi River area. Decreases for the year were noted for the Ohio River System (4.1%), the Illinois River system (3.3%), and the eastern Gulf section of the GIWW (0.7%). Despite these changes, over 50% of the Texas products are still destined for the upper midwest area serviced by the Mississippi River and its tributaries.

The importance of distinguishing the trading areas cannot be overemphasized. Since 1960, the shallow-draft marine trade of the entire midwest and Gulf Coast has increased from 169 million tons to over 317 million tons, a growth of 86.7% in the seventeen year period. The movements of the Texas interstate trade have increased 73.6% in the same period. Prior to the last two years, Texas led this trade area in growth rate, but has now fallen slightly behind. The principal explanation for this behavior would be the drop in crude petroleum shipments to Texas and the growth in the coal and grain movements in the total trade area. Generally, Texas contributes approximately 17% of all movements in this vast trade area.

COMMODITIES IN INTERSTATE TRADE

The historic record of the major commodities involved in interstate trade is shown in Figures 4 and 5. Figure 4 shows the rise and decline of the products imported into Texas. A major decline in imports has occured since 1969. The cause of this decline is due to a sharp decrease in the

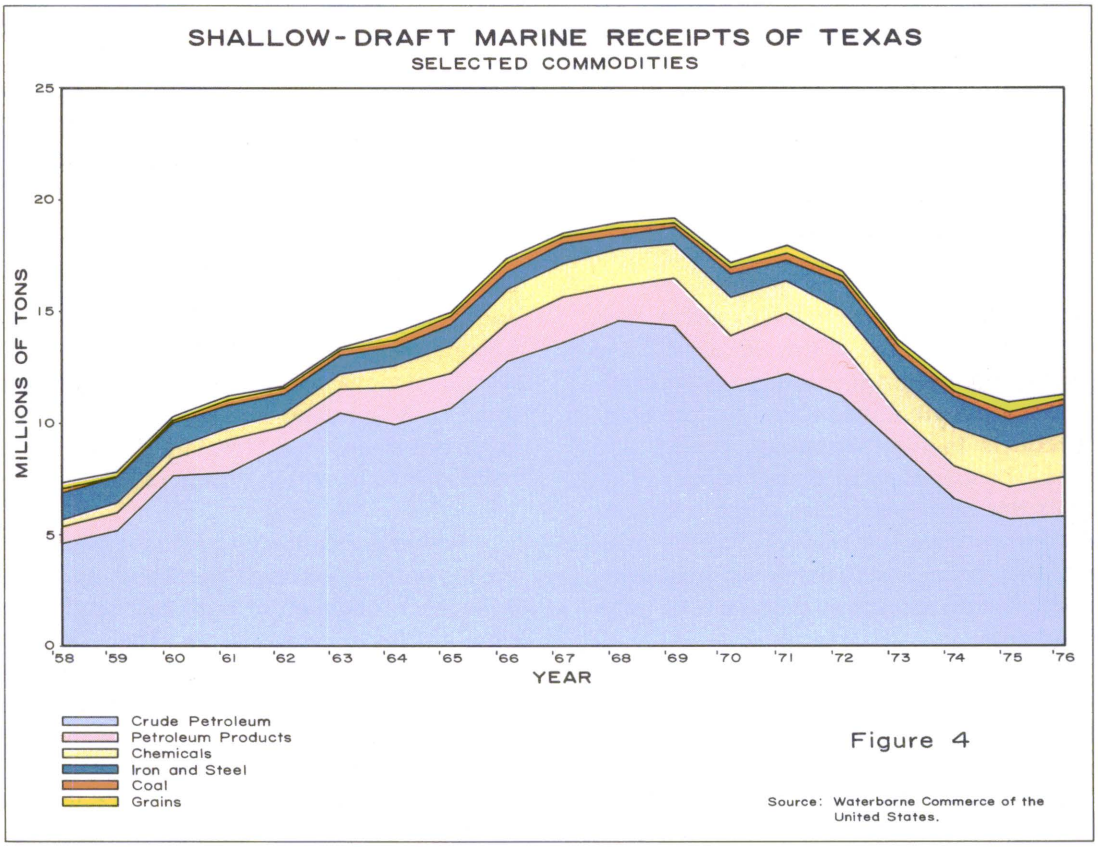


Figure 4

Source: Waterborne Commerce of the United States.

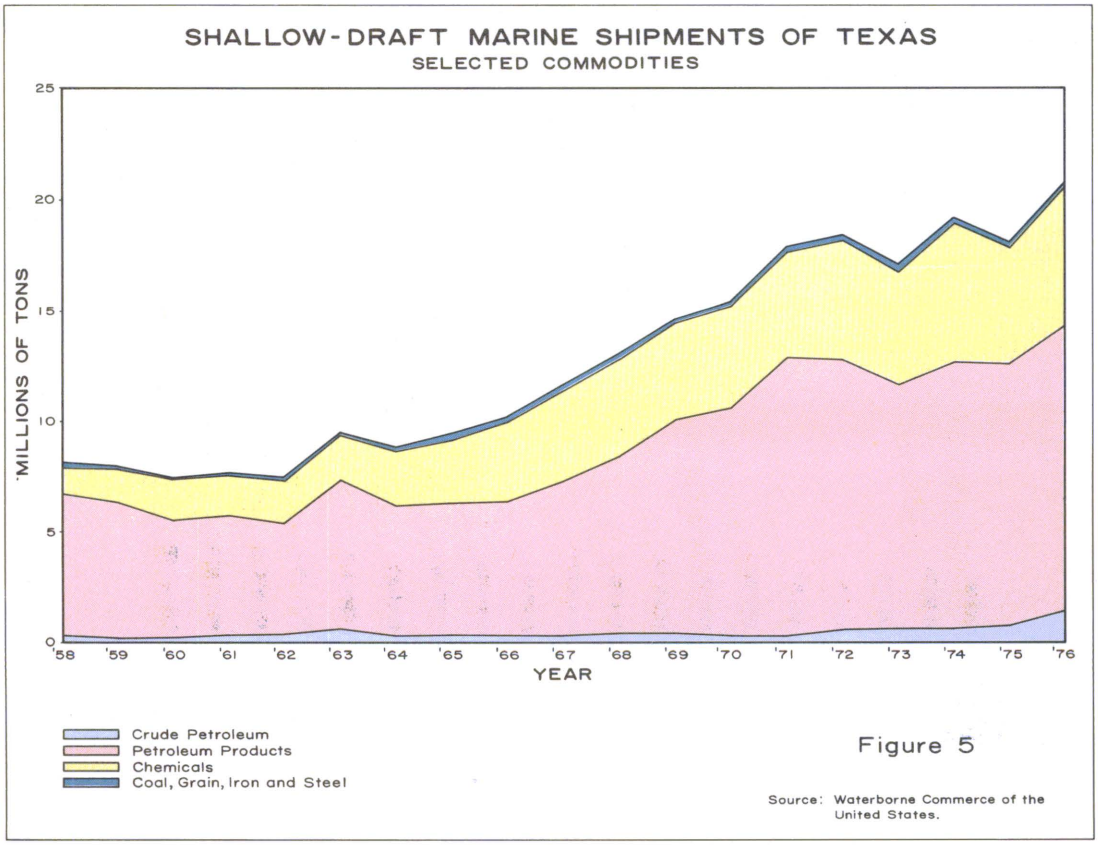


Figure 5

Source: Waterborne Commerce of the United States.

amount of domestic petroleum shipped into Texas since 1969. The decrease in this one commodity was sufficient to cause a similar decline in the total import trade into Texas. Most of this decline was in shipments from Louisiana into Texas.

Figure 5 shows a steady growth in the export portion of the Texas interstate trade. Most of this increase is due to gains in the shipment of petroleum products and chemicals from Texas. Major growth in this trade is in the shipment of these products to the Mississippi, Illinois, and Ohio River systems. The net effect of these changes in interstate movements has been a decrease in the total tonnage of the Texas interstate trade since 1971, the peak year for this trade. Only now, are the rising exports beginning to overcome the falling imports so that the total trade will begin to grow again.

TYPES OF TRADE ON THE GIWW

The total trade on the Texas segment for the years 1958-76 is shown in Figure 6. On this chart the trade is disaggregated into interstate traffic, intrastate traffic and local traffic. The first two definitions are self-evident, but for this chart, local traffic is defined as that traffic that originates and terminates within one of the five segments of the GIWW. The five segments used for this definition are the Sabine-Neches Waterway, the Sabine River to Galveston, Galveston Bay, Galveston to Corpus Christi, and Corpus Christi to Brownsville. Since 1960, Texas intrastate trade has represented 29-40% of all movements, with local movements averaging approximately 15% of the total. Thus, approximately 60-71% of all movements are in interstate trade. The current percentage is 63%, which has held consistent within recent years.

Previous mention was made regarding the decrease in the movements of crude petroleum and marine shell. The domestic production of both commodities has decreased significantly in recent years. The use of substitutes or alternate sources has taken up much of the slack, but these items no longer ordinarily move by barge. The five top commodities moving by barge in Texas commerce have long been crude petroleum, petroleum products, industrial chemicals, marine shell and non-metallic minerals.

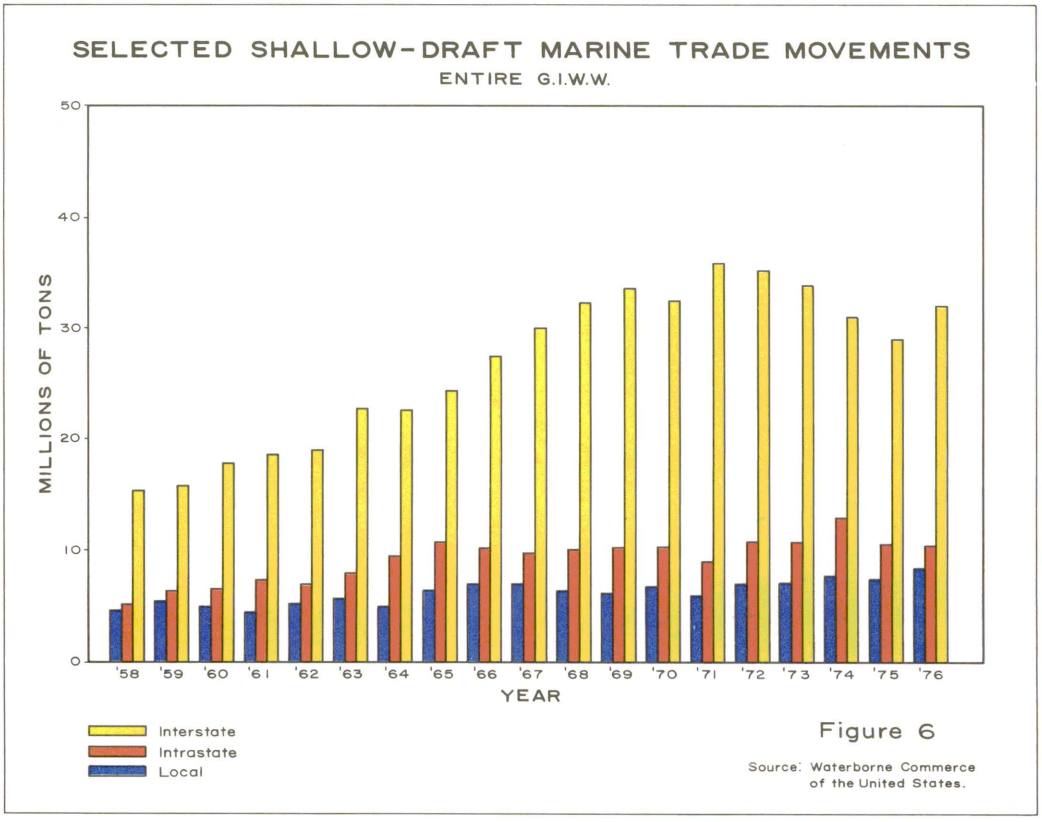


Figure 6

Source: Waterborne Commerce of the United States.

Although these five commodities have consistently maintained an average of 94% of all GIWW commerce in Texas, from 1960 through 1976, the share of the total traffic represented by crude petroleum and marine shell has shown the following decline: 1960-50.4%; 1965-50.9%; 1970-44.1%; 1976-27.6%. These declines have taken place during a period when total traffic has risen from 34.5 million tons in 1960 to 61.9 million tons in 1976. However, while crude petroleum has taken a substantial decline, petroleum products and industrial chemicals have experienced a significant rise in tonnage. This rise took place despite the fact that both of these commodities are dependent on crude petroleum as a basic feed-stock. This indicates that it is not a slow-down in production that is involved, but rather that a new source of feed-stock has developed in the past six years.

WHY ARE IMPROVEMENTS NEEDED

The previous report to the legislature noted the increasing flow of commerce on the GIWW in Texas. The growing problem of congestion on the waterway was successfully handled by technological improvements in the equipment utilized. Such advances in technology can no longer be depended on to carry the brunt of further increases in traffic. While other areas must now depend on improvements in port layout and material handling equipment, Texas must look to increased line-haul capacity for further increases in traffic. Crude petroleum, petroleum products and industrial chemicals now represent over 80% of the Texas GIWW commerce. Since these commodities also represent the most hazardous cargoes moving in marine commerce, safety becomes a prime concern in Texas. Life, property and the natural resources of Texas can be endangered should accidents occur involving these shipments.

Over 50% of Texas shipments go to such distant ports as Minneapolis, Chicago, Cincinnati, Louisville and Pittsburgh. In order to hold such distant markets for Texas products, the GIWW must have the improvements necessary to allow competitive shipping costs. Figure 7 shows the major waterways included in the Mississippi River and Gulf Coast systems. The major markets served by Texas exporters are situated on the Mississippi, Ohio, Illinois and Tennessee Rivers. Most of these rivers have channels only 9 feet in depth, but with channel widths from 225 feet to 1,100 feet. This is in contrast to the 12 feet by 125 feet channel dimensions of the GIWW.

Tows on the GIWW are restricted to five, 195 feet by 35 feet barges, or three, 290 feet by 50 feet barges. These maximum tow sizes compare with maximums of 40-barge tows on the Mississippi River south of Cairo, Illinois; 20-barge tows on the Ohio River; and 15-barge tows on the Monongahela River, the Illinois River and the Upper Mississippi River. Thus, not only do Texas shippers have to compete with areas having shorter line-hauls, but they are also restricted to smaller tows, which increases the cost per ton-mile over areas having more favorable channel dimensions.

The channel dimensions are further restricted by the sharp curvature on bends on the GIWW in Texas. At present, the standard channel alignment utilizes curves of 1° curvature. However, in certain sections, the curvature exceeds 2° and may even exceed 3°. A recent study of the relationship of tow size to degree of curvature and channel widths indicated that a maximum allowable GIWW tow measuring 55 feet by 1,180 feet would require the following channel widths: 1° curve, 164 feet; 2° curve, 198 feet; and 3° curve, 283 feet. These widths are for one-way traffic only on the curves. Two-way traffic would require almost twice as much channel width.

Attempts to double the tow size by widening the channel would require channel widths of 215 feet for one-way traffic and 425 feet for two-way traffic, if the maximum curvature is held to 1°. Model studies should be performed to determine what radius of curvature would permit two-way traffic within a more reasonable channel width. This channel width should be that width which will permit doubling of the tow size on the straight sections of the channel.

The advantages possible with improved channel dimensions were attested to at the public hearings regarding improvements to the Louisiana-Texas section of the GIWW. One marine expert testified that his company's current practice is to utilize a tow of four, 195 feet by 35 feet barges, pushed by a 760 horsepower towboat. Barge drafts are restricted to 9 feet for an average load of 1,500 tons per barge. If a 16 foot depth were provided, these same barges could be loaded to 1,950 tons with an 11 foot draft. New deep barges could be utilized which would allow a load of 2,600 tons per barge with a 14 foot draft. While such heavy loading would be restricted to movements on the improved channel and the Lower Mississippi

Figure 7

River only, substantial savings in the cost or number of movements would be possible. Other tows, not loading so heavily, would still benefit by the need for less horsepower to push the barges at greater speeds, due to the decreased bottom friction of a deeper channel.

Improvements to the channel width, however, present the greatest opportunity for transportation savings. Doubling of the tow size to use ten medium-sized barges would require a tow boat of approximately 1,800 horsepower. However, this would allow savings of approximately 60% in the number of boat-hours required for the same tonnage moved. Other savings would be in less fuel required plus substantial capital savings. Such efficiencies, if carried out industry-wide, could represent a cost-saving of 1.17 mills per ton-mile for GIWW shippers.

HOW MUCH WILL IMPROVEMENTS COST

The official study of improvements for the Louisiana-Texas Section of the GIWW is now underway. The completion of the study is scheduled for October, 1981, with the final report scheduled for completion by October, 1983. Such schedules are tentative only and may be extended due to inadequate funding or additional efforts required as the study progresses. This study includes the 669 miles of the GIWW from the Mississippi River to the

Brownsville Ship Channel, the 64 miles of the Morgan City-Port Allen Cut-off, and the 10 miles of the Algiers Alternate Route; a total length of project of some 743 miles. Approximately 403 miles, or some 54% of the total mileage of the project, is in Texas. Since a project of this magnitude will necessarily have a high cost, a portion of which will be a state responsibility, we have done a preliminary estimate of the major construction items for the Texas portion of the project.

The estimate had to be based on the following assumptions:

1) The improved channel will follow the same alignment as the existing channel.
2) The excavation quantities could be based on the original natural ground elevations present at the time of the original construction.
3) The existing disposal areas possessing perpetual easements will not be disturbed or reduced in area during the improvement project.
4) Maintenance dredging quantities are not dependent on channel dimensions.
5) The channel side slopes will be the same as those of the original construction.

Based on the preceding assumptions, the project was estimated from the Sabine-Neches Waterway to the junction with the Port Isabel turning basin. This length of waterway was divided into five segments as follows:

Segment #1 - Sabine-Neches Waterway to the Houston Ship Channel
Segment #2 - Houston Ship Channel to the Freeport Harbor Channel
Segment #3 - Freeport Harbor Channel to the Matagorda Ship Channel
Segment #4 - Matagorda Ship Channel to the Corpus Christi Channel
Segment #5 - Corpus Christi Channel to the Brownsville Ship Channel

In addition, six channel configurations were estimated; 250 feet by 12 feet, 250 feet by 14 feet, 250 feet by 16 feet, 300 feet by 12 feet, 300 feet by 14 feet, and 300 feet by 16 feet. The channel side slopes used were 1 on 2 for usual land-cut sections, 1 on 5 for open-water sections, and 1 on 10 for certain Kenedy County land-cut sections.

The project quantities were based on a 50-year life of project, with construction assumed to begin in 1987. Thus, the disposal areas were required to have sufficient capacity for the interim ten-year maintenance, the project construction quantities, and the fifty-year project-life maintenance quantities. A summary of the quantities required is shown in Table 1. The only quantities studied were property requirements, dredging requirements, levee requirements, and required open-water disposal. Any changes in locks or bridges which might be found necessary in the final study were not included. In addition, the number of pipelines to be relocated or lowered is not known at this time, so no provision was made for these items.

TABLE 1

ESTIMATED QUANTITIES FOR CHANNEL IMPROVEMENTS

Property Requirements

Channel	Right-of-Way	Disposal Sites	Total Property
250' x 12'	2,046.5 Ac.	6,493.8 Ac.	8,540.3 Ac.
250' x 14'	2,046.5 Ac.	7,579.4 Ac.	9,625.9 Ac.
250' x 16'	2,046.5 Ac.	8,899.9 Ac.	10,946.4 Ac.
300' x 12'	3,070.8 Ac.	7,739.8 Ac.	10,810.6 Ac.
300' x 14'	3,070.8 Ac.	9,698.5 Ac.	12,769.3 Ac.
300' x 16'	3,070.8 Ac.	11,531.6 Ac.	14,602.4 Ac.

Dredging Requirements

Channel	Construction	Maintenance	Total
250' x 12'	116,893,000 C.Y.	401,756,000 C.Y.	518,649,000 C.Y.
250' x 14'	167,192,000 C.Y.	401,756,000 C.Y.	568,948,000 C.Y.
250' x 16'	219,696,000 C.Y.	401,756,000 C.Y.	621,452,000 C.Y.
300' x 12'	163,656,000 C.Y.	401,756,000 C.Y.	565,412,000 C.Y.
300' x 14'	221,269,000 C.Y.	401,756,000 C.Y.	623,025,000 C.Y.
300' x 16'	281,135,000 C.Y.	401,756,000 C.Y.	682,891,000 C.Y.

Levee Requirements

Channel	Construction	Maintenance	Total
250' x 12'	805,380 C.Y.	7,006,980 C.Y.	7,812,360 C.Y.
250' x 14'	1,630,170 C.Y.	7,704,990 C.Y.	9,335,160 C.Y.
250' x 16'	2,897,650 C.Y.	8,399,420 C.Y.	11,297,070 C.Y.
300' x 12'	1,764,890 C.Y.	8,000,330 C.Y.	9,765,220 C.Y.
300' x 14'	3,395,090 C.Y.	8,479,450 C.Y.	11,874,540 C.Y.
300' x 16'	5,553,820 C.Y.	8,199,270 C.Y.	13,753,090 C.Y.

Open-Water Disposal Requirements

Channel	Construction	Maintenance	Total
250' x 12'	26,337,000 C.Y.	168,057,000 C.Y.	194,394,000 C.Y.
250' x 14'	40,779,000 C.Y.	168,057,000 C.Y.	208,836,000 C.Y.
250' x 16'	56,091,000 C.Y.	168,057,000 C.Y.	224,148,000 C.Y.
300' x 12'	35,026,000 C.Y.	168,057,000 C.Y.	203,083,000 C.Y.
300' x 14'	51,533,000 C.Y.	168,057,000 C.Y.	219,590,000 C.Y.
300' x 16'	68,234,000 C.Y.	168,057,000 C.Y.	236,291,000 C.Y.

A summary of the project cost estimates is shown in Table 2. These costs were calculated on the basis of 1978 dollars; with no provision added for inflation or rising costs during the entire project life. Although the costs are not accurate for the full term of the project life, they are useful to compare the relative costs of various channel configurations. Such comparisons can also be useful to determine the segments of the GIWW having the best benefit-cost ratios for proposed improvements.

TABLE 2

COST SUMMARY FOR CHANNEL IMPROVEMENTS

Channel	Construction	50-Year Maintenance*	Total Project*
250' x 12'	$172,647,000	$269,686,000	$442,333,000
250' x 14'	$247,183,000	$272,926,000	$520,109,000
250' x 16'	$327,025,000	$275,816,000	$602,841,000
300' x 12'	$244,865,000	$274,338,000	$519,203,000
300' x 14'	$333,718,000	$276,801,000	$610,519,000
300' x 16'	$427,923,000	$276,083,000	$704,006,000

* Includes estimated federal cost for maintenance dredging during 50-year period of $235,801,000. This cost may be deducted to determine required initial cost of project.

Table 3 provides a breakdown of the federal and state shares of the project costs. It should be noted that the federal share of the total project costs includes the cost of the maintenance dredging during the fifty year life of the project. This cost would not ordinarily be included in the initial project costs, but it was necessary that it be included here, so that the state's costs due to acquiring the required disposal areas could be included.

TABLE 3

COST DISTRIBUTION FOR CHANNEL IMPROVEMENTS

Channel	Federal Cost*	State Cost	Total Project*
250' x 12'	$402,041,000	$40,292,000	$442,333,000
250' x 14'	$472,694,000	$47,415,000	$520,109,000
250' x 16'	$546,345,000	$56,496,000	$602,841,000
300' x 12'	$468,543,000	$50,660,000	$519,203,000
300' x 14'	$549,544,000	$60,975,000	$610,519,000
300' x 16'	$633,620,000	$70,386,000	$704,006,000

* Includes estimated federal cost for maintenance dredging during 50-year period of $235,801,000.

This cost study has been based on the assumption that the state will not only be required to provide all right-of-way and required additional disposal sites, but will also be required to construct and maintain the required containment levees. Although the exact terms of sponsorship will not be determined until the final plans for improvements are completed and approved, these responsibilities are usually included in most current navigation projects.

A major portion of the state's cost is caused by the assumption that all land disposal will be contained within properly designed levees. Since a large portion of these costs is required to contain the fifty-year maintenance dredging, substantial savings could be realized if means of reusing disposal areas were developed. While the reuse of facilities would be expensive and time-consuming, these costs could be considerably less than the cost of acquiring the additional sites and facilities for permanent containment of all dredging quantities. In addition, reuse of facilities would allow the additional sites to remain in their natural state, thus reducing the environmental impact of the project on the natural resources of Texas.

Texas will be an active partner in the maintenance or improvement of the GIWW. This is properly so, considering the importance of the waterway to the Texas economy and the state's concern for the preservation of the wetlands in which it is located. Texas must take a strong, active role to protect both of these valuable resources.

THE STATE AS LOCAL SPONSOR

The formal assumption of full sponsorship responsibilities for the GIWW in Texas has been delayed due to the provisions of the Federal Flood Control Act of 1970 (P.L. 91-611). The provisions of this act forbid the commencement of construction activity on any water resource project without a written contract between the sponsor and the Secretary of the Army to furnish the required cooperation for the project. One requirement for such a contract is that the proposed sponsor must have full authority and capability to pay damages, if necessary. This statuatory requirement would pledge the credit of the State, in violation of the Texas Constitution.

Efforts to resolve this conflict were initiated by the Commission and the aid of Senator Bentsen of Texas was

enlisted. Senator Bentsen succeeded in having an amendment to P.L. 91-611 introduced into pending legislation before the U.S. Congress. This amendment would make the payment of damages contingent on the legislative appropriations process of the State.

The legislative vehicle for this amendment also contained the authorization for Lock and Dam 26 and the imposition of the fuel tax on inland navigation. During the final rush for congressional adjournment, this bill never reached the floor for the final vote necessary for passage. Although the controversial portions of the act were incorporated in another bill and did become enacted into law, the remaining portions, including this amendment, saw no action.

It is anticipated that the remaining portions of this bill will receive speedy action from the next session of the Congress. The Commission intends to take the necessary actions to try to ensure that this amendment will be included once again in the new legislation. Only after such remedial action, will it be possible for the necessary contract to be formally concluded. Until such a time, the official sponsorship by the State is not possible. However, immediately upon the signing of the necessary contract, the Commission is prepared to begin immediate assumption of the responsibilities thereby incurred.