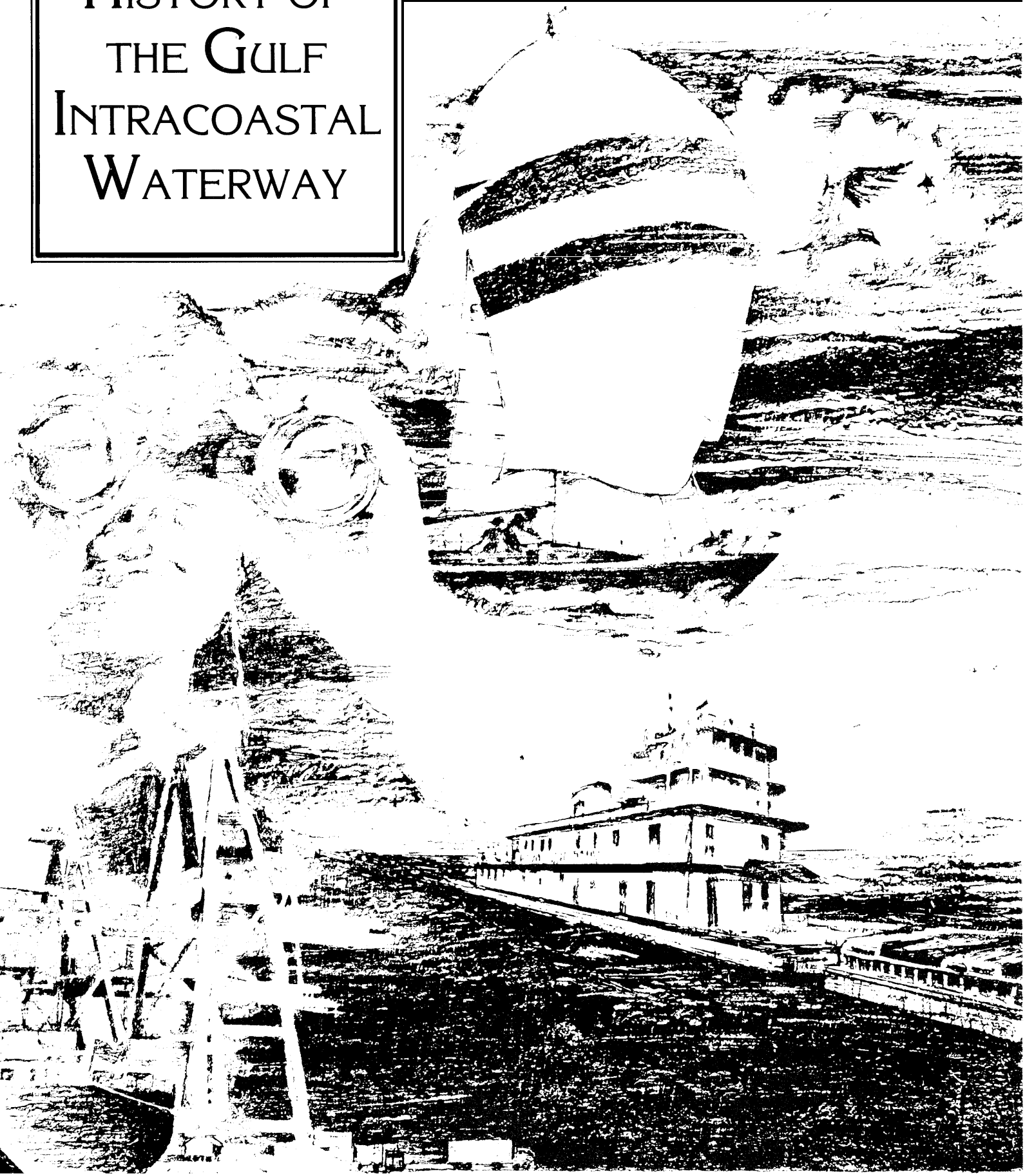
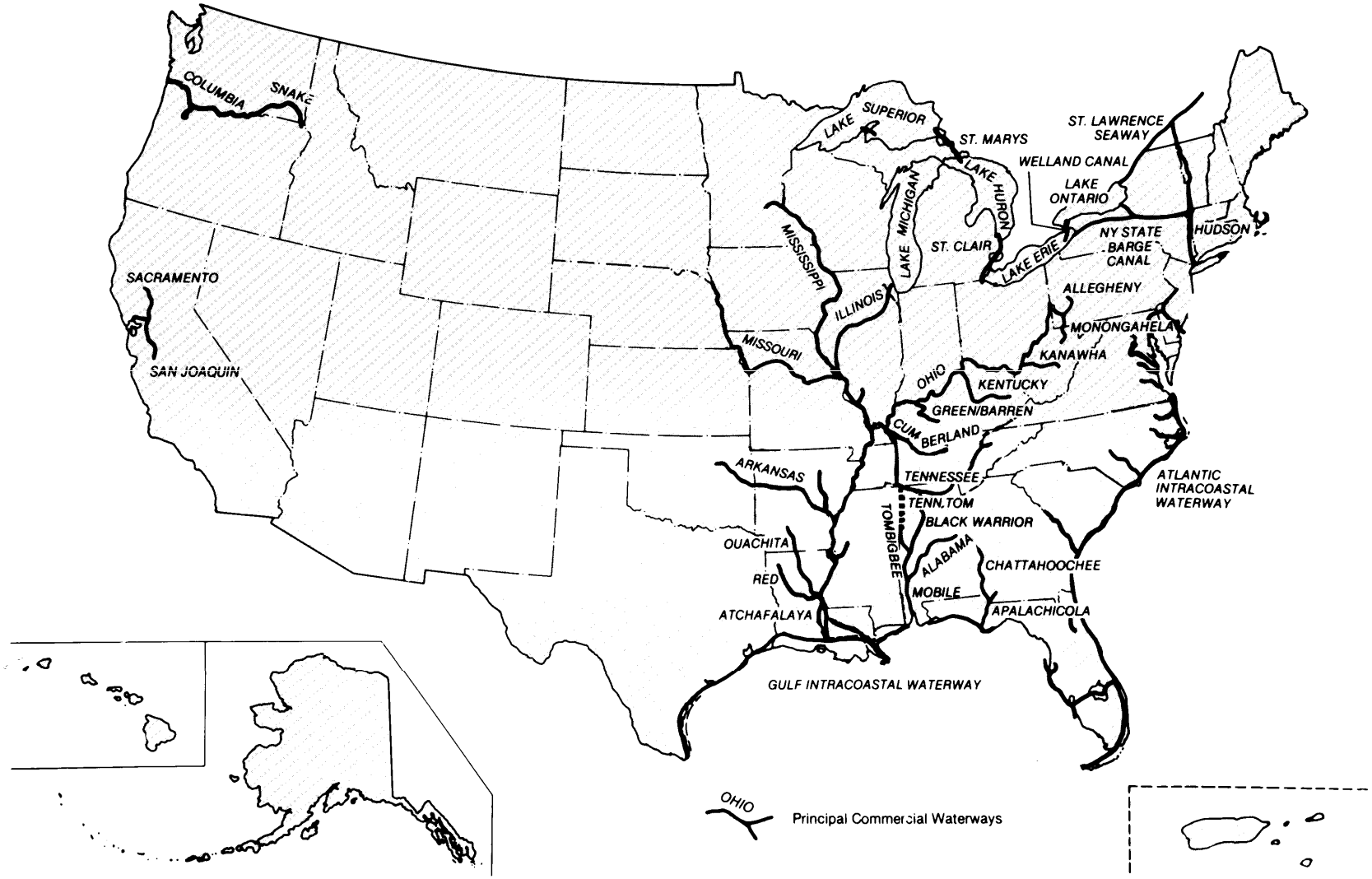
History of the Gulf Intracoastal Waterway



National Waterways Study □ U. S. Army Engineer Water Resources Support Center □ Institute for Water Resources

THE NATIONAL WATERWAYS
GULF INTRACOASTAL WATERWAY



History of the Gulf Intracoastal Waterway

Lynn M. Alperin

January 1983
Navigation History NWS-83-9

National Waterways Study □ U.S. Army Engineer Water Resources Support Center □ Institute for Water Resources

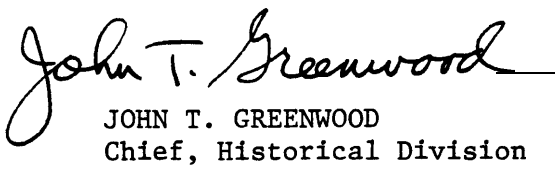
AUTHORITY FOR THE NATIONAL WATERWAYS STUDY

The Congress authorized the National Waterways Study (NWS) and provided the instructions for its conduct in Section 158 of the Water Resources Development Act of 1976 (Public Law 94-587):

> The Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to make a comprehensive study and report on the system of waterway improvements under his jurisdiction. The study shall include a review of the existing system and its capability for meeting the national needs including emergency and defense requirements and an appraisal of additional improvements necessary to optimize the system and its intermodal characteristics. The Secretary of the Army, acting through the Chief of Engineers, shall submit a report to Congress on this study within three years after funds are first appropriated and made available for the study, together with his recommendations. The Secretary of the Army, acting through the Chief of Engineers, shall upon request, from time to time, make available to the National Transportation Policy Study Commission established by Section 154 of Public Law 94-280, the information and data developed as a result of the study.

PREFACE

This pamphlet is one of a series on the history of navigation done as part of the National Waterways Study, authorized by Congress in Public Law 94-587. The National Waterways Study is an intensive review by the Corps of Engineers' Institute for Water Resources of past, present, and future needs and capabilities of the United States water transportation network. The Historical Division of the Office of the Chief of Engineers supervised the development of this pamphlet, which is designed to present a succinct overview of the subject area.



JOHN T. GREENWOOD
Chief, Historical Division

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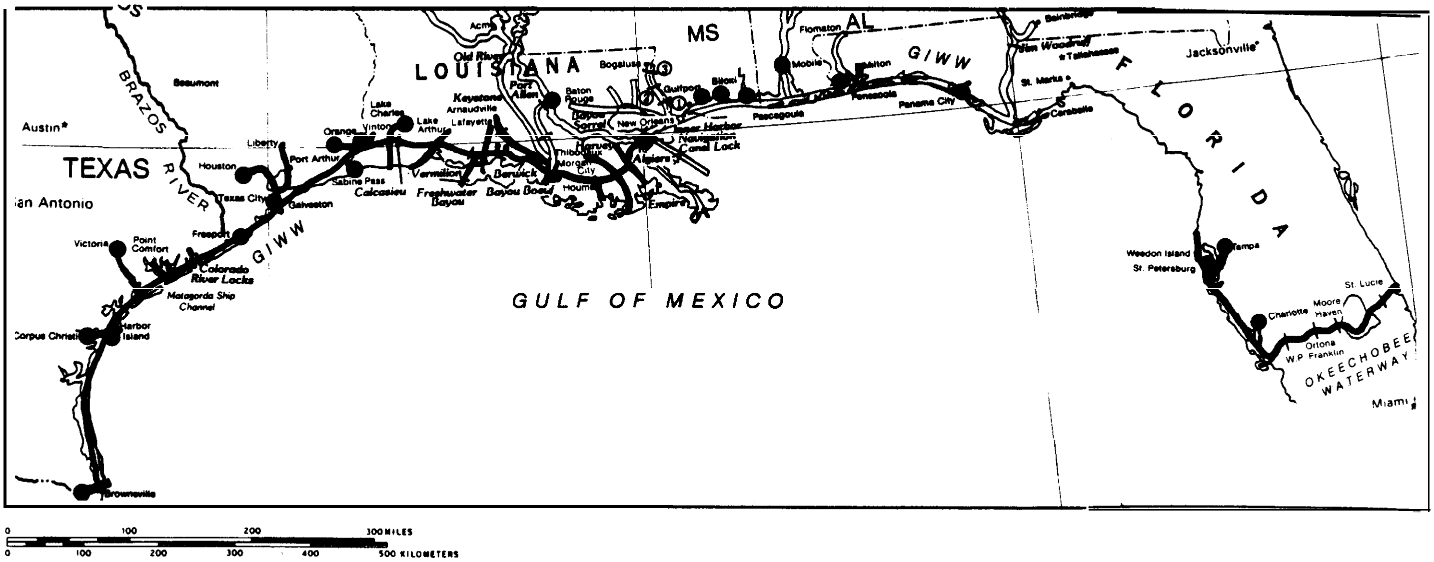
TEXAS
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FLORIDA
GULF OF MEXICO
GIWW
OKEECHOBEE WATERWAY
BRAZOS RIVER
Austin
Houston
Galveston
Texas City
Freeport
Victoria
Point Comfort
Corpus Christi
Harbor Island
Brownsville
Port Arthur
Orange
Lake Charles
Baton Rouge
New Orleans
Mobile
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Panama City
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Chapter I

THE CONCEPT

The earliest settlers in America quickly recognized the advantages afforded by inland waterways. As vital arteries supporting transportation, the streams, rivers, bayous, lakes, and other natural water routes facilitated primitive settlement and eventual urban development. They also promoted a type of water transportation different from that conducted at deep-water ports. Their shallow, sheltered waters provided safe passage to barges and other light-draft vessels that could not withstand the battering of the "open seas; they could be depended upon to link the scattered coastal communities and to penetrate the interior of the country, creating a commercial connection between geographically isolated points.

A PLAN FOR NATIONAL TRANSPORTATION

The vision of a vast network of roads and protected waterways captured the imaginations of influential men. Thomas Jefferson and other leaders of the young republic proposed a national system of internal improvements. Responding to the growing desire for improved inland transportation, the Senate ordered a report on the subject. In 1808, Secretary of the Treasury Albert Gallatin submitted his classic report on "Public Roads and Canals." This report formulated a plan for federal promotion of inland transportation and established the principles that have guided the government[s] role in water-related public works since that time. Gallatin advocated considerable federal assistance, arguing that private capital was not being used to develop essential roads and canals. Many areas through which potential avenues of traffic would run were settled only sparsely, if at all, and more attractive investments divertd the precious supply of available capital. Gallatin maintained the federal government could overcome these obstacles by participating in construction of extensive projects that would, in turn, stimulate private enterprise to carry on further improvements.[1]

The prototype for many future plans of internal improvement, Gallatin's report called for canals along the Atlantic Coast, canals linking the Atlantic Ocean with the western rivers and the Great Lakes, and interior roads and canals to provide strategic local connections. The elaborate plan further proposal that the government conduct engineering surveys to establish the need and to plan for improvements beneficial to the national interest. Gallatin based his justification on the military, political, and commercial needs of the growing nation.[2]

Although the War of 1812 forestalled any immediate implementation of the Gallatin plan, it emphasized the pressing need for an adequate network of coastal defenses and underscored the military value of

improved inland communication. Postwar efforts to improve military logistics directly involved the War Department and its Army Engineers in transportation planning. A board, including one naval officer and Corps of Engineers officers Brigadier General Simon Bernard and Lieutenant Colonel (later Brigadier General) Joseph Totten, undertook a study of national defense needs in 1816. These officers concluded that the national defense depended on four elements: a strong navy, adequate coastal fortifications, a regular army and organized militia, and improved internal transportation. Agreeing with the board's recommendations, Secretary of War John C. Calhoun used the Army Engineers to investigate problems of inland river navigation. The Engineer studies revealed urgent military and commercial needs for waterway improvements. In 1819, Calhoun published his "Report on Roads and Canals," reiterating Gallatin's plan and adding to it. Familiar with the work of the Army Engineer officers in fortification construction and navigation studies, he proposed that they be used extensively in surveying, planning, and, when necessary, supervising the construction of internal improvements.[3]

Pointing out the mutual benefits to military and commercial objectives, Calhoun included navigable rivers in the broad scope of his program. He recognized the desirability of developing a chain of canals along the Atlantic seaboard, but he also perceived that no state or group of states would have sufficient interest in such a canal to complete it.[4] In this astute projection, he anticipated a political problem that later would impede the development of an intracoastal waterway along the Gulf Coast.

Certain features of Calhoun's proposal formed the basis for federal policy contained in the General Survey Act of 1824. This legislation formalized the use of Army Engineers in civil projects meriting national support. Thus began the continuous association between the Corps of Engineers and the waterways, leading to the Army Engineers? historic responsibility to maintain the navigable waters of the United States. President James Monroe appointed a Board of Engineers for Internal Improvements to administer the act. Essentially, the General Survey Act represented the first step in a prolonged struggle to fashion a national policy for waterway development.[5]

The more heavily populated East Coast presented the greatest demand for immediate canal improvements, but men of vision pursued their grandiose schemes to create avenues of transportation reaching far across the country. Some entertained dreams of a canal that would tie the Atlantic Ocean to the Gulf of Mexico, eliminating the need for vessels to navigate the cumbersome and often dangerous course around the Florida peninsula. Two years after enactment of the General Survey Act, the President called for an examination to determine the most eligible route for such a canal. The Army Engineers responsible for this assignment pointed out the formidable difficulties and expense involved in a trans-Florida canal, but they viewed more favorably the possibilities for a protected passage to permit inland navigation along the Gulf Coast between St. Marks, Florida and Lake

Pontchartrain, Louisiana.[6] This last optimistic projection laid the groundwork for the eventual creation of the canal we know today as the Gulf Intracoastal Waterway (GIWW).

POLITICAL PROCRASTINATION AND RAILWAY COMPETITION

Even though in 1829 the Engineer officers described much of the route actually followed by the eastern portion of the future GIWW, almost a century would elapse before Congress authorized its construction. For many years, the intracoastal waterway from Florida to the Mississippi River existed in conceptual form only while Congress dealt with more urgent domestic and military concerns. When the Civil War ended, the Corps of Engineers decentralized, establishing regional "Engineer Offices" from which the Army officers, assisted by government-employed civilian engineers, initiated a far-flung program of local river and harbor improvements. After an ambitious beginning, the fact became painfully clear that even the vast resources of the federal government could be spread too thinly. Political pressures eventually resulted in more selective appropriations, concentrating larger sums on fewer projects.[7]

No clear-cut federal policy dictated development of a national system of navigable waterways--or, for that matter, of transportation in general. The bitter rivalry that arose between the railroads and the waterway users further complicated the problem. Railroad growth accelerated at an enormous rate between 1850 and 1910. Workers laid more miles (70,335) of track between 1880 and 1890 than during any other decade in the nation's history.[8]

Seeking to entice commerce away from the waterways, the railroads successfully adopted various techniques to drive competing water carriers out of business. Rate-cutting practices became prevalent soon after the Civil War. In locations where water transportation was available, the railroads would reduce their freight rates to artificially low levels, even hauling water-competitive commerce at a loss if necessary. Another technique they employed was to purchase competing water lines and then discourage their use by raising the water rates. By gaining control of waterfront facilities, the railroads hampered freight delivery to and from water carriers. Also, they often refused to transship goods that might be moved in combination by rail and water.[9]

The competitive practices of the railroads worked to the detriment of the waterway operators, causing a marked decline in river and canal transportation toward the end of the nineteenth century. The economic advantage of water transportation resided in the movement of low-grade, heavy and bulky staples such as lumber, cotton, and coal, for which low freight rates were more important than speed of delivery.[10] By offering equally low or lower rates for these commodities, the railroads undermined the ability of the water carriers to compete and brought ruin to many boat lines. As commerce abandoned the waterways for the railroads, many channels fell into disrepair and were not maintained by the private companies for which they had ceased to be profitable.

INLAND WATERWAYS GRADUALLY GAIN SUPPORT

Interest in the waterways revived late in the 1800s, as the people of the Mississippi Valley complained the railroads did not have sufficient capability to meet their needs. Because the Interstate Commerce Act passed in 1887 had failed to curb effectively the discriminatory practices of the railroads, railroad regulation remained a compelling issue. Renewed interest in waterway transportation assumed the form of demand for river and canal improvements to be financed with public funds. Frustrated commercial interests banded together, formed numerous organizations and associations, and petitioned for a comprehensive plan to improve and control the national river systems.[11]

A champion for the waterways emerged. According to one, not disinterested, contemporary, "Theodore Roosevelt was as a Moses leading the people from an 'oppressed and degraded state of commerce? in which they found themselves beleaguered, as did their forebears a century and a quarter before."[12] During the first decade of the new century, President Roosevelt vigorously addressed the issue of national transportation. His leadership and efforts on behalf of the waterways bore fruit. In 1909, Congress authorized sweeping surveys for a host of waterways improvements including a system of connected intracoastal waterways stretching from Boston to Brownsville.[13] Finally, Congress had bestowed official recognition upon the concept of a national system of inland waterways; however, this acknowledgment was not tantamount to actual adoption of the desired project. More years, more money, more effort, and more people would be required to achieve a continuous navigable passageway along the shores of the Gulf coast .

The most successful and enduring effort came from an unexpected quarter. In 1905, a group of businessmen in Victoria, Texas had organized the Interstate Inland Waterway League, pledged to the goal of a continuous system that would tie together the 18,000 miles of navigable waters extending from the Great Lakes, through the Mississippi Valley, and along the Louisiana and Texas coastlines. This league clamored for a channel to match navigational features on the Mississippi and Ohio river systems. In 1912, supporters of the project claimed that coal from the mining regions of Pennsylvania could be brought by water to Texas at half the price being paid for the fuel in Texas and Louisiana, saving $2 million annually on coal shipments alone.[14]

The league later changed its name to the "lntracoastal Canal Association of Louisiana and Texas" and, finally, to the "Gulf Intracoastal Canal Association" as it is known today. No history of the GIWW would be complete without presenting the crucial role played by the canal association. From camping on the doorstep of the nation's Capitol to prodding sluggish county governments, encouraging the donation of necessary rights-of-way and the rebuilding of bridges, this organization has served as the leading proponent of the

GIWW.[15] To the present day, this unique association remains exclusively identified with the waterway. Without the association, there might never have been a canal.

Two pieces of legislation probably represent the canal association's greatest triumph. The Rivers and Harbors Act in 1925 authorized for the first time a continuous Louisiana-Texas waterway from New Orleans to Galveston. Two years later, Congress authorized extension of this canal west to Corpus Christi. The Louisiana-Texas Intracoastal Waterway proved an immediate success. Eventual extension of the association's scope to include the entire Gulf Coast became inevitable as eastern interests sought support to develop the portion of the canal between the Mississippi River and Florida. The association's unyielding efforts further supported passage of legislation in 1942 authorizing an enlarged channel extending from Florida west to the vicinity of the Mexican border.[16]

TO PROMOTE THE NATIONAL DEFENSE

The impact of war has facilitated transformation of the Gulf Intracoastal Waterway from concept to reality. During periods when the nation was engaged in military conflicts, movement of personnel, troops, and defense materials increased greatly. Heavy transportation demands imposed by wartime conditions served to emphasize the urgent heed for protected inland transportation and called attention to existing inadequacies. The correspondence between major military encounters and subsequent transportation-related legislation must be noted: the General Survey Act followed the War of 1812; extensive railroad surveys followed the war with Mexico; a rash of river and harbor improvements followed the Civil War; the progressive policies of the Roosevelt era, culminating in the surveys of 1909, followed the Spanish-American War; authorization for the intracoastal canal in Louisiana and Texas followed World War I; and authorization to enlarge and complete an intracoastal waterway from Apalachee Bay, Florida to Brownsville, Texas followed the outbreak of World War II.

During World War II, the presence of German submarines in the waters skirting the eastern and Gulf shores of the United States demonstrated most dramatically the extreme vulnerability of coastwise traffic. The enemy vessels sunk more than two dozen merchant ships in the Gulf of Mexico, severely disrupting commerce. Towboats, tugs, and barges, pressed into service on the protected inland waterways, moved tremendous quantities of strategic commodities essential to wartime production.[17]

Heavy movement of petroleum products, more than 1 million barrels a day, began early in 1943 and continued throughout the war. The barges coordinated with pipelines, tank cars, and tank trucks to deliver a total of 1,731,030,485 barrels of petroleum and petroleum products during the war. Assessing the contribution of the inland waterways to the war effort, the Office of Defense Transportation said, "If our waterways rendered no service beyond that of transporting petroleum and its products during the war, they would have amply justified their improved existence.

Vital war-related industries located production facilities along the GIWW and its tributaries. This waterside industrial development offered innumerable benefits to the adjacent communities. The experience of Houston provides an outstanding case in point. The spectacular rise of the petrochemical industry along the banks of the Houston Ship Channel not only supported the war effort but also contributed significantly to that city's tremendous postwar boom. The advantages of low-cost barge service for bulk-loading commodities attracted many manufacturers to the Gulf Coast ares, enabling them to move large quantities of raw materials from one stage of production to the next along the intracoastal canal.

The Gulf Intracoastal Waterway is sometimes referred to as the 1,000-mile miracle. Although its creation may not have been truly miraculous, it certainly was prolonged and laborious, involving an enormous region and a multitude of scattered communities. Development of the waterway progressed in a fragmentary, piecemeal fashion, subject to the political forces of the times and the whims of Congress. This pattern of segmented growth does not lend itself to presentation as a single, continuous story, dictating instead organization by geographical units. Therefore, chapters in this history correspond to the major segments of the inland canal along the Gulf and to the respective Army Engineer installations responsible for them.

Today, chemical plants, glass plants, paper mills, oil refineries, steel-fabricating plants, power plants, shipyards, grain elevators, and fertilizer and synthetic rubber plants are among the industrial facilities lining the waterway. Picturesque fishing vessels, sleek pleasure boats, and graceful sailboats dot the channel, joining the bustling stream of barge traffic. Perhaps J. F. Ellison, secretary of the National Rivers and Harbors Congress, entertained such a vision seventy years ago when he wrote:

> The New South, not the old, self-satisfied South of pleasant memories and tender recollections, that lay ever half asleep basking in her own sunshine, content to raise the cotton supply of the world and to allow her wonderful natural resources of mine and forest to remain undisturbed, but the New South, awakening as a young giant, strong and vibrant, throwing off the fetters of commercial indifference, is at last . . . being aroused, to the fact that the beneficent hand of the Creator has given to her more natural advantages than He has vouchsafed to any other part of this great Union.[19]

Chapter II

MISSISSIPPI RIVER TO WESTERN FLORIDA

SLUGGISH BEGINNINGS

The first portion of the present Gulf Intracoastal Waterway to receive the attention of the federal government lay east of the Mississippi River. Almost twenty years before Florida and Texas were admitted to the Union, legislation of March 3, 1826 authorized a survey of a canal route between the Atlantic Ocean and the Gulf of Mexico. In 1829, Brigadier General Simon Bernard, a member of the Board of Internal Improvements, and Army Engineer Captain William Tell Poussin, functioning as an assistant to the board, reported their survey findings. After discussing in detail possible canal routes across the Florida peninsula, they cast an eye to the matter of inland coastal navigation from St. Marks to Lake Pontchartrain, which, they stated, could be "rendered secure, safe, and commodious"[1] by means of certain improvements:

> lst. A canal along Crooked creek, from Ocklockony river to a convenient point in St. George's sound; through this sound and the canal the Appalachicola will become connected with St. Mark. Secondly. The clearing and deepening of the Santa Rosa sound, at the meeting of tides. Thirdly. A canal from the Bay of Pensacola to that of Mobile, through the Great Lagoon and the river Bon Secour. Fourthly. The deepening of the Pass au Heron, between the eastern point of Dauphin island and the main.
>
> Lake Pontchartrain can be connected with the Mississippi by a canal, which has been projected, at or near New Orleans, and by Bayou Manchac.[2]

Their proposed improvements set forth the first suggested route for an intracoastal waterway from western Florida to New Orleans, but Congress appropriated no funds for such a projects

A lone appropriation in 1828 provided for one local improvement in the future waterway. Lake Pontchartrain, Lake Borgne, and Mississippi Sound afforded protected passage to vessels traveling between New Orleans and Mobile Bay; however, at Pass au Heron, the natural controlling depth was about 3 feet over the shoal between Mobile Bay and Mississippi Sound. This forced ships navigating the inland route into the open Gulf at Dauphin Island, with increased risk of danger from the elements and corresponding increased rates of insurance. On May 23, 1828, Congress appropriated $18,000 to deepen the channel through Pass au Heron. Available records indiicate this construction was conducted between 1828 and 1832, when a severe southwest storm destroyed the work already accomplished and the effort was discontinued.[4]

After the United States abandoned the Pass au Heron project, John Grant sought a monopoly on the pass. In 1838, he obtained a charter from the state of Alabama authorizing possession of as much of the shell reef as necessary to construct a channel and granting him the power to collect tolls at a rate of fifteen cents per registered ton to defray the cost of the work. By the fall of 1839, he had expended $100,000 and had completed a channel about 1,300 feet north of Pass au Heron, adequate for vessels drawing 6 feet. A $25,000 congressional appropriation on August 30, 1852 for a harbor on Lake Pontchartrain near the city of New Orleans resulted in construction of a wooden breakwater that further benefited vessels traversing the entire route from Mobile to New Orleans.[5] Called "Grants Pass," the dredged channel north of Pass au Heron was later deepened to 8.5 feet and maintained at that depth by periodic dredging until 1869. Considerable traffic plied the inland route between New Orleans, the Mississippi coastal communities, and Mobile, making Grant's venture a profitable one until rail competition entered the picture. Revenue from tolls reached as much as $23,000 the year before completion of a railroad connecting New Orleans and Mobile. Vessel cargoes consisted primarily of timber, lumber, cotton, naval stores, and sundry merchandise.[6]

The improvement authorized for Pass au Heron in 1828 appears to represent the only appropriation for construction of an intracoastal waterway between Florida and the Mississippi River during the nineteenth century. The meager funding for this potentially vital waterway does not reflect a lack of interest in its development, however. On the contrary, the passing years saw a continuing interest in an intracoastal canal manifested sporadically with several surveys being conducted.

In 1830, Engineer Captain William Chase surveyed all the channels and islands between Mobile and New Orleans, charting the best route for navigation between the two points and marking sites for needed lighthouses and buoys.[7] Two years later, a congressional act identified two reaches of the coastline to the east to be surveyed for “practicability and cost of canals" to connect the designated bays and rivers. The segments of coastline selected for this study lay between “the waters of St. Andrew’s bay and the river and bay of Chattahoochie [sic], and between Pensacola bay and Bon Secour" just east of Mobile Bay.[9] Army officers, led by Lieutenant William G. Williams, conducted the survey and reported in 1833 on opening navigation between Mobile Bay and Pensacola Bay to boats drawing 7.5 feet. They recommended a route up Bon Secour Bay and River, eastward by a cut to Bear Creek, on throgh Bay La Lanche into Perdido Bay from which, by a cut, it would proceed either into the Great Lagoon or into Bayou Grande, an arm of Pensacola Bay. They estimated a cost of $1 million for the route into Great Lagoon and $2 million for that into Bayou Grande.[10] Sparse political backing for the canal in these coastal areas resulted again in no funding from Congress.

Federal interest in the inland waterway along the Gulf Coast lay dormant for another forty-two years, during which the growing nation concentrated its energies in other directions: pushing back frontiers, laying out roads and railroads, fighting a disruptive Civil War, and subduing the native American Indians as they struggled to preserve their threatened lifestyles. The proposed waterway demanded fresh attention in the decade of the 1870s along with renewed interest in many civil. works.

By 1873, the citizens of Savannah, Georgia aspired to secure a share of the thriving Mississippi River commerce. The mayor and the Savannah Chamber of Commerce requested a review of the proposed project for an intracoastal waterway connecting New Orleans with Savannah. Captains Charles W. Howell and Andrew N. Damrell, stationed at the United States Engineer Offices in New Orleans and Mobile, respectively, received instructions to provide the information sought by the Savannah citizenry. Looking at the reach between the Mississippi River and the Apalachicola River, these officers determined a 9-foot-deep channel would be required to accommodate "first-class grain-barges" that measured 40 feet in beam, 220 feet in length, and could carry 1,500 tons of bulk corn or a total of 55,000 bushels. Damrell calculated the cost of construction for improvement between Mobile and Apalachicola at $7 million. Both officers considered such an inland route (9 by 100 feet) feasible from an engineering standpoint but agreed that its financial prospects were dismal. Howell declared it "preposterous to think Savannah could draw . . . . any portion of the Mississippi commerce, either export or import." He did, however, recognize potential military justification for an inland waterway continuing across the Florida peninsula, stating, 'In time of war, supposing the Gulf ports blockaded by a hostile fleet and Savannah not, this inland-water route would be invaluable.?"[11]

Still, the concept of safe, land-locked navigation between the Mississippi River and the Atlantic Coast persisted, giving rise to authorization in 1875 for the most comprehensive survey of this stretch to date.[12] To encompass a canal across Florida and an inland route along the Gulf coasts of Florida, Alabama, and Louisiana to the Mississippi River, the survey met the same fate as did so many other attempts for waterway improvement--lack of funds.

On April 3, 1876, Chief of Engineers Brigadier General Andrew A. Humphreys informed Secretary of War Alphonso Taft that the appropriations were not sufficient to perform the required examinations and surveys. As a substitute, he submitted extracts of the reports from the prior surveys authorized in 1826 and 1852 as well as the reports from Captains Howell and Damrell made in 1873. He also referred to the two possible routes for moving the Mississippi River grain trade to the Atlantic; these had been pointed out by the Senate Committee on Transportation-Routes to the Seaboard in April, 1874. One route, essentially inland, retraced earlier schemes to run along the coastline through Lake Pontchartrain *or* Lake Borgne and continue by means of short canals and land-locked bodies of water to the

Florida coast and by canal to the Atlantic. The other route ran an exterior line, along which steamers and their tows passing out of the mouths of the Mississippi might travel along the shores to a western terminus of a Florida canal at either the mouth of the Suwannee River or the Withlacoochee River or at Tampa Bay. For opening a channel near New Orleans, Humphreys considered the most economical route to originate at a point about 12 miles below the city, with a lock required at the connection with the Mississippi River.[13]

Most of' the remaining work necessary to establish a 'continuous line of bay, river, and canal navigation" between the Mississippi and Apalachicola lay within the eastern two-thirds of the 300-mile route, between Grants Pass and the Apalachicola River. For the inland route between Mobile Bay and Pensacola Bay, Humphreys referred to the examination made in 1833 with two possible courses at the Pensacola Bay end. Continuing eastward from Pensacola, he proposed following Santa Rosa Sound, Choctawhatchee Bay and River, St. Andrew Bay into Wetappo Creek, and then proceeding either by canal into Dead Lake and the Apalachicola River about 30 miles from its mouth, or through Searcy River and Lake Wimico to near the mouth of this river, about 5 miles from Apalachicola. Humphreys estimated that 21 miles of this 200-mile stretch would have to be cut through a "comparatively flat, sandy country" and another 35 miles would require widening and deepening to afford a 9-foot channel.[14] He concluded his report on "Water-Communication Between the Mississippi River and Atlantic Ocean, Across the Peninsula of Florida" by stating, "Should Congress see fit to require a full investigation," a minimum of $20,000 would have to be appropriated.[15] Congress did not "see fit" at that time and, for all practical purposes, any further progress toward accomplishing an inland waterway east of the Mississippi was shelved by the federal government for the remainder of the nineteenth century.

A FRESH START

The first decade of the twentieth century heralded a new dawn for inland waterway development in the country. Disappointed with the lack of progress on the inland transportation system, President Roosevelt began calling for more dynamic federal action. In 1904, he directed congressional attention to the problems of inadequate railroad regulation.[16] Responding to the demands of the people in the Mississippi Valley, he appointed the Inland Waterways Commission in the spring of 1907. Roosevelt viewed development of a complementary system of water transportation as the "remedy" for the railmads' inability 'to keep transportation abreast of production." He charged the commission to conduct a broad study, considering rivers as "natural resources of the first rank" and concerning itself with all aspects of the waterways: navigation, flooding, protection of bottomlands, water purification and pollution, and construction of locks and dams.[17]

The fall of 1907 witnessed an unprecedented crop of conventions and support for waterway improvements. W. J. McGee, secretary to the Inland Waterways Commissioner, suggested that sentiments reminiscent

of those expressed a century earlier were not purely coincidental: “We are in the throes of our second waterway agitation . . . . The first agitation followed hard on the Revolution." He paid tribute to the viability of the intracoastal concept when he said, “It would seem easy to return to and perfect Gallatin's great waterway system” to afford barge passage “from Benton to Boston or to Brownsville."[18]

On February 26, 1908, exactly 100 years after Gallatin presented his historic report, President Roosevelt transmitted the preliminary report of the Inland Waterways Commission to Congress. Underlying the report was the basic premise that "every waterway should be made to serve the people as largely and in as many different ways as possible."[19] The commissioners addressed the nation's water resources in their fullest sense, recommending plans to improve navigation but at the same time taking into account purification, power development, flood control, land reclamation by irrigation and drainage, and other benefits that might stem from such control.[20] The report contained recommendations but no specific plan per se. Roosevelt laid before Congress the need for, first, "a definite and progressive policy" and, second, "a concrete general plan."[21]

The surveys authorized in the landmark Rivers and Harbors Act of March 3, 1909 included study for "a continuous waterway, inland where practicable," along the Gulf from St. George Sound in Florida to the Mississippi River at New Orleans. The Army Engineers charged with this assignment were instructed to ascertain costs for a channel with a maximum depth of 9 feet or less where shallower drafts would suffice. The designated route incorporated St. George Sound, St. Andrew Bay near Panama City, Choctawhatchee Bay, Pensacola Bay, Perdido Bay, Mobile Bay, Mississippi Sound, Lake Borgne, and Lake Pontchartrain.[22]

The work in the northwestern Florida portion of the survey included some of the most hazardous features of the entire undertaking. The Engineer employees encountered swampy terrain inhabited by wild turkeys, bears, panthers, alligators, and poisonous reptiles and infested with mosquitoes and deer flies. To conduct the distasteful task of exploring this unpleasant region, each surveyman counted among his essential accoutrements rubber boots, snake bite kits, and side arms.[23]

The following year, the Rivers and Harbors Act of June 25, 1910 made the gesture that transformed the future Florida-to-Mississippi River waterway from a figment of the imagination into a credible project. So long in coming, two appropriations breathed life into the eastern Gulf waterway. Congress appropriated $100,000 to improve the channel from Apalachicola River to St. Andrew Bay and specified a second appropriation of $24,000 to improve Santa Rosa Sound so as to afford a continuous channel from Choctawhatchee Bay to Pensacola.

Apalachicola to St. Andrew Bay

Little had changed geographically between Apalachicola and St. Andrew Bay since Lieutenant William G. Williams surveyed this stretch in 1833. The route favored by the Engineers in 1909 ran from Wetappo

Creek via Searcy Creek and Lake Wimico to the Apalachicola River, about 5 miles above its mouth. Commercial conditions on the adjacent river system, however, had changed drastically since Williams's survey and even since the turn of the century. The commercial significance of this stretch of inland waterway derived largely from its proximity to the 470-mile navigable system composed of the Flint, Chattahoochee, Chipola, and Apalachicola rivers. Between 1898 and 1908, the value of commerce hauled on these rivers rose from $1.5 million to $12 million. Commodities transported included cotton, cotton seed, cotton-seed meal, fertilizers, lumber, grain, brick, shingles, staves, turpentine, resin, molasses, and provisions. By 1909, users of the Apalachicola River system were crying for a deep-water harbor to realize the fullest potential of its economy. A deep-water outlet was crucial for cotton growers along the river to compete with planters using already deepened cotton ports along the Gulf Coast.[24]

The three candidates for deep-water development were the ports of Apalachicola, Port St. Joe, and Panama City. Apalachicola was eliminated because of the large amounts of silt carried down the river and deposited in Apalachicola Bay. St. Joseph Bay was thought to be more exposed to the Gulf than St. Andrew Bay and the low, marshy coastal region north of Port St. Joe was considered a deterrent to establishing rail connections from the port to the interior. Panama "City had relatively high ground toward the interior, making it more accessible. Thus, the Army Engineers selected Panama City for deep-water port development, enhancing the commercial potential of this eastern stretch of the future GIWW.[25] The advantages of these improvements indeed appeared so evident to Captain (later Brigadier General) Harley B. Ferguson that this future president of the Mississippi River Commission concluded his survey recommendation with the statement:

> With this short canal and the opening of St. Andrews Bay you will have the engineering problem of a harbor without silt, and a commercial problem with freight assured and the rate thereon regulated by 470 miles of navigable rivers following the natural line of traffic from a rich territory.[26]

Since the Apalachicola River system supported transportation of commercial vessels with drafts ranging from 2 to 4 feet, channel dimensions of 5 feet deep and 65 feet wide were deemed sufficient for the inland route between Apalachicola and St. Andrew Bay. The channel was constructed to these authorized dimensions between 1911 and 1915. Congress authorized dimensions of 9 by 100 feet in 1935 and the Army Engineers completed this enlargement in 1937.[27]

Choctawhatchee Bay to Pensacola Bay

The second stretch of the inland waterway along the Gulf provided for in 1910 ran from Choctawhatchee Bay westward to Pensacola Bay. These two bays are connected by a 35-mile-long natural waterway, Santa Rosa Sound, which is protected from the Gulf by a long, narrow sand island . The commerce of this area, consisting mainly of cattle, wool, wood, sheep, and cotton, originated along the Choctawhatchee River, by which it entered the eastern end of Choctawhatchee Bay and was shipped

on shallow-draft schooners and barge tows through Santa Rosa Sound to the ocean port at Pensacola. Numerous large lumbering industries bordering Choctawhatchee Bay also supplied a major part of Pensacola's export trade. Shoals, known as "the Narrows," at the eastern end of Santa Rosa Sound hampered navigation, however. Thus, the congressional appropriation in this reach provided for a channel 6 feet deep to be dredged across the Narrows. Within a year after completion of this improvement in 1912, the 85,132 short tons (naval stores, lumber, hay, feed, and general merchandise) transported on this route reflected an increase of 34,200 tons.[28] Army Engineers enlarged the channel to dimensions of 9 by 100 feet in 1937.

Mobile Bay to Mississippi Sound

In 1912, with work underway on the first two (noncontiguous) reaches of the inland waterway, Congress skipped some distance westward and redirected its attention to Grants Pass, just west of Mobile Bay. After the Civil War, as railway transport gained supremacy, Grants Pass had been neglected and the channel had deteriorated. Rather than pay tolls to navigate the undependable channel, many vessel operators preferred the "outside" route through the open waters of the Gulf even though it was longer, more hazardous, and more costly.[29] In 1882, great increases in timber, lumber, and coal exports and improvements in Mobile Harbor gave fresh impetus to coastwise trade, leading to a preliminary examination of this shoal by the Army Engineers. The number of vessels using Grants Pass that year increased to 486 and revenues from tolls reached $4,500. Major Damrell considered channel enlargement "an absolute necessity."[30] He submitted another favorable survey report in 1894, recommending improvement at either Grants Pass or Pass au Heron, depending upon the price that would have to be paid for Grants Pass.[31]

By the first decade of the twentieth century, the growth of Mobile as a commercial deep-water port and the growing traffic (63,929 tons in 1906 with lumber as the principal commodity) between Mobile and the ports on Mississippi Sound and New Orleans prompted Congress to appropriate $50,000 to construct a channel connecting Mobile Bay and Mississippi Sound. The Rivers and Harbors Act dated July 25, 1912 provided for a 10-by-100-foot channel through Pass au Heron, completed in 1914.[2]

World War I interrupted the revived thrust for national waterways by diverting appropriations from navigation improvements to pressing military expenditures. By the war's end, the eastern portion of the yet-to-be Gulf Intracoastal Waterway consisted of several segments of improved channel interspersed with stretches that had not been improved. Moving westward from Apalachicola to Panama City on St. Andrew Bay lay the first improved stretch. From the West Bay of St. Andrew Bay to Choctawhatchee Bay, no improvements had been made, forcing traffic between the two bays out into the open Gulf. The stretch from Choctawhatchee Bay to Pensacola Bay was navigable with the improvements in Santa Rosa Sound. From Pensacola to Mobile Bay,

no improvements had been made. The final stretch from Mobile Bay to the Mississippi River reflected improvements at either end that afforded continuous navigation between its two termini.

Federal interest in the eastern leg of the Gulf waterway picked up again in the 1920s. The Rivers and Harbors Act of 1925 authorized new preliminary examinations and surveys for an inland waterway from New Orleans to the Apalachicola River including the Apalachicola and Chattahoochee rivers to Columbus, Georgia, "with a view to securing a depth suitable to the economical operation of self-propelled barges." The same act also identified the stretch between Pensacola and Mobile bays for closer examination.[33]

Pensacola Bay to Mobile Bay

When the Army Engineers examined the stretch between Pensacola and Mobile bays as part of the comprehensive survey authorized in 1909, they found low country with a number of disconnected natural waterways and no through navigable route. At that time, the principal argument cited to justify improving this reach was the potential shipment of coal in barges drawing 6 feet of water from the Birmingham mines via the Warrior River system and the proposed canal to Pensacola Bay. Such coal transport was expected to benefit government installations and private consumers in the Pensacola vicinity. This argument could not compensate, however, for the fact that both Mobile and Pensacola had already established ocean trade, the coal traffic on the Warrior River system had not yet developed; the Board of Engineers for Rivers and Harbors viewed prospects for commerce through this stretch as not sufficiently encouraging to warrant improvement.[34]

By 1929, the commercial justification for improving the stretch between Pensacola and Mobile remained questionable, but a new rationale had been introduced. The report of the survey authorized in 1925 indicated that two commercial routes connected Pensacola (population 38,000) and Mobile (population 100, 000): a 103-mile rail route serviced by the Louisville & Nashville Railroad and a 95-mile "outside" water route plied by the Pensacola, St. Andrews & Gulf Steamship Co. vessel Tarpon. This 281-net-ton steamer, operating on a weekly schedule between Mobile, Pensacola, Panama City, Apalachicola, and Carrabelle, carried 430 passengers and not quite 12,000 short tons of freight during the year 1925. About 77 percent of this commerce was handled between Mobile and Pensacola. The Gulf Division Engineer estimated the proposed canal between Pensacola and Mobile would probably not carry commerce exceeding 75,000 tons annually and predicted that about 90 percent of that would probably move eastward. Concluding that the project was still not economically justified, he did, however, point out that excavation of a mere 16 miles of canal in this stretch would open a continuous waterway westward to Louisiana and Texas and eastward to the eastern end of Choctawhatchee Bay.[35]

Advised of the tenor of the Division Engineer's report, interested parties provided additional information at a public hearing held by the Board of Engineers for Rivers and Harbors. The commercial traffic

projected for the proposed Pensacola-Mobile inland waterway was revised to 197,000 tons with annual savings in transportation costs amounting to $130,000. The principal commodities included grain, coal, sand and gravel, resin, lumber, gasoline, iron, steel, and fertilizers. The Board of Engineers further noted the economic impact of the recent entrance of the Frisco Railroad into Pensacola and anticipated that, in view of the size and importance of the ports of Pensacola and Mobile and the existing waterway connections to the east and west, sufficient traffic would develop to justify constructing the canal. The proposed canal would also furnish a connecting link between two other extensive waterway systems: to the east, the Escambia and Backwater rivers, the Narrows, Choctawhatchee Bay, and the Holmes and Choctawhatchee rivers, and, to the west, the Alabama, Tombigbee, and Black Warrior rivers. Added to the potential commercial benefits were those that would result from recreational use by pleasure craft owners. But despite all these tentative justifications, one simple sentence seems to be the clincher in the board's resolve to construct the canal: "A waterway between pensacola Bay and Mobile Bay is a logical improvement in the development of the inland waterway system along the Gulf coast." By 1929, the mood of the country and the Congress was receptive to this kind of logic and the Rivers and Harbors Act of July 3, 1930 authorized $600,000 for a 9-by-100-foot channel.[36]

The channel between Pensacola Bay and Mobile Bay was completed early in 1934 at a cost of $443,000, rather than the $600,000 appropriated. The route followed Big Lagoon, Old River, Perdido Bay, Bay La Lanche, Wolf Bay, Portage Creek, Bon Secour River, and Bon Secour Bay. Besides improving these natural waterways, the project involved two land cuts amounting to about 7 miles in length. In 1939, repairs were made to an existing jetty at the south side of the canal entrance into Pensacola Bay to protect the channel against the strong tidal currents and thereby avoid excessive maintenance costs. The projected tonnage of 197,000 did not materialize until three years after completion of the canal. Commerce increased rapidly, however, during the prewar years, reaching 632,587 tons in 1941. World War II accounted for particularly heavy traffic, totaling 4,093,595 tons (more than twenty times the projected tonnage) in 1944. By the late 1940s, petroleum products represented the major commodity transported by barges on this waterway.[37]

Mobile Bay to New Orleans

Besides providing for the Pensacola-to-Mobile canal construction, the 1930 Rivers and Harbors Act also authorized two improvements in the adjacent western stretch between Mobile Bay and New Orleans. By 1929, a total of 514,707 tons moved through the Pass au Heron channel connecting Mobile Bay and Mississippi Sound.[38] Barges (some as large as 280 by 49 feet) of the Mississippi-Warrior Service and the International Cement Corporation carried a large portion of this commerce. Grounding and collisions of these vessels occurred frequently within the restricted confines of the 100-foot-wide channel.[39] Under the new appropriation, the channel was widened to 300 feet and straightened by the year 1933.

At the New Orleans end of the stretch, commerce required greater depths. The 1930 legislation replaced earlier projects (1852, 1910, and 1917) for the Lake Pontchartrain Channel. Completed in 1933, the new project from Lake Pontchartrain to Mississippi Sound provided for a 9-by-100-foot channel from the 9-foot contour in Lake Pontchartrain (near the end of the state-owned Inner Harbor Navigation Canal leading to the Mississippi River) to the 9-foot contour in Grand Island Pass, connecting Lake Borgne with Mississippi Sound. Thus, the completion of the Pensacola-Mobile stretch in 1934 afforded a continuous channel with 9-foot depths extending from New Orleans to Pensacola.[40]

Finally, the Rivers and Harbors Act of August 30, 1935 cleared the way for a continuous 347-mile thoroughfare for protected navigation between Apalachicola and New Orleans. This eastern segment of the inland waterway would link points between these two termini with such tributaries as the Tombigbee-Black Warrior River system, the Mississippi River system, and the Louisiana and Texas Intracoastal Waterway, opened the preceding year as far west as Galveston. Specifically, the act provided for enlargement of the two previously improved reaches from Apalachicola River to St. Andrew Bay and from Choctawhatchee Bay to Pensacola Bay, resulting in minimum channel dimensions of 9 by 100 feet, accomplished in 1937. The third project adopted in 1935 called for construction of the last "holdout"--the to-date untouched reach from the West Bay arm of St. Andrew Bay to Choctawhatchee Bay.

West Bay to Choctawhatchee Bay

First authorized in 1935, the project for the reach between West Bay and Choctawhatchee Bay proved to be the most troublesome. Extending about 26 west miles from the 10-foot contour in West Bay to the same depth roughly 3 miles out in Choctawhatchee Bay, the canal cut through territory composed of almost pure sand. The land cut began about 7 miles west of the starting point as the channel left West Bay Creek and ran a northwestward inland course. At 15 miles west of the starting point, the ground elevation had risen from 10 feet below sea level to a height of 40 feet above mean low tide, at which peak it continued for another 4 miles" before gradually descending to the 10-foot depth in Choctawhatchee Bay.[41] In other words, for a distance of 4 miles, the sandy banks of the canal loomed 50 feet above the bottom of the 10-foot channel. This section became known in local parlance as the "little Grand Canyon."

Construction of the channel went smoothly at both ends of the reach; private hydraulic pipeline dredges operating under Army Engineer contracts rapidly completed the sections in West Bay, West Bay Creek, and Choctawhatchee Bay. The dredge Duplex, belonging to the Sternberg Dredging Company of St. Louis, worked westward from West Bay and two dredges belonging to the Shell Producers Company of Tampa, the Punta Gorda and the Tennessee, worked eastward from Choctawhatchee Bay. As the dredges moved toward each other into the higher ground, the character of the soil combined with the high bank elevations created a dangerous and time-consuming problem. The sand, rather than sloping off uniformly, would stand in an almost vertical position and then suddenly cave in. This necessitated removing sand from the

ladder and forward part of the dredge's hull as well as backtracking the dredge to a point where the ladder could again be lowered in water.[42]

Fortunately, a simple procedure solved the problem. When the dredges had advanced far enough into the land cut for the banks to be sufficiently high to function as reservoir walls, the contractors constructed a dam of earth across the channel. The dams and high banks acted as a lock chamber, confining all water discharged by the dredges, seepage water, and water from natural drains to raise the dredges to an elevation at which caving sand no longer posed a serious threat. The desired water level was obtained originally by pumping water from the channel behind the dams into the pools. These artificial reservoirs also served to facilitate handling and connecting pipeline to the shore as well as to prevent a considerable amount of bank erosion that would normally be caused by the water discharged from the dredge.[43]

The initial cut was made by a small dredge with a short ladder, followed by a larger dredge to provide greater depth. After partially completing the cut, the contractors lowered the water level in the pool and repeated this process. When they had completed the cut, the contractors removed the dams, allowed the water to return to its natural level, and made their final clean-up cut.[44]

Despite the technical difficulties encountered, the Army Engineers in the Mobile District accomplished construction of this segment of the inland waterway, spending $303,394 less than the $1,770,000 appropriated. The commercial projections on which digging the canal was justified amounted to 535,000 tons per year, to consist of miscellaneous coastwise traffic of St. Andrew Bay, raw material for paper manufacture, and other commodities. These projections were exceeded in 1941, three years after the canal was opened to navigation, and increased rapidly to the peak war year of 1944, when commercial traffic totaled 3,578,792 tons.[45]

The opening of the West Bay-to-Choctawhatchee Bay reach on April 27, 1938 allowed uninterrupted passage along a Protected waterway with minimum dimensions of 9 by 100 feet between Apalachicola and New Orleans, connecting with many northern and western points beyond.[46] A natural, though shallow, protected connection through St. George Sound further extended the eastern terminus of the waterway to Carrabelle. This long-awaited inland waterway between Florida and the Mississippi River had been 110 years in the making since the first appropriation for its improvement.

AFTER THE FACT

The story does not end with the accomplishment of the 9-foot channel. Each waterway assumes its own character, fashioned by the impact of often unforeseen physical, social, political, and economic forces that impinge upon it and direct further changes in its development. Certainly this has been true of the Gulf Intracoastal Waterway.

Almost as soon as the "little Grand Canyon" section between West Bay and Choctawhatchee Bay was opened to navigation, bank erosion became a problem. The land cut crossed several natural drains that continued to discharge water into the newly cut channel after its completion. Because the flowline elevations of these streams were considerably higher than the water level in the channel, the canal banks eroded and caused excessive shoaling at their mouths. After experimenting with retaining levees (vertical cut-off walls made of steel sheet piling) located between the inlet control structures for the drains, Army Engineers in the Mobile District adopted a new design with levees composed of earth fill. Water collected in each upright intake structure ran through a corrugated metal pipe down to the canal level, where it could be discharged without damaging the banks. The Engineers completed this erosion protection system in May, 1941. Later, they planted grass on the levee slopes to stabilize the earthen fill. In 1944, while some of the structures were undergoing repair, unusually heavy rainfall exceeded the capacity of this system, resulting in destruction of three control structures, two breaks in the retaining levee, and a completely blocked channel. The Mobile Engineers returned to their drawing boards and modified the system to increase its discharge capacity. They completed their modifications early in 1946 and the system has functioned satisfactorily since that time.[47]

Port St. Joe had been bypassed when the intracoastal canal was dredged from Apalachicola to St. Andrew Bay. This segment of the waterway ran in-land to the north of Port St. Joe's fine natural harbor, which had been improved to a 27-foot depth. The Rivers and Harbors Act of August 26, 1937 called for preliminary examination and survey of a waterway to connect the deep water in St. Joseph Bay with the intracoastal canal. Between the time this study was authorized and the Army Engineers reported on it in 1939, local interests in Gulf County were attempting to revitalize their depressed economy. Industrial activity in this heavily timbered area consisted mainly of the manufacture of paper, naval stores, and other forest products. By October 1938, Gulf County had completed a 9-by-70-foot canal linking St. Joseph Bay with a point on the inland waterway 6 miles away. Bonds that were to be retired by revenue collected from toll charges financed the $200,000 cost of construction. In April, 1939, the Army Engineers recommended taking over the Gulf County Canal and enlarging it to the dimensions prevailing along the intracoastal waterway. Although the local interests had hoped to be reimbursed by the United States government, the Board of Engineers for Rivers and Harbors noted that the canal had been constructed primarily for local benefit and had effectively revived business activity at Port St. Joe, concluding that such reimbursement would set an undesirable precedent. The Gulf County Canal was incorporated into the federal waterway project free of cost to the federal government in 1943 and enlarged to a width of 100 feet.[48]

The question of how far east the intracoastal waterway should extend was addressed in a preliminary examination and survey from Apalachicola Bay southeast to Withlacoochee River authorized in 1935. The resultant legislation in 1937 provided for a 9-by-100-foot channel as far as St. Marks on Apalachee Bay. The project called for the

Apalachicola end of the reach to be dredged to a point in St. George Sound where natural. depths accommodated vessels through to Carrabelle; the eastern end of the authorized route involved an inland channel through Crooked River and Ochlockonee River and Bay. Dredging at the Apalachicola end was eventually accomplished, but at the Apalachee Bay end funding was revoked in 1939 after local interests failed to alter a Georgia, Florida & Alabama railroad bridge across the Ochlockonee River near McIntyre. In 1945, Congress assumed the responsibility for construction of a movable span so that the railroad's inability to alter this bridge would not postpone completion of the intracoastal waterway. By 1952, this railroad had been abandoned, the rail disposed of and the bridge removed along with the requirement for a new bridge.[49] Army Engineers restudied the project in the 1960s, and found an alternative route, continuing from Carrabelle through St. George Sound into Alligator Harbor and cutting across the land into Ochlockonee Bay, economically feasible but environmentally damaging. This modification was rejected in 1974.5° The original authorization still stands, but the channel between Carrabelle and St. Marks remains unimproved; vessels traveling eastward from Apalachicola exit St. George Sound through East Pass, between St. George Island and Dog Island, and continue through the open waters of the Gulf into Apalachee Bay and the channel to St. Marks.

At the outbreak of World War II, the waterway east of the Mississippi was complete to Carrabelle, Florida. The military value of this waterway was quickly recognized as enemy submarines entered the Gulf of Mexico and oceangoing tankers were diverted to overseas shipping lanes. Vital shipments of aviation gasoline to air bases and other military establishments, as well as oil to relieve the critical shortage in the Northeast, were hauled on the inland waterway. Pipelines were laid from Carrabelle to Jacksonville and from Port St. Joe to Chattanooga, Tennessee; gasoline from refineries on the GIWW in Texas and Louisiana was shipped by barge to these pipelines. At the Jacksonville terminus of the pipeline, this precious commodity was again loaded onto barges and shipped via the Atlantic Intracoastal Waterway to the New York-Philadelphia area.[51]

To accommodate the increased demands of wartime traffic, Congress passed legislation on July 23, 1942 authorizing enlargement of the inland canal from Apalachee Bay, Florida to Corpus Christi, Texas, with extension to Brownsville at the Mexican border and construction of the pipelines mentioned above. From the Mississippi River to Florida, Army Engineer and private dredges accomplished the new project dimensions of 12 feet in depth by 125 feet in width (150 feet through the open waters in Mississippi Sound) between December 22, 1942 and September 24, 1943. Tonnages carried on the canal during the war years far exceeded even the most optimistic projections used to justify construction of the waterway.[52]

During the peak war year, 1944, the channel between Apalachee Bay and New Orleans supported transport of 20,735,834 tons. Traffic dropped off considerably after the war (in 1949, this section of the waterway carried only 5,563,171 tons) but has built up steadily since that time to more than 27 million tons in 1969 and to 40,618,351 tons

in 1978. Ranging from slightly over 3 million tons along the sparsely developed reach between Apalachee Bay and Panama City to 22.6 million tons along the heavily industrialized reach between Mobile Bay and New Orleans, this traffic represented large shipments of gasoline, crude petroleum, fuel oils, coal, and lignite as well as a vast array of other commercial items. Except for large quantities of phosphate rock destined for manufacture into fertilizer, movement of most commodities tended to be predominantly eastbound, providing raw materials and vital sources of energy to the eastern section of the country.[53]

Chapter III

THE LOUISIANA AND TEXAS INTRACOASTAL WATERWAY

The Louisiana and Texas coastlines were not even considered in congressional planning for an inland canal tying together the Gulf and Atlantic waterways until almost the last quarter of the nineteenth century. Fifty years earlier, when the first appropriation was made to improve Pass au Heron, the Mexican flag flew over Texas. This state, with its vast expanses of land and enormous resources, was admitted to the Union in 1845. Louisiana had gained statehood in 1812 and enjoyed the tremendous geographic advantage of its location on the Mississippi River as well as the benefits of 4,000 miles of natural waterways. The fact that no survey was authorized for the intracoastal waterway west of the Mississippi River until 1873 is striking. Also striking is the fact that the first appropriation made for the western leg of the intracoastal waterway and, indeed, the only appropriation made during the century for a stretch of inland canal along the entire Gulf Coast was designated for Texas.[1] Ironically, the intracoastal waterway west of the Mississippi was conceived many years after its eastern counterpart but, once underway, moved somewhat more swiftly toward the accomplishment of a continuous waterway.

A LOOK TO THE WEST

The first step toward creation of the western inland waterway was taken when the Rivers and Harbors Act of March 3, 1873 provided an appropriation "not to exceed twenty thousand dollars" to conduct a survey "For connecting the inland waters along the margin of the Gulf of Mexico, from Donaldsonville, in Louisiana, to the Rio Grande river, in Texas, by cuts and canals." From his post in the United States Engineer Office at New Orleans, Captain Charles W. Howell delegated the field chores to three civilian engineers. The Louisiana segment was divided between J. A. Hayward, who began working westward from the Mississippi River on December 6, 1873, and H. C. Ripley, who in February of the following year began working eastward from Sabine Lake. The two survey parties met at a point midway between Vermilion Bay and White Lake, concluded their field work on June 6, and then returned to New Orleans to plot their work. Hayward and Ripley found their levels only differed by one-tenth of a foot, considered by Howell "gratifying evidence of the correctness of their work."[2]

The formidable task of surveying the entire Texas coast was assigned to Assistant Engineer James S. Polhemus. With a party of three men, he ran his transit line a distance of 50 miles from East Galveston Bay to Sabine Lake between January 23 and April 1, 1873. (Curiously, the survey appears to have begun before passage of its authorizing legislation.) Characterize by an average elevation of 2 feet, this territory led them through marshy swamplands, infested with "clouds of mosquitoes" and covered with a "dense growth of sea-cane." The remainder of the Texas coast, from West Galveston Bay to the Rio

Grande, was surveyed between November 20, 1873 and August 1, 1874. Accompanied by one assistant and four men, Polhemus measured 242 miles as the East Texas swampland gradually gave way to "wide and shallow bays, along a wild and almost uninhabited coast."[3]

Two stretches along their route in Texas had been altered by man about twenty years earlier. The Galveston and Brazes Canal, connecting the waters of West Galveston Bay and the Brazes River, remained navigable with depths ranging from 3 to 6 feet. Further down the coast, a stream known as Caney Creek, which at one time emptied into the Gulf, had been rechanneled into Matagorda Bay by a 2,850-foot-long ditch. The outlet to the Gulf disappeared and the small ditch gradually enlarged to dimensions of 15 by 80 feet, earning for itself the name of "The Big Canal." Polhemus and his party also traversed several "cuts" connecting bays along the 77 miles between Indianola on Matagorda Bay and Corpus Christi.[4]

Howell based his survey report, dated 1875, upon the extensive fieldwork of these "young gentlemen," who "suffered hardships rarely met in the line of their profession." He explained the guiding principle in selecting the route for the proposed 6-by-60-foot canal:

> to utilize the navigable bayous, lakes, bays, and sounds or lagoons, near the coast, and make the cuts connecting them along the shortest lines available.

In this report, Howell presented the first plan for an inland waterway beginning at the Mississippi River and terminating at the Rio Grande where he deemed necessary a lock with a double gate and 5-foot lift.[5]

The eastern terminus of the proposed waterway to be surveyed was Donaldsonville, located 25 miles south of Baton Rouge where Bayou Lafourche joined the Mississippi River. Howell astutely pointed out that if commercial traffic between the Mississippi River and the Rio Grande were to justify developing an inland waterway, more elaborate surveys might suggest an initial point on the Mississippi below Donaldsonville. Perpetually plagued by funding problems, he had prefaced his report by stating the work had been performed under a "scant appropriation" so that some parts of the survey "only reached the dignity of a reconnaissance."[6]

Howell designated the section from Donaldsonville to the head of Vermilion Bay as the most important commercially, offering southern Louisiana a water connection with the Mississippi River that would replace the long or obstructed routes available during only certain seasons of the year through the Atchafalaya and Lafourche or the outside Gulf route. He noted the southeastern Louisiana parishes that would be served by this section of the proposed waterway covered some of the most fertile agricultural land in the state and contained much good timber. At the point where the Mississippi River and Bayou Lafourche converged, the bayou was to be closed to permit its dredging. A connection could be maintained either by a lock, by inclined planes over which vessels might be transferred between river

and bayou, or by transfer of freight across the levee. Howell preferred the clearly less expensive third alternative involving a solid dam across the head of the bayou.[7]

The proposed route descended Bayou Lafourche from Donaldsonville to Napoleonville, then proceeded through a new canal to Lake Verret and on through Bayou Long and Flat Lake to Brashear (Morgan) City. West of Morgan City, in keeping with the congressional requirement to utilize navigable bodies of water near the coast, the recommended route continued coastward through the Lower Atchafalaya River and along the coast through Atchafalaya, Cote Blanche, and Vermilion bays. Howell found this route deficient because the wide shallow bays, subject to storms from the south, would not afford truly protected inland navigation for ordinary river steamboats and coal boats. Preferring a more inland course, Howell proposed two alternative routes via Bayou Teche and dredged cuts to reach Vermilion Bay.[8]

Howell justified the section between Vermilion Bay and Galveston more on the basis of potential than on existing commerce. An inland channel along this stretch would connect the Mermentau, Calcasieu, Sabine, and Neches rivers with the Mississippi and Galveston seaports. Howell predicted considerable lumber movement westward, great development of sugarcane production due to reduced coal costs in the sugar distillation process, improved transport of cotton to market, and enhanced development of the Calcasieu sulphur mines. The route surveyed lay no more than a few inches above tidewater and incorporated Vermilion Bay and White, Grand, Calcasieu, and Sabine lakes, believed by Howell to have been formerly connected by natural passes that were ‘gradually obliterated by the action of the Gulf tides." Expecting the same causes that destroyed the original passes to fill in excavated cuts, he anticipated maintenance costs would be high. In addition, the reach extending west of Calcasieu Lake posed another problem. This swampy territory, described by surveyor Ripley as terre tremblante, consisted of a soft mud foundation covered by the matted roots of a heavy, 5-foot-high growth of "broad-bladed, three-edged grass." Ripley noted a slight agitation of this matted surface could be felt several feet away. To counteract the unstable character of what Ripley called the *trembling prairie,” Howell proposed depositing material excavated from the cuts at some distance from their sides. This, of course, would entail greater cost.[9]

The prospects of dredging an inglorious ditch through an often desolate, 725-mile stretch of sand and swampland did not fire the imagination or loosen the purse strings of Congress. This western two-thirds of the future GIWW fared little better than the one-third east of the Mississippi River during the last quarter of the nineteenth century. The vision was there, but the time was not right. Renewed interest in this waterway would have to wait another thirty years for stimulation from a growing population, the discovery of oil, and more vocal rumblings from the local captains of industry.[10] The only improvement made during this time was on an isolated stretch several hundred miles west of the mighty Mississippi.

The first segment of canal improved by the federal government lay in West Galveston Bay, Texas. The state had dredged a channel 5 feet deep across obstructing reefs in 1859, but this passage had deteriorated drastically after the cyclone of 1875 and sustained still more damage from a severe storm in 1886. In 1892, Congress authorized a project for enlarging and straightening the channel to afford depths of 3 to 3.5 feet and widths of 100 to 200 feet. Dredging was begun under contract on January 19, 1893 and completed October 2, 1895. The improvement terminated at Christmas (also called Christian's) Point in Oyster (also called Christmas) Bay.[11]

Next, attention shifted immediately southwestward to the canal of the Galveston and Brazes Navigation Company. This n-mile-long stretch represented the only obstruction to a federally improved, continuous channel between Galveston and the Brazes River. Tolls levied on the river steamboats carrying cotton to market, fishing schooners, and other small craft rendered the canal ineligible for improvement by the federal government. Recognizing the value of this route as an alternative to the troublesome bar at the mouth of the Brazes River, Army Engineer Major Oswald H. Ernest had raised the possibility of acquiring the canal in 1887. Nine years later, his successor in the Galveston Engineer Office, Major Alexander M. Miller, recommended making this purchase. On February 11, 1897, the navigation company offered the canal to the government for $50,000. Congress authorized the purchase at $30,000 and the transaction was completed in December, 1902, providing an improved federal channel from West Galveston Bay to the Brazes River. Meanwhile, in 1900, Army Engineers reported their surveys and examinations of certain “adjacent streams"--Caney Creek, the San Bernard River, and Oyster Creek--with a view toward incorporating them into a network of protected waterways.[12]

ROUND TWO

Slowly but steadily the idea of an inland navigation system was taking hold. Several factors significantly boosted the impetus for the waterway along the Gulf Cosst during the first decade of the twentieth century. An event on a salt dome south of Beaumont, Texas dramatically altered the region's economy and greatly influenced development along its waterways. For several years, test drilling had been conducted at the Spindletop oil field. On January 10, 1901, a well blew in with a spectacular gusher, which ran wild for several days before being capped. The birth of the Texas petroleum industry ushered in a new future for the navigable waters along the Gulf Coast.[13] Also, the new century produced a ground swell of public support for waterway improvement from which emerged a comprehensive naticnal policy by the end of the decade.

Amidst the spin-off from this policy-making process came authorization on March 3, 1905 for the first in a second round of surveys, this one for the "Louisiana and Texas Inland Waterway." Major (later Lieutenant General) Edgar Jadwin, from his post as

District Engineer in the Galveston Engineer Office, reported on the renewed Louisiana and Texas waterway studies late in 1906. This distinguished Army Engineer, an alumnus of the Panama Canal construction who would later become Chief of Engineers and sponsor of the Mississippi River flood-control plan adopted by Congress in 1928, retraced the steps of the 1873 survey, finding a considerable portion of Howell's report still applicable. Jadwin's examination included two additional surveys: one from Aransas Pass through Turtle Cove to Corpus Christi and the other from Aransas Pass to and up the Guadalupe River. His assessment of potential commerce for the proposed Mississippi River-to-Rio Grande waterway included coal, rice, oil, sugar and molasses, lumber, cotton, and general merchandise.[14]

One development since Howell's time influenced Jadwin's thinking in regard to the point at which the inland canal and the Mississippi River should be joined. A project adopted in 1888 provided for dredging a channel and constructing a lock to connect Bayou Plaquemine and the Mississippi River. This project would afford through passage for boats from Bayou Teche and the Atchafalaya River via Bayou Plaquemine and the Mississippi River to New Orleans. Rather than joining the inland waterway to the Mississippi River at Donaldsonville and utilizing Bayou Lafourche as Howell had been instructed, Jadwin proposed taking advantage of the Plaquemine improvements. His proposal would have been advantageous for nearby Baton Rouge but offered little appeal to New Orleans, 100 miles downriver from the Plaquemine Lock.[15] By 1909, the Plaquemine Lock was completed, but a special board of engineers responsible for the entire Gulf Coast section of the extensive set of surveys authorized in 1909 left little doubt that New Orleans should indeed become the site where the inland canal and the Mississippi River should come together. The board's report, published in 1914, explained:

> Both economy of construction and saving of time in movement of freight make desirable a waterway as nearly direct as can be obtained; it should preferably join the Mississippi River as near the business portion of the city of New Orleans as practicable.

The recommended terminus lay at Harvey, Louisiana (just across the river from New Orleans), to be reached by a number of possible routes involving privately constructed canals. The Harvey Canal would place the point of entrance to the Mississippi nearer the business center of New Orleans, while that of the Company Canal joined the river about 4 miles upstream and would be that much more advantageous for traffic to points above the city.[16]

During the first decade of the century while the eastern terminus of the canal remained indefinite, a start was made on the canal's midsection. Jadwin's report in 1906 had anticipated a heavy water-freight traffic in the region between Franklin on Bayou Teche to the Vermilion River and on to Lake Misere, west of the Mermentau River. The region contained two large salt mines and was the meeting ground of the rice and sugar areas of the state; its western portion bordered the largest rice section in Louisiana. Prospective commerce

also included extensive outputs of oil and lumber. The Army Engineers concluded the inland waterway between Franklin and the Mermentau River was worthy of improvement and Congress appropriated an initial $89,292 in the Rivers and Harbors Act of March 2, 1907. The Rivers and Harbors Act of June 25, 1910 appropriated $100,000 to improve the adjacent western reach from Mermentau River to Sabine River. Congress authorized the final segment of this 5-by-40-foot canal in Louisiana, from the Mississippi River west to Bayou Teche, in 1919, incorporating the Harvey Canal-Lake Salvador route recommended by the Engineers five years earlier. By 1922, cargoes totaling 171,000 tons were transported on the existing channels of this eastern segment between Bayou Teche and New Orleans even though the federal improvements had not yet been accomplished.[17]

At the Texas end of the line, Jadwin's surveys of 1905-06 gave rise to more fragmented legislation, providing only for 5-by-4O-foot channels from Corps Christi to Aransas Pass, from Aransas Pass to Pass Cavallo, and from the Brazes River to West Galveston Bay, all dredged by 1909. Also, legislation authorized a tributary channel up the Guadalupe River to Victoria. Jadwin advised reconsidering the southwestern extremity from Corpus Christi to Point Isabel at a future date.[18]

In 1908, reexamination of Jadwin's report focused on the unimproved segment between the Brazes River and Matagorda Bay. This review prompted Gulf Division Engineer Lieutenant Colonel (later Major General) Lansing H. Beach, a future Chief of Engineers, to make a statement that seems to reflect a shift toward a more flexible approach:

> Even should local conditions not be such as to demand the improvement of this portion of the inland waterways, . . . the fact that it is one link in the chain of waterways paralleling the shore of the gulf is of sufficient importance to cause the improvement to be made at as early a date as possible.[19]

Congress authorized improvement of this segment in 1910, thereby clearing the way for an uninterrupted charnel from Galveston to Corpus Christi. Still, despite the more embracing national policy explicity underscored by the Rivers and Harbors Act of 1909, which ordered surveys for a 'continuous waterway' from Boston to the Rio Grande, appropriations did not keep pace with the enthusiastic spirit endorsing this enormous project. As late as 1924, the Board of Engineers for Rivers and Harbors admitted that "No complete project . . . . exists for the proposed waterway as a whole, nor for any improvement in the stretch between Port Arthur and Galveston Bay."[20]

THE 7-MILLION-TON JUSTIFICATION

"Round three," as it were, followed the interruption of World War I. Although diverting appropriations from civil to military undertakings, the war had also pointed up the value of water

transportation. Another far-reaching survey was authorized on March 3, 1923, designating the region "from the Mississippi River at or near New Orleans . . . to Corpus Christi" as the locale to be studied for the intracoastal waterway. The Engineers now pleaded for a continuous waterway, observing that the ports from Mobile to Galveston that would thus be connected were handling an annual commerce of nearly $2 billion.[21] Actually, two issues were involved, one dealing with the continuity and length of the inland canal and the other with its dimensions.

By 1923, the Corps of Engineers was not the only group taking exception to the manner in which the Louisiana and Texas Intracoastal Waterway was being strung together. Eastern steel and iron products enjoyed great demand in Texas oil fields and Texas industrialists were eager to enhance their booming economy by transporting these products at the reduced water rates. The disconnected links placed along the coastline bore little resemblance to the continuous waterway chain so eagerly sought. The fragmented congressional action that seemed to many to be stifling incipient economic development vexed many business and political leaders in the burgeoning industrial cities along the Gulf Coast. Frustration was reaching a feverish pitch. Sensing that the canal's time had come, the Interstate Inland Waterway League prepared to strike.

The canal association's origin dated back to 1905. Early that summer, announcements appeared in local newspapers throughout Louisiana and Texas calling for a convention to discuss "the feasibility, plans and final construction on an intercostal canal from Brownsville, Texas, to Donaldsonville, La., and for the special purpose of organizing an intercostal canal league." The announcement, signed Very respectfully, C. S. E. Holland, President, Business Men's Association, Victoria, Texas," stressed the advantages to be derived from construction of the proposed canal as compared to a railroad at "a ratio of about 20 to l." Holland urged "every board of trade, chamber of commerce and business men's organization" in both states to send delegates to the convention.[22] This appeal, emanating from a cowtown remarkable mainly for its obscurity, set in motion the formation of an association that has endured to the present day.

The convention called by Clarence Holland, a Victoria banker, gave birth to the Interstate Inland Waterway League on August 8, 1905. A yellow fever epidemic prevented the participation of interested parties from Louisiana, but newspaper accounts of the day indicate that "what is lacking in attendance is more than made up in enthusiasm and the prominence of the delegates."[23] Despite the absence of Louisiana representation, more than 200 Texas delegates including congressmen, judges, and prominent businessmen assembled in the Victoria opera house and laid the foundations for a permanent organization.[24] These far-sighted men recognized the potential value of an inland waterway to the economy of a region extending many miles beyond their respective locales.

The new league reconvened a year later in Lake Charles, Louisiana, and the following year (1907) in Houston. At that time, a dynamic young man named Roy Miller became the "active" vice president of the organization. Only a few years out of college, Miller had worked briefly as a junior reporter for the Houston Post and then moved to South Texas to serve as advertising agent for the St. Louis, Brownsville & Mexico Railway. In his capacity as an advance man for the railroad, which was then being extended toward Brownsville, Miller became well acquainted with civic leaders in the various coastal communities. If Clarence Holland provided the inspiration for the association, Roy Miller furnished the perspiration. Miller energetically launched its activities and spearhead its program, becoming a persuasive advocate of the canal and devoting his capable leadership to this cause for the remaining forty years of his life.[25]

During the early years of the league's existence, Roy Miller scored some modest successes in selling the inland canal to Congress. By securing needed rights-of-way from local interests, the organization facilitated passage of the 1910 legislation providing for the Mermentau-to-Sabine River segement; nevertheless, Congress continued to parcel out authorization for the 5-by-40-foot channel segments in piecemeal fashion. Meanwhile, industrial development mushroomed along the Gulf Coast and deep-water ports proliferated. Miller was instrumental in obtaining appropriations for the port facility at Corpus Christi and served a five-year stint as the city's "boy mayor" during the war years. His legislative efforts on behalf of the Texas Gulf Sulphur Company led to improvement of the reach between Galveston and Matagorda Bay, facilitating movement of a large volume of tonnage destined for export from the island port.[26]

"The Intra-Coastal Canal will put Houston on the Mississippi river," declared Miller as he moved the association office to that city in March, 1923. At that time, a 9-foot depth prevailed on the Mississippi River between New Orleans and St. Louis and on the Ohio River between Cairn and Pittsburgh. Pushing for a continuous waterway with a comparable depth along the Gulf Coast, Miller envisioned traffic through 6,627 miles to connect points along this coast with such distant ports as Minneapolis, St. Paul, and Birmingham.[27] The March 23 Galveston Daily News reported his reaction to announcement of the new federal survey:

> According to Mr. Miller, this is the first time the association has been able to get the government to act on the canal as a whole. Heretofore, it has been considered section by section. . . . After the preliminary survey, a report will be made as to whether a commercial necessity exists for the waterway.

Miller was not content to leave the commercial case for the waterway to chance. Leaders of his organization, now renamed the Intracoastal Canal Association of Louisiana and Texas approached Major General George W. Goethals and asked him to recommend a bright young engineer to study the commercial potential of a continuous canal through Louisiana and Texas. The retired Army Engineer, whose name

was synonymous with accomplishment of the Panama Canal, had a more-than-passing interest in the proposed canal; his consulting firm had recently supervised construction of the Inner Harbor Navigation Canal Lock at New Orleans. When he met with the canal association officials the next morning, Goethals declared, "I believe I will take that job myself." Announcing Goethals's retention by the association, the July 5 Beaumont Enterprise described this "move" as a "master stroke" and predicted that "Employment of General Goethals will have a very impressive bearing on the canal's future."[29]

While Goethals conducted his investigation, Miller raced up and down the Louisiana and Texas coastline, flamboyantly garnering support for the proposed project and leaving a flurry of stirring pronouncements in his wake. "Sell It" Says Miller," reported the New Orleans States on July 18, 1923. Miller had been in New Orleans to raise $30,000 for a three-year campaign to promote the canal project between the Mississippi River and Corpus Christi. The newspaper reproduced a portion of his effective oratory:

> The transportation demands of this country increase 100 per cent every ten years. Railroads have not increased their facilities a particle during the past 10 years. . . . What we are here today for is to sell the intracoastal canal project to the people of Louisiana and Texas. Make 'em buy it; it's the best investment I know. The real job before us is to work up public sentiment to back up this project before Congress. . . . Let's strike.[30]

In his report submitted on November 27, 1923, Goethals estimated the present tonnage possibilities of the combined Louisiana-Texas inland waterway between 5 million and 7 million tons annually, indicating, "this statement is conservative." He rejected the aggregate 12,315,953 tons compiled in the statistics for 1922 because of duplication, but he did conclude his report by stating:

> With the maintenance of a 9-foot channel in the Mississippi River; with the completion of the Ohio River improvement; and with the enlargement of the Chicago-Mississippi Canal, the tonnage possibilities of the canal will exceed the 12,000,000 tons annually, which in the early part of this report are mentioned but not accepted, and the intracoastal canal will become a vital part of the great inland waterway system of the country.[31]

The Army Engineers estimated construction costs for the waterway from New Orleans to Corpus Christi at $16 million. On March 3, 1925, Congress appropriated the lesser sum of $9 million for a 9-by-100-foot intracoastal waterway to extend only as far as Galveston. Learning of the departure from the original proposal to Corpus Christi, Roy Miller, with his penchant for pithy phrases, declared, "I am not satisfied, but gratified. Indeed, despite its shortcomings, this piece of legislation finally provided for the long-awaited continuity as well as for enlarged project dimensions.

The Rivers and Harbors Act of 1925 also authorized preliminary examinations and surveys to the east, from New Orleans to the Apalachicola River in Florida, for an inland waterway deep enough to accommodate self-propelled barges. Authorization in 1927 further extended continuous inland navigation along the Texas Coast as far west as Corpus Christi, and provided for the larger project dimensions throughout. The Plaquemine waterway to Morgan City offered an expedient Mississippi River outlet while the Harvey Lock and existing 5-by-40-foot waterway from New Orleans were being enlarged. Direct access between New Orleans and Texas was achieved in 1934 when the segment between the Sabine River and Galveston Bay, was completed, uniting the Louisiana and Texas portions of the waterway, and the new Harvey Lock was opened to navigation.[33]

Another development in June of 1923 carried profound implications for the route of the future intracoastal canal. In proposing the course of the channel from Sabine to Galveston, Gulf Division Engineer Colonel George M. Hoffman departed from the earlier principle of dredging through the open bays. He defended the notion of a landlocked channel, to run along and inside the shoreline, stating:

> This route while a little longer and requiring more excavation will cost less for maintenance than other routes previously proposed through the bays. . . . Experience has demonstrated the difficulty and cost of maintaining the entrance of a canal into a large bay, especially where this entrance lies across the normal currents of the bay. . . . Boats using this route will be less exposed to storm conditions in the open bay. . . .

This change in philosophy led to the eventual relocation of many older channels as the project for the 9-foot channel terminating at Corpus Christi was pushed forward to its completion in 1942.3[5]

As work on the main channel progressed, the desirability of constructing certain tributary channels became apparent. Branch channels by which cargoes could travel directly to terminals farther inland would enhance the advantages afforded by the growing intracoastal waterway. In 1938, Congress authorized feeder channels up the San Bernard and Colorado rivers plus channels to Palacios, Rockport, and the town of Aransas Pass. By that time, the nature of the commerce evidenced considerable change. petroleum, petroleum products, iron, and steel constituted the bulk of the traffic, displacing the agricultural commodities for which the canal had been envisioned originally.[36]

The spirit of the Texas frontier prevailed on the San Bernard River for some time after completion of the tributary channel. Occasionally, towboats moving too quickly or carelessly along the channel would scrape the banks with the barges they pulled. Viewing this as a threat to their property, individual property owners along the channel resorted to stationing themselves on the banks, armed with rifles, to keep the towboat captains in line. Several incidents occurred in which the irate landowners literally took potshots at the recalcitrant navigators.[37]

The 9-foot project, authorized in 1925, provided for construction of locks or guard locks where necessary. Two Texas rivers of sufficient magnitude to cause problems intersected the waterway. At the Brazes and Colorado river crossings, the intracoastal waterway was subjected to large intrusions of sediment that washed down the rivers during periods of high discharge and to excessive currents when the river stages rose. Funds for the necessary protective structures did not become available until the 1942 fiscal year. The Brazes River floodgates were completed in 1943, followed within the next year by the Colorado River floodgates.[38]

Next, Army Engineers working in the Galveston District conducted studies to determine the advisability of converting the floodgates into locks. At the Brazes River crossing, the velocity of the river flowing toward the Gulf posed the major threat to navigation. But while these currents often caused restrictions to be placed on traffic at this point, the Brazes floodgates did not require as frequent or as prolonged closure as did those at the Colorado River.[39]

For many years, the Colorado River has been plagued by an enormous log raft, about 25 miles long, in the vicinity of Bay City. Between 1925 and 1929, Matagorda and Wharton counties broke up this obstruction to obtain relief from severe flooding upstream. River currents carried debris from the raft downstream, where it soon formed a massive delta in Matagorda Bay and created a new flood hazard to the lands adjacent to the intracoastal waterway. To alleviate this problem, the Matagorda County Conservation and Reclamation District No. 1 in the mid-1930's dredged a channel across the bay and across Matagorda peninsula, furnishing the river an outlet to the Gulf about 7 miles away. Maintenance of this channel as a flood discharge channel was incorporated into the intracoastal canal project in 1937; however, this channel did not offer a definitive solution to the problems created by the Colorado River. When floods swelled the river, its flow still remained partially confined and the water level in the river would rise as much as 12 feet above mean low tide at its crossing with the canal. Because of this troublesome head differential, the Corps of Engineers concluded that lock structures at the Colorado River must become essential features of any plan to minimize delays to navigation on the waterway. Between the early 1950s and 1957, the Engineers converted the Colorado River floodgates into locks.[40]

All of the remaining locks on the GIWW are located in Louisiana.[41] Those at Algiers, Harvey, and Port Allen overcome the differences in elevation between the water in the Mississippi River and that in the adjacent GIWW. The lock in the Inner Harbor Navigation Canal at New Orleans serves this purpose between the river water level and that in the canal. Locks at Bayou Boeuf and Bayou Sorrel overcome elevation differences between the Atchafalaya Basin Floodway and the main and alternate routes of the intracoastal canal.

Other locks in Louisiana prevent intrusion of salt water into the waterway. Operated in concert, the Vermilion and Calcasieu locks protect a large freshwater reservoir used largely for rice irrigation in the adjacent wetlands. The lock at Freshwater Bayou was also constructed to prevent saltwater intrusion from the Gulf.

THE CRUCIAL CONNECTION

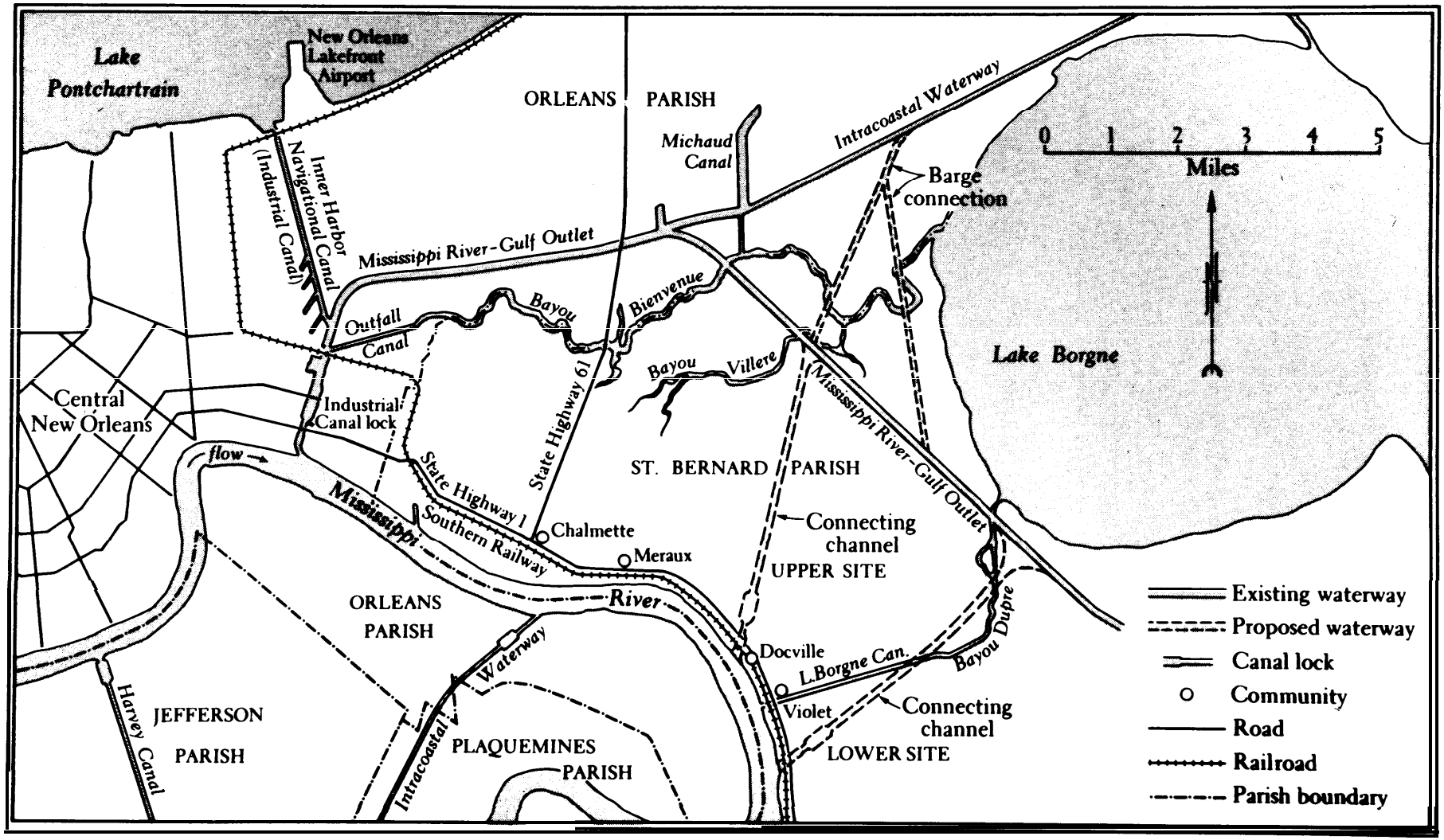
Exigencies of wartime hastened the next significant step in the growth of the main channel. Under the plea of national defense, Congress authorized enlargement of the entire waterway and its extension from its eastern terminus at Apalachee Bay in Florida to "the vicinity of the Mexican border." The Second Supplemental National Defense Appropriation Act of October 26, 1942 funded the work, which was prosecuted with such dispatch that by 1945 a continuous waterway with minimum dimensions of 12 by 125 feet extended from Carrabelle to Corpus Christi.[42]

The 1942 legislation provided not only for the western extremity of the inland waterway but also for an improved connection of its eastern and western halves. During the 1930s, as the main channels on either side of the Mississippi River were being joined into continuous thoroughfares, no "federal channel" connected the two. Westbound barges passing through Lake Pontchartrain arrived at the state-owned Inner Harbor Navigation Canal. To reach the Mississippi River, they had to travel through this canal and pay the toll of five cents per gross ton levied by the Port of New Orleans to go through the lock affording entrance to the river.

The Inner Harbor Navigation Canal (also called the Industrial Canal), constructed between 1918 and 1923, created a long-sought connection between Lake Pontchartrain and the Mississippi River. A lock was required at the Mississippi River end of the 5.5-mile-long canal to admit the waters of the river into the lower level of the canal. The state of Louisiana and the city of New Orleans constructed the Industrial Canal to cut off approximately 40 miles of water distance from New Orleans to the Gulf, to provide an inner harbor with leaseable waterfront property, and to furnish an indispensable link in the intracoastal canal by connecting the inland waterways lying to the east of the Mississippi River with those to the west.[43]

As early as 1921, efforts were underway to induce the federal government to take over the canal so the lock could be freed of tolls and coastwise traffic of small craft could be encouraged. At the twentysixth annual convention of the Intracoastal Canal Association in November, 1930, Louisiana Senator Edwin S. Broussard called for the United States government to take over the Industrial Canal and to reimburse the state the $20 million expended on its construction. Only a few months earlier, however, the Board of Engineers for Rivers and Harbors had rejected such a proposal. because the inland waterway traffic at that time did not justify federal takeover of the canal. Furthermore, incorporation of the Industrial Canal into the federal intracoastal waterway project had become caught up in another issue involving construction of an alternate deep-water outlet from the

Proposed New Lock and Connecting Channel for the Mississippi River–Gulf Outlet



Mississippi River to the Gulf, also not considered necessary at that time. The Chief of Engineers, Major General Lytle Brown, acknowledged the "prospective value" of the Industrial Canal as part of the inland waterway system, but he added that the extent of the private improvement exceeded that required by the inland waterway. Thus if the federal government chose to acquire this canal, Brown urged that it offer to pay only a portion of the total construction cost.[44]

The wartime act passed in 1942 modified the inland waterway project to provide a new eastern approach to New Orleans. The modification involved a land cut through the marsh from the Rigolets to a point on the Industrial Canal, about 2.25 miles from the Mississippi River. The federal government agreed to lease that portion of the state-owned canal from the point where i t was intersected by the intracoastal canal, through the lock, to the Mississippi River. This change eliminated passage through Lake Pontchartrain and five drawbridges, saving 30 miles in travel distance and offering the further advantage of easier, cheaper channel maintenance. Since the lease went into effect on April 1, 1944, this portion of the Industrial Canal has been operated by the United States government, free of tolls, representing the vital link between east and west in a continuous federal Gulf Intracoastal Waterway.[45]

Unusual circumstances attended the lease agreenent for the Industrial Canal. The 1944 lease arrangement with the Board of Commissioners of the Port of New Orleans (commonly known as the "Dock Board") was viewed as a temporary measure until the United States could acquire fee simple title to the canal facilities. Construction of the Industrial Canal had been financed by funds covered by bond issues; under the restrictions imposed by the bond indentures, the state could not relinquish any portion of the canal or lock before maturity of the bonds in 1960. Although these impediments to transfer of title were subsequently removed, the United States has never acquired this canal but continues to operate it as a link in the GIWW under the lease agreement, which has been renegotiated over the years to keep pace with inflation and escalating maintenance costs.[46]

Shipping essential supplies for the war effort revived the issue of creating a more direct Mississippi River-Gulf Outlet (MR-GO) by making an alternate route to the Gulf appear somewhat more attractive in the interests of national defense than it had when viewed purely in economic terms. By 1946 the large and growing sea borne commerce of New Orleans provided economic justification for the improvement in the view of Major General Robert W. Crawford, Lower Mississippi Valley Division Engineer. Crawford also argued that the port capacity at New Orleans for emergency war service would be enhanced by an additional outlet and the resulting expansion of terminal facilities available for embarkation of defense-related personnel, material, and supplies.[47] Nevertheless, construction costs were estimated at a whopping $67 million, economic justification remained qualified, and broad-based political backing was sorely needed to secure congressional authorization for the project. A decade later, far-reaching support together with a national climate favorable to transportation development convinced Congress that the proposed outlet

would not merely offer local benefits but would affect a large area of trade. Authorized finally in 1956, the MR-GO was opened to navigation in 1963. Although it is not actually part of the GIWW project, this artificial., deep-draft outlet runs 5.5 miles along the route of the eastern leg of the GIWW before turning southeast across the intervening marshlands to reach the Gulf.[48]

The legislation authorizing the main MR-GO channel also dealt with the problem of the Industrial Canal Lock$ which was becoming inadequate to handle the increasing volume of traffic through the New Orleans port. Specifically, the 1956 act provided for replacement of the existing lock at the Industrial Canal. or for construction of an additional lock in the vicinity of Meraux, east of New Orleans in St. Bernard Parish. Access from the Mississippi River to the inner tidewater area being developed as a " Centroport" at the juncture of the Industrial Canal. and the MR-GO required passage through the Industrial Canal Lock. Determining how to relieve the critical bottleneck at the antiquated lock involved approximately twenty years of bitter contrivers y. The powerful Dock Board, representing shipping and commercial interests, favored an alternate route (with ship lock) that would bisect St. Bernard Parish. Incensed residents and political leaders of this parish voiced strenuous objections. The alternative course, replacing the existing lock on the Industrial Canal, entailed enormous social, financial, and technical difficulties. The New Orleans Army Engineers found themselves caught in the midst of the heated dispute. Tempers flared over issues of local self-determination , political power, jurisdiction over the proposed channel, cost allocation, hurricane-flood protection, and projected social and ecological impact. In 1977, after literally much ado, President Jimmy Carter resolved the dilemma in a directive to the Corp of Engineers that removed the option of an alternate channel location. Within a year, the New Orleans Engineers were well into planning for replacement of the Industrial Canal Lock on its present site.[49]

The desirability of alternate routes for the GIWW led in the middle 1940s to provision for two main connecting channels. A 9-mile-long route joining the western section of the inland waterway with the Mississippi River through a lock at Algiers, downstream from New Orleans, was authorized in 1945 and completed in 1956. This route diverted sane of the GIWW traffic away from the congested passage near New Orleans. The Morgan City-Port Allen route, authorized in 1946 and opened to navigation in 1961, offered a shorter course for traffic moving between the upper Mississippi and Ohio rivers and the western portion of the intracoastal waterway. This alternate route incorporated the earlier Plaquemine-Morgan City waterway and added the new lock at Port Allen, which replaced the older Plaquemine Lock as the point of entrance to the Mississippi River .5°

The last and extreme western segment in the main channel of the GIWW was charted through the Laguna Madre, a 150-mile-long, shallow body of water paralleling the coast from Corpus Christi to Brazos Santiago Pass (the pass between Brains and Padre islands, through which the channel to Brownsville rum). Separated from the Gulf by

Padre Island, the Laguna Madre itself forms two natural bays that are divided in the middle by an area of mud flats. Dredging of this final extension did not begin until the existing waterway had been enlarged to Corpus Christi. Operations began on December 12, 1945, as pipeline dredges started from Corpus Christi and from Port Isabel, working toward a meeting that would join the two sections of the Laguna Madre and mark the accomplishment of an undertaking far more vast. At the remote mud flats, the McWilliams dredge Caribbean moved north to meet the Standard Dredging Corporation dredge Miami. The final cut was made and the channel was opened on June 18, 1949, affording a continuous inland water route from Carrabelle, Florida to Brownsville, Texas.[51]

BRANCHING OUT

The main channel of the Louisiana and Texas Intracoastal Waterway had been seventy-five years in the making. Its completion, however, signifies only a portion of the total GIWW story. Subsequent improvements have involved various modifications and enlargements, relocation of channels, and the addition of many branch channels. As segments of the main channel were opened to navigation, commercial interests worked vigorously to establish tributary connections. Numerous rivers flowing into the Gulf crossed the GIWW and naturally became offshoots of it. Where nature failed to provide an existing stream, man could create an artificial channel. By 1961, almost ninety tributaries had been incorporated into the GIWW system, more than half of them in Louisiana and Texas.[52]

The addition of each tributary channel enhances the value of the main channel while, in turn, linkage with the vast GIWW system endows a minor stream or out-of-the-way location with new commercial relevance. Many tributary channels provide outlets to the Gulf, making it easier for the oil industry to service offshore rigs by water and greatly benefiting shrimping and fishing fleets as well as waterborne trade in general. Other tributary channels reach inland and furnish water access to the hinterland. Some offer pathways to major industrial centers and provide water avenues along which raw materials can be shipped directly to the point of production. Still others may contribute to improved ecological balance, flood control, and drainage.

One example of tributary advantages can be seen at Port Mansfield, Texas. Situated 38 miles above Port Isabel on the lower part of the Laguna Madre, this isolated spot was known as "Red Fish Landing" until 1950. As the GIWW was extended to Brownsville, a tributary channel at Port Mansfield quickly was joined to it. During the 1950s, the Army Engineers dredged an artificial channel across Padre Island, giving Port Mansfield its own Gulf outlet. Prosperity at Port Mansfield (population 731) depends heavily upon commercial and sport fishing. Creation of the artificial inlet yielded benefits in addition to navigation. Opening of the channel improved tidal exchange, reducing salinity in the bay and thereby enabling it to support more marine life. Resulting ecological changes in the adjacent bay area have nurtured more abundant populatioms of redfish, brown shrimp, flounder, and spotted trout, as well as other saltwater species.[53]

In contrast to the remote tributary at Port Mansfield are major deep-water channels leading to thriving ports in Corpus Christi, Freeport, Houston, Texas City, Galveston, Port Arthur, Beaumont, Orange, Lake Charles, Morgan City, Baton Rouge, and New Orleans. Their articulation with the GIWW has stimulated and facilitated enormous economic development and industrial expansion in these port communities . Each tributary channel adds to the dimension and magnitude of the remarkable inland waterway to which it is linked.

Since 1949 when through inland navigation was established between New Orleans and Brownsville, traffic has risen and commerce has increased dramatically. Cargoes include crude petroleum, fuel oil, petroleum products, marine shells for cement manufacturers , nonmetallic minerals, and chemicals. Figures for tonnage handled on the section of the GIWW between Galveston and the Louisiana border topped 46 million tons in 1972; on the main channel of the Louisiana section, they exceeded 70 minion tons in 1971. These are spectacular statistics in the light of the 5-7 million tons estimated by Goethals as justification for constructing this western leg of the intracoastal waterway. [54]

Chapter IV

THE FLORIDA PENINSULA

The Florida peninsula forms a natural barrier separating the Gulf of Mexico from the Atlantic Ocean. Extending approximately 340 miles south of the Florida panhandle, the peninsula ranges in width from 100 to 140 miles. Except for a ridge that runs downits axis from the north, the peninsula is characterized by coastal marshlands and low elevations.[1] The 1,197-mile coastline of the state presents a cumbersome and often hazardous course for vessels traveling between the two major bodies of water. The notion of a direct water route crossing the peninsula originated as early as the sixteenth century and played a key role in the development of the Gulf Intracoastal Waterway.

"THE FIRST SHALL BE LAST"

Advocates of political causes have never been reluctant to employ holy scripture when it serves their purpose. Henry H. Buckman of Jacksonville, Florida, president of the National Rivers and Harbors Congress, resorted to the Gospel according to St. Matthew in an impassioned address to the Intracoastal Canal Association in 1959: "...it is written," he said, "The first shall be last." His biblical reference alluded to the moribund cross-Florida barge canal project, "The first reach (of the national intracoastal waterway) to be conceived and seriously advocated" and “the last reach remaining to be constructed."[2] Indeed, the history of the long-desired cross-Florida canal recounts a succession of unsatisfactory studies, political controversies, heated opposition from various quarters, two abortive attempts at construction, and lack of funding.

The concept of a water route across Florida dates back to 1567, when Pedro Menendez de Aviles received instructions from his king, Philip II of Spain, to explore the peninsula and to determine a suitable route for crossing the isthmus. The route he recommended largely anticipated the one authorized by the United States Congress for a canal more than 300 years later. After Spain ceded Florida to England in 1763, British naval officers assigned to the territory reiteratd the desirability of a cross-peninsula waterway to the Lords of the Admiralty. Late in 1818, Army Engineer Captain James Gadsden wrote Secretary of War John C. Calhoun recommending investigation of a route from the St. Marys River on the Georgia-Florida border to the Suwannee River in Spanish Florida. (Eastern Florida had reverted to Spain in 1783.) U.S. acquisition of the territory in 1821 quickly generated more immediate interest in developing a route by which circumnavigation of the Florida peninsula could be avoided. At the end of 1824, Florida's legislative council urged Congress to consider constructing a canal from the Suwamee River to the St. Johns or any other appropriate eastern terminus. The three objectives cited in support of such a canal have been presented repeatedly to Congress

ever since: to develop the land, to benefit commerce, and to enhance troop and supply movements during wartime. Soon after the council's appeal, Richard Keith Call, Florida's first territorial delegate to Congress, wrote the chairman of the Committee on Roads and Canals regarding the advantages of an inland waterway between the Mississippi River and the Atlantic Ocean.[3]

Congress responded on March 3, 1826 by authorizing the first in a long series of surveys for a canal route across Florida. Chief of Engineers Major General Alexander Macomb instructed Brigadier General Simon Bernard to arrange for a survey brigade directed by an Army Topographical Engineer to examine the two routes specified in the act. Survey parties began their fieldwork in July, braving the summer sun and troublesome incidents with the Seminole Indians. Early in 1827, Bernard and his assistant, Captain William Tell Poussin, personally toured the routes, and they combined their findings with these of the various survey parties into the report submitted to Congress in 1829.

Although Bernard and Poussin observed that " both routes will require expensive excavations to supply the summit level with water ," they preferred the shorter and more southerly "St. Johns route, " utilizing the St. Johns, Santa Fe, and Suwanee rivers. The canal the y envisoned would rise more than 100 feet above the Atlantic but still require a cut of 60 feet beneath the summit of the mid-Florida divide. The Engineers also proposed extending this canal westward from the Suwanee River to St. Marks, from whence they believed an intracoastal waterway could feasibly be constructed. The total length of the trans-Florida canal would be 168 miles.[4]

A major problem identified by Bernard and Poussin was the questionable adequacy of the water supply along the ridge the canal would have to cross. To quell this uncertainty, Congress passed a second act on May 31, 1830, appropriating $10, 400 to complete the survey and estimate for the canal. A new survey team initiated studies of the infiltration properties of the terrain, but funds ran out before conclusive results could be obtained and Congress tabled the matter of the proposed canal.[5]

Congress rekindled the fire for the project with the Rivers and Harbors Act of August 30, 1852, providing $20,000 to complete the previous survey or to run a new line if necessary. Topographical Engineer Lieutenant Martin Luther Smith drew this assignment and directed his attention to a tours e between the headwaters of the St. Johns River and Tampa Bay. He concluded that at least two other routes across the peninsula might be preferable and recommended they be surveyed before any selection was made. For the third time, investigation of the proposed canal yielded inconclusive results.[6]

After the Civil War, navigation improvements commanded fresh attention from Congress, which once again focused on the Florida canal issue. The Rivers and Harbors Act of March 3, 1875 authorized a new

survey "to ascertain the most eligible line on which a canal across the Isthmus of Florida can be constructed ." This survey produced a recommendation for further study. An act dated June 18, 1878 provided for yet another survey, this time for a deep-draft "ship-canal" rather than a shallow-draft barge canal. Transit and level lines were run along a 170-mile route from the St. Marys River to St. Marks, including 60 miles across the summit. The Engineers concluded that the Okefenokee Swamp could meet demands for water to supply the canal and eleven locks would be needed to lift and lower ships using the waterway. They reviewed previous survey records, but for the fifth time in fifty years, the Army Engineers did not enthusiastically endorse the proposed canal project.[7]

Private enterprise entered the picture in 1878 when the Atlantic and Gulf Transit Canal Company was chartered with a $30 million capitalization to construct a canal across the state. This venture, however, came to naught. Several private surveys merely underscored the inordinate expense such a canal would entail. On June 14, 1880, canal proponents secured congressional authorization for a survey " to open steamboat communication" from the St. Johns River via Tohopekaliga Lake and Peace Creek to Charlotte Harbor. Once again, the Army Engineers rendered a " not practicable" verdict. [8]

Federal interest in a water route across Florida revived again under President Theodore Roosevelt. The survey conducted under the Rivers and Harbors Act of March 3, 1909 considered five routes for a barge canal but failed to generate a positive recommendation. The report of this survey, entitled "Intracoastal Waterway - Across Florida Section ," was published in 1913. Responding to a request from the Senate Committee on Commerce eight years later, the Board of Engineers for Rivers and Harbors reviewed it and confirmed its negative findings in 1924. Two more surveys authorized in 1927 and 1930 also found economic justification for the canal lacking.[9]

Economic justification of a different type came indirectly, however, from the devastating financial conditions of the Great Depression in the early 1930s. Suddenly, the proposed canal offered new appeal as a salve for the pervasive problem of reemployment plaguing the country. In 1932, the mayor of Jacksonville and Henry H. Buckman went to New Orleans and joined with other Gulf Coast leaders to form the National Gulf-Atlantic Ship Canal Association, installing former Army Chief of Staff General Charles P. Summerall at its helm. Sensing that a century of discussion might now conclude with an actual canal project, the canal's major competitors began to organize opposition. Early in 1933, representatives of the Atlantic Coast Line . Railroad, the Florida East Coast Line Railway, the Seaboard Airline Railway, and the Southern Railway testified before the Special Board of Engineer Officers who were preparing a report on the surveys authorized in 1927 and 1930. These canal opponents introduced for the first time the possibility that the proposed project might endanger the underground water supply of central and south Florida.[10]

The members of the Special Board of Engineer Officers reported late in 1933 on the investigation of no less than twenty-eight routes, seven of which they studied in detail. Selecting a route through the St. Johns, Oklawaha, and Withlacoochee river valleys known as "13-B," they concluded either a barge or ship canal could be built. Presumably influenced by the testimony of the railroad interests, they advised that any canal design should incorporate locks to protect the Florida aquifer; however, in the end, their report stated that the proposed canal was not economically justified and should not be undertaken.

The findings of the special board were, of course, unpalatable to the growing corps of canal advocates who requested action be deferred until they could present new data to justify the project. Using his political clout, General Summerall persuaded President Franklin D. Roosevelt to form another board to reconsider the sensitive matter. In April, 1934, the President directed appointment of an Interdepartmental Board of Review which, in its report of June 28, recommended a 30-foot-deep sea-level ship canal. In August, 1935, sixty canal boosters went to Washington to press their cause to the President through Florida Senator Duncan Upshaw Fletcher.[12]

A natural disaster added to these political pressures probably turned the tide. On Labor Day, a hurricane struck the Florida Keys and grounded the Morgan liner S. S. Dixie on French Reef for almost two days.[13] With his shrewd sense of timing, President Roosevelt announced the next morning that he would allocate $5 million of relief money for the canal to 'forever make it unnecessary for seagoers to risk their lives in circumnavigating Florida's long, hurricane-blistered thumb.[w14] Two days later, work began on the sea-level project recommended by the Interdepartmental Board under provisions of the Emergency Relief Appropriation Act of 1935.[15] In this extraordinary manner, the long-unauthorized cross-Florida canal obtained its first funding.

Shocked by the sudden turn of events, canal opponents rallied, playing on the public anxieties over the underground water supply. Alarmed truck farmers and fruit growers formed the Central & South Florida Water Conservation Committee. The published advertisements asking, "What Will You Do Without Water?"[16] Disturbed by the growing opposition, Roosevelt announced on December 15 that he would not apply any more relief money to the carol but instead would ask Congress to fund it, thereby divesting himself of the responsibility for proceeding with the controversial project. Congress, however, chose not to appropriate funds for the project. In September, 1936, after $5.4 million had been expended and three percent of the project completed, operations were discontinued.[17]

Even the Army Engineers were unable to reach any consensus on the canal issue. The Chief of Engineers appointed a Revisory Board to review the various conflicting reports submitted to date. On November 1, 1936, the Revisory Board recommended the sea-level canal be completed to a 33-foot depth at an estimated additional cost of

$157,585,000. A month later, the Board of Engineers for Rivers and Harbors held a public hearing after which its members determined a ship canal would shorten the route by "somewhat less than 1 day's steaming time, " preferred a lock canal instead in view of potential damage to underground water supplies , estimated its cost at $263,838,000, and concluded the canal was not economical y justified. In April, 1937, Chief of Engineers Major General Edward M. Markham disagreed, stating he considered a sea-level 33-by-4OO-foot ship canal worthy of favorable consideration based on the combined justification of unemployment relief and navigation improvement. Markam based his divergent recommendation on the timely notion that "employing those who would otherwise require relief" would, when labor expenditures were deducted from the capital investment in the canal, yield a "handsome profit in benefits to shipping."[18]

Congress took no further action on the canal issue until World War II, when German U-boats began sinking American vessels traveling along the coast. Early in 1942, Congress asked the Corps of Engineers to review the project in light of the military situation. By June, the Chief of Engineers and the Board of Engineers for Rivers and Harbors agreed that the value of a 12-by-150-foot barge canal across Florida would "in time of war, together with the prospective benefits to be anticipated in normal times, " be " sufficient to warrant its construction. "[19] Route 13-B remained the preferred course, following the St. Johns River to Palatka, the valley of the Oklawaha River to the divide, and the Withlacoochee River to the Gulf. Locks along this route would protect the ground water supply. On July 23, 1942, the cross-Florida canal was authorized at long last in the interests of national defense as a high-level lock barge canal. This approval was included in the same act that authorized the enlargement and extension of the existing Gulf Intracoastal Waterway and the $93 million appropriation provided was applied to other features of the act, rather than to the cross-Florida canal project .[20]

Gradually, wit bout funding, the project fell into the "inactive" category. In 1958, the Army Engineers reported that an economic restudy yielded economic justification for the first time. Two years later, more hope for the cross-Florida canal appeared as presidential candidate John F. Kennedy came out in its favor. Appropriations finally began in 1962, plans were revised , and construction resumed on February 24, 1964.21

Still more problems lay in store for the controversial canal. As work across Florida continued through the 1960s, an urgent concern to preserve the environment swept across the country, giving long-standing canal opponents a restocked arsenal of ammunition and adding opposition from new quarters. The rail roads and the conservationists joined forces, claiming the 12-by-150-foot barge canal would drown a hardwood forest, threaten vegetation and wildlife dependent on an annual flooding cycle, and upset the hydrologic equilibrium. Further, they predicted the formation of "a series of stagnant, weed-clogged ponds" that would lead to use of herbicides and pesticides, in turn, polluting the aquifer. In 1969, the

Environmental Defense Fund, a legal action group, filed suit against the Corps of Engineers on behalf of a local organization, the Florida Defenders of the Environment. On January 15, 1971, U.S. District Judge Barrington Parker ruled the Corps had not complied with the National Environmental Policy Act of 1969 and issued a preliminary injunction. Four days later, citing the advice of the Council on Environmental Quality, President Richard M. Nixon stopped the project .[22]

By canceling a congressionally authorized project to which $50 million in federal funds and $12 million in state funds had already been committed, the President's order “broke with precedent" and “violated political protocol. "[23] Nevertheless, new work on the canal halted abruptly on January 20, 1971, with about one-third of the 107 -roil e waterway completed. No further work has been undertaken since that time and prospects for the future of the cross-Florida canal seem dismal at this writing. Indeed, whether "The first shall be last” remains to be seen.

DRAINAGE AND NAVIGATION

Ironically, before shovels unearthed the first cubic yard of dirt for the controversy al cross-Florida barge canal excavation, developments in the southern part of the state actually led to the creation of an inland waterway between the Atlantic and the Gulf. The Okeechobee Waterway, however, came into existence more for purposes of drainage and land reclamation than for navigation .[24]

The Florida peninsula ranks as somewhat of a geological newcomer, having thrust its land mass above the sea a relatively short 19 million years ago. Sane time after that, huge covers of ice blanketed much of North America. Although these glaciers did not reach Florida, their great thaws washed melting ice water over much of the land, leaving an indelible mark on the geography of the peninsula. Okeechobee remained as a large, circular depression in the limestone, filled with fresh water. When rains filled the lake beyond capacity, they overflowed its low southern shores to nourish the unique, 50-mile-wide river of grass called the Everglades. This saw-grass marsh sweeps 100 miles southward in a dense, broad curve to the tip of the peninsula .25

The Indians named the lake "Okeechobee" which means "big water ." Indeed, the great lake contained more water than the Everglades alone could carry off, so the water seeped and spilled eastward to fill a swamp called Loxahat thee Slough and westward to form the headwaters of the Caloosahatchee River. When flood waters swelled within its hanks, the Caloosahatchee rose and overflowed the surrounding country to the north and to the south. In its natural state, this extreme southeastern appendage to the United States offered few enticements for human habitation; nevertheless, its history shows that , one way or another, man was determined to make it fit .[26]

Florida gained statehood in 1845. Over the next five years, its population grew from 57,951 to 87,455. In June, 1847, scholarly Buckingham Smith gathered information on the Everglades. His report, published by Congress in 1848, naively presented the feasibility of drainage. The year 1850 saw passage of the Swamp and Overflow Land Grant Act that provided for states to reclaim "swamplands" within their borders. Five years later, the Florida legislature empowered a Board of Internal Improvements to secure the federal grants and handle disposition of the swamplands. Proceeds from sales formed an Internal Improvement Fund to be applied exclusive y to land reclamation by use of levees and drains. At that time, however , the Everglades wilderness had attracted few settlers and the matter of drainage demanded less attention than continuing Indian problems and growing sectional strife within the country.

After the Civil War, the state's Internal Improvement Fund was heading into receivership, its money lest in interest guaranteed on prewar bonds for dilapidated railroads. Everglades property was being offered for thirty to forty cents per acre and no one was buying. During the 1870s, various s themes and scandals arose over the Everglades. Involved in one shady deal, Republican Lieutenant Governor William H. Gleason was ousted from office. He went on to petition the Internal Improvement Fund's Board of Trustees for swamplands that he intended to drain and he set up the Southern Inland Navigation & Improvement Company to claim free grants from the state. Gleason's accomplishments did not match his expectations , however, and nothing came of this scheme.

In 1878, unusually heavy rains fell throughout South Florida, inundating the Caloosahatchee valley for most of the year. Settlers, driven from their homes and tropical fruit placations on the rich hummock lands lining the river, asked the government to investigate drainage possibilities for the valley and the feasibility of lowering the water level in Lake Okeechobee. Assistant Army Engineer J. L. Meigs led a survey party up the Caloosahatchee River in March, 1879. Floating masses of water-lilies, wild lettuce, and "careless weeds" impeded the survey boat? s progress and the party reluctantly abandoned its attempt to enter Lake Okeechobee. Meigs recognized that the greatest advantage to be derived from draining the saw-grass marsh along the lake and the river would be reclamation of rich, black loam, particularly desirable for growing sugar cane. He concluded the sparse population along the river, largely engaged in raising cattle, did not provide commercial justification for improvement along the length of the river; he advised instead dredging between the mouth of the river and Fort Myers (population 150), indicating this "would satisfy all the needs of commerce for many years to come."[29] In 1882, Congess adopted his recommendation and authorized a project for a 14-mile-long channel from the Gulf to Fort Myers. This 7-foot-deep canal was completed by August , 1885.30

Still striving for drainage, state officials approached Hamilton Disston, a wealthy Philadelphian who was interested in Florida's undeveloped resources. Governor William D. Bloxham, president of the

Board of Trustees of the Internal Improvement Fund, persuaded Disston to purchase 4 million acres of swamplands for $1 million, thereby rescuing the insolvent fund from receivership. Disston and his friends formed the Atlantic and Gulf Coast Canal and Okeechobee Land Company to drain and improve this acreage west of Lake Okeechobee .[31] Disston's engineers went to work in 1882, starting at Fort Myers, dredging up the Caloosahatchee River to its headwaters, and cutting through the dense marsh to Lake Okeechobee. Although this improvement was not specifically designed to benefit navigation, it opened a 300-mile-long water route from the Gulf to the interior via Caloosahatchee River, Lake Okeechobee , and on up the Kissimmee River .[32] By 1887, the Army Engineers reported that steamers navigated the route at “irregular intervals" and regular trips were anticipated within the coming year.[33]

Disston's company dredged only the one canal. Even before 1882 had ended, an agent for the Internal Improvement Fund reported to the trustees in Tallahassee that Disston's two dredges would not be able to drain all the Everglades. In 1885, the trustees appointed a committee to study Disston's results. This committee produced the classic statement: "The reduction of the waters is simply a question of sufficient capacity in the canals which may be dug for their relief."[34] Future experience would show that the matter was by no means so simple.

Residents of the Caloosahatchee valley sought improvement of the upper reaches of the river by removal of snags and overhanging trees. Congress appropriated $4,000 for this purpose on August 5, 1886. By this time, however, sane local citizens had grown fearful that the increased volume of water in the river resulting from Disston's canal company operations threatened to overflow their lands and they urged the federal government to make no improvements that would increase this danger. In response, the Army Engineers modified the federal project for the upper river and completed the work in 1891. The threat from the Disston company when the financial depression of 1893 put a halt to further operations, and three years later Disston died.[35]

Meanwhile, another set of participants had joined the unfolding drama of the Everglades. Land value was approaching seventy cents an acre in 1879, when the state legislature decided to grant sections of swampland to railroad and canal companies along with the purchased rights-of -way. With Henry B. Plant and Henry M. Flagler leading the way, an era of intensive railroad building began. By the early 1900s, the rail roads controlled the Everglades, the Internal Improvement Fund had no money, and Everglades lands were not selling. Governor William S. Jennings sought a legal remedy to this situation, maintaining that the rail roads had received swamplands to which they were not entitled and the present trustees should not be bored by unfulfilled obligations assumed by former trustees. The trustees declared the previous issues of land to the railroads and canal companies invalid. On April 23, 1903, the United States government issued a patent to the Internal Improvement Fund trustees for more than two million acres of

Ever glades land. The rail roads promptly filed suit, but the Supreme Court five years later decided the superior title vested in the trustees.[36]

A local sheriff, and gunrunner in the Spanish-American War, Napoleon Bonaparte Broward, succeeded Governor Jennings. In his dramatic campaign, Broward swore that all the Everglades could be drained at a cost of one dollar per acre. After his election* he requested that the state legislature create a Board of Drainage Commissioners. Consisting, as did the Board of Trustees of the Internal Improvement Fund, of the state governor, comptroller, treasurer, attorney general, and commissioner of agriculture, this board was established on May 27, 1905. The commissioners were empowered to drain and reclaim swamplands, levy drainage taxes, and create drainage districts. In November, 1905, two new dredges constructed by the state went to work on the New River. The Everglades Drainage District was created on May 28, 1907, and empowered to levy taxes on the land around Lake Okeechobee. The following year, Governor Broward announced plans to build four more dredges. Everglades land value rose to five dollars an acre. Speculators jumped into the act, settlers flocked to the banks of the Caloosahatchee, land prices soared to a range of twenty to fifty dollars an acre, and soon 15,000 people inhabited an area where formerly there had been 12 landowners.[37]

The Everglades Drainage District based its operations on plans contained in a report known as the I sham Randolph Report, submitted by the Florida Everglades Engineering Commission to the drainage district board of trustees on October 25, 1913. Althuogh drainage was the name of the game, navigation received incident al benefits. Dredging of the St. Lucie Canal east from Lake Okeechobee to the St. Lucie River quietly provided the final cut in a waterway crossing the Florida peninsula. By January 1, 1927, the district had constructed 486 miles of canals and levees plus fourteen concrete locks and dams. A levee skirted the southern, southwestern, and southeastern shores of Lake Okeechobee; four main drainage canals extended from the lake to the Atlantic Ocean and several auxiliary drainage canals had been dredged. Florida had spent more than $14 million, but drainage of the Ever glades continued to present a persistent and unsolved problem .3[8]

Two natural disasters demonstrated the inadequacy of these local protective measures. A hurricane on September 17-18, 1926, blew water across the southwestern rim of Lake Okeechobee, smashing the muck dikes built to keep Moore Haven dry. Several hundred people lost their lives. Another storm in the fall of 1928 lashed out even more savagely, inflicting more extensive property damage and killing approximately 2,000 persons. Whet her this unique swampland was meant for human use and habitation was no longer the point at issue. Everglades land was now valued at ninety-two dollars an acre. The struggling local interests sought help from the federal government to protect their considerable investment in the area .39

Navigation had long been a fringe benefit of the drainage efforts in southern Florida. In 1888, Army Engineers recognized that the inhabitants of the Caloosahatchee River valley were "entirely dependent on the river for the carriage of all heavy freights and bulky products."[40] Citrus growers, sugarcane farmers, and cattlemen had used the river for years. Thus, when federal aid for the Caloosahatchee valley and Lake Okeechobee area finally came, Congress attempted to achieve a combination of flood control and navigation objectives. Under provisions of the Rivers and Harbors Act of July 3, 1930, a shallow-draft channel dredged along the southern shore of Lake Okeechobee furnished material used to build a 31-foot-high levee; the levee was designed to provide the long-sought protection for the flood-prone areas around the lake's southern borders. Project modification under the Rivers and Harbors Act of August 30, 1935 called for the United States to maintain the completed works and to bear the cost of drainage structures except for $500,000 to be raised locally. By 1937, a navigable channel with minimum dimensions of 6 by 80 feet connected the Gulf with the Atlantic Ocean.[41] A beneficiary of the demand for relief from flooding, the Okeechobee Waterway constituted a potential link in the growing system of inland waterways.

THE FLORIDA GULF COAST

The next part of Florida logically begging for intracoastal waterway development ran along the western coast of the peninsula. By the middle of the 1930s, with the Atlantic Inland Waterway completed and the connecting Okeechobee Waterway nearing completion, operators of commercial barges, pleasure and excursion boats, and fishing vessels sought a suitable western exit from which they could continue protected passage northward. With a population of more than 300,000, the coastal area seeking the waterway improvements included the cities of Tampa, St. Petersburg, Sarasota, Fort Myers, Clearwater, Bradenton, and Tarpon Springs. Catering to a large tourist trade, this region produced citrus fruit, vegetables, livestock, lumber, fish, lime, and phosphate rock. Local interests requested the improvement of an inner waterway “as a link in the Intracoastal Waterway from Boston to Corpus Christi." Although some scattered improvements had been accomplished earlier, no comprehensive project existed for Florida's Gulf coast. In 1935, Congress authorized the first preliminary examination and survey for an intracoastal waterway from the Caloosahatchee River north to the Withlacoochee River.

Geographical features tended to divide the Gulf coastline of the peninsula into two naturally distinct sections. Directly north of the Caloosahatchee River, a chain of inlets or passes between the barrier islands and the coastline composed an almost continuous "inside" waterway, extending 148 miles north to the Anclote River. Above the Anclote River, the shoreline lay directly exposed to the action of the Gulf; however, because the water deepened very gradually along this reach and waves dissipated far offshore, small vessels could navigate safely in the open waters under normal weather conditions. In stormy weather, entrances at the mouths of the Homosassa, Crystal, and Withlacoochee rivers afforded refuge.[43]

The first federal project for intracoastal navigation along Florida's Gulf coast consisted of dredging a 5-by-100-foot channel in Sarasota Bay, to run south from Tampa Bay to Sarasota. In 1890, when Congress appropriated $5,000 for this purpose, channel limitations restricted exportation of the region's rich abundance of agricultural products. Below Sarasota, farmers required only a 3-foot-deep channel to carry their goods to Little Sarasota Pass or to Sarasota, where they could connect with the Tampa Bay steamers. A modification of the Sarasota Bay project in 1896 extended the improvement south to Caseys Pass with a 3-by-75-foot channel. In 1907, this project was extended further to Venice. By 1917, two-thirds of the 3,841 tons (brick, canned goods, groceries, cement, corn, feed, fertilizer, fish, flour, grain and hay, ice, lumber, refined oils, shingles, and miscellaneous merchandise) transported on this waterway moved between Sarasota and Tampa. Two years later Congress provided for a relocated 7-foot-deep channel above Sarasota.[14]

Northward along the coast, Boca Ciega Bay, the Narrows, and Clearwater Harbor formed the basis for an inland waterway from Tampa Bay to the Anclote River. In 1910, Congress adopted a project to improve this stretch with a 7-by-100-foot channel from Tampa Bay into Boca Ciega Bay and a 5-by-50-foot channel on to Clearwater Harbor. Legislation in 1919 provided for channel dimensions of 8 by 100 feet from Boca Ciega Bay to Tampa Bay. Army Engineers completed this channel enlargement in 1920.[4]5

In 1939, the Board of Engineers for Rivers and Harbors recommended an intracoastal project, 9 feet deep and 100 feet wide, reaching from the Caloosahatchee River north to the Anclote River. The Board saw the proposed waterway as a connecting link in the Boston-to-Corpus Christi intracoastal system and argued that it would facilitate economical collection and distribution of freight for the deep-water harbors on the western coast of Florida. As proposed, the Calootsahatchee-to-Anclote waterway would incorporate the improvements already made in Sarasota Bay, Caseys Pass, and the channel from Clearwater Harbor to Tampa Bay. For the 45 miles from the Anclote River to the Withlacoochee River, the only recommendation for improvement consisted of marking a route along the 12-foot depth in the Gulf and constructing and maintaining suitable harbors of refuge. The South Atlantic Division Engineer, Colonel Jarvis J. Bain, estimated the potential commerce of the waterway would be at least 202,000 tons annually.[46]

World War II delayed funding for Florida's intracoastal waterway until 1945, and its authorization then included the usual provision that local interests furnish all lands needed for the project. Accordingly, in 1947, the Florida legislature created the West Coast Inland Navigation District, empowered to levy taxes for land procurement. During the interim, however, a number of fine homes and apartment houses had been built on or near the originally authorized route through Venice, raising land values considerable. Moreover, local interests objected that the original route would cut off the rapidly growing population of Venice from the Gulf and its beaches.

The desirability of adopting an alternate route and revising the cost-sharing arrangement between the federal government and local interests generated modifying legislation in 1948, 1950, 1954, and 1957. Terms of local compliance were resolved in 1959 and dredging began in June, 1960. The final segment dredged in the 151-mile waterway was the alternate route known as C-1. Completed in January, 1967, this 5-mile alternate passageway cut inland, encircled most of the city of Venice, and then rejoined the original route north of Lemon Bay.[47]

Project modification in 1962 incorporated maintenance of the Sunshine Skyway Channel that had been created from a borrow pit for bridge fill and ran parallel to the bridge, across the entrance to Tampa Harbor. The following year, another modification provided for construction of a channel for small craft, 6 by 80 feet, in Boca Ciega Bay. Called Cats Point Channel, this smaller channel was designed primarily to serve recreational vessels, affording a shorter route to the harbor of refuge at St. Petersburg. Within two years after its completion, the Florida intracoastal waterway carried 418,268 tons--more than twice the tonnage estimated when the Army Engineers first recommended the project. Commerce has risen steadily since then, totaling 1,568,618 tons in the year 1978. As may as 152,986 passengers have traveled on this waterway in a single year.[48]

With completion of the main channel of the Florida intracoastal waterway in 1967, the only stretch on the Gulf Coast not incorporated into the existing 25,000-mile network of inland waterways lay between the Anclote River and St. Marks. In 1968, Congress authorized a waterway 12 feet deep and 150 feet wide to extend from St. Marks to Tampa Bay, overlapping the upper 43 miles of the Florida intracoastal waterway. Shortly after passage of this legislation, however, growing concern over environmental preservation cast a new light on the impact of many waterway projects. As a result, construction of the cross-Florida barge canal ceased in 1971 and the GIWW segment between Carrabelle and St. Marks, authorized in 1937, has still not been constructed. Work on the final connecting link, south of St. Marks, never began. Disposal of excavated material along the shoreline posed major environmental problems, giving Floridians cause to reconsider their local sponsorship. Lack of progress on the Carrabelle-to-St. Marks channel, directly to the north, and discontinuation of the cross-Florida barge canal further detracted from the proposed channel. In the end, the state decided not to sponsor it. Vessels continue to ply the open waters of the Gulf south of St. Marks and the project between St. Marks and Tampa Bay remains authorized but not funded.[49]

Unlike other portions of the inland waterway system intended to connect far-distant points, the Florida intracoastal waterway functions mainly for short hauls. Along this route, barges carry commodities to the nearest seaport, where they can be transferred to ocean-going vessels.[50] Recreational use of the channel is heavy and commerce continues to increase. Meanwhile, the fate of the continuous waterway as originally conceived awaits resolution.

Chapter V

UNFINISHED BUSINESS

For the past thirty years , a continuous inland waterway along the Gulf Coast has been a practical reality. Undergoing occasional modification, realignment, enlargement, and extension into new tributary channels, the GIWW has functioned as a full-fledged member of the system of national waterways. Whether or not this inland waterway has justified its creation poses an appropriate question. Numerous yardsticks and complex formulae are applied to measure the ramifications of the GIWW. Assessments are couched in terms of the canal's economic, social, recreational, and environmental effects. While some consequences of the waterway are subtle and indirect, others point clearly to distinctive trends and incontestable conclusions. Still others raise fresh concerns and questions for the future of water resources development in general and for the GIWW in particular.

AN UNQUALIFIED SUCCESS

Because the earliest justifications for embarking on waterway projects were based on economics, an evaluation of the GIWW should first consider its economic impact as seen in the quantities of cargo transported along the main channel from Apalachee Bay to Brownsville. Here, the GIWW has greatly surpassed, by a factor exceeding twenty, the most optimistic original projections for its potential. Tonnage statistics tell the waterway's success story in no uncertain terms. In 1949, the year this channel was completed, the GIWW carried slightly more than 28 million tons.[1] By 1972, this channel carried almost 109 milliom tons with the Morgan City-Port Allen alternate route accounting for an additional 19 million tons.[2] Through the remaining years of the 1970s, tonnages decreased slightly and leveled off, possibly due to such phenomena as energy shortages, changes in patterns of petroleum distribution and importation, and national economic difficulties.

The ratio between the benefits the waterway produces and the cost of its construction offers another evaluation of a navigation project. Construction costs for inland waterways vary greatly, depending on such factors as extent of local cooperation, availability of rights-of-way, and technical considerations related to specific geographical conditions of the area. The average construction cost of the Gulf Intracoastal Waterway, less than $300 thousand per mile, presents a modest contrast to portions of the upper Mississippi and Illinois waterways that cost $7.2 million and $8.1 million per mile, respectively. Estimated at 26 to 1, the GIWW benefit-cost ratio places this waterway in a truly enviable position.[3]

Analyzing GIWW usage by channel segments generates still another perspective on the impact of the waterway. Each channel segment has developed trade patterns individually suited to its unique commercial characteristics. As a result, economic development along the GIWW does not occur uniformly. Tonnage statistics for the year 1979 (Table 1) show the differences among the three major reaches of the main channel.[4] These figures leave little doubt that the portion of the waterway west of the Mississippi River has had the greatest impact on commercial. activity.

Table 1

CARGO TRANSPORTED BY SECTION OF GIWW IN 1979

Channel Section	By Weight (in millions of tons)	By Weight and Distance (in million of ton-miles)
Apalachee Bay to Panama City	3.0	310
Panama City to Pensacola Bay	5.0	510
Pensacola Bay to Mobile Bay	7*9	371
Mobile Bay to Mississippi River	21.2	2,167
Mississippi River to Sabine River	55.9	8,446
Sabine River to Galveston	42.9	2,725
Galveston to Corpus Christi	22.4	2,451
Corpus Christi to Mexican Border	2.5	306

Cargo transported into two or more sections is counted in the weight total for each section.

THE GIWW IN TEXAS

Texas contains the longest section of the waterway. More than 400 miles of the GIWW are located in Texas, connecting the state's deep-water ports and industrial complexes with the markets of the Midwest. Commercial growth on that section has been striking, with the 5,481 million ton-miles carried on the GIWW in Texas in 1979 representing a doubling of the combined weight and distance figures of 1961.5 The direct economic contribution of the GIWW to the state of Texas has been calculated at an annual $1.8 billion. This includes the value of cargo to ports, expenditures on the waterway itself, and the economic impact of water transportation and water transportation industries. The combined direct and indirect economic impact of he GIWW for Texas has been estimated at nearly $19 billion annually.[6]

Many factors reflect the influence of the GIWW on the Texas economy. Its contributions include more jobs, greater income, increased tax revenues for local communities, energy savings, and reduced prices of consumer products. Between 1950 and 1975, industrial interests established nearly nine thousand waterside plants along the banks of the GIWW, attracted by the proximity to raw materials, good transportation, and the availability of skilled labor

supply, land, and water resources. At a time when unemployment was rising and many plants were cutting back production, 301 new plants and expansions appeared along the waterway.[7]

Unlike many other states, Texas exports more goods than it imports. The fact that almost 75 percent of these goods are shipped from the state by water reveals how heavily the Texas economy relies on water transportation. Overall, the impact of the GIWW on Texas port activity is clearly considerable, but the extent to which the GIWW accounts for total commerce at selected Texas ports varies widely (Table 2).9 If this range of commercial activity is viewed as a microcosm for the waterway as a whole, comparable fluctuations may be assumed among other ports along the entire 1,000-mile length of its course.

Table 2
GIWW PERCENT OF TOTAL COMMERCE* AT SELECTED TEXAS PORTS IN 1974

Port	Per cent
Houston	33.1
Corpus Christi	23.4
Beaumont	30.7
Port Arthur	18.7
Texas City	55.3
Freeport	41.6
Galveston	12.4
Matagorda Ship Channel	13.9
Victoria	100.0
Brownsville	62.1
Orange	94.6
Sabine Pass	98.7

*Total commerce at these ports amounted to 273,507,212 tons. Ports are listed by tonnage in descending order.

Recreation adds one further dimension of economic impact. Pleasure craft make approximately 1.5 million trips on the GIWW annually. Because sports fishing, residential development, and tourism all generate benefits for the coastal area, the recreational boating public constitutes another meaningful class of GIWW users.[10]

PEROLEUM AND THE GIWW

Petroleum merits special mention in any discussion of the GIWW. The discovery of oil at Spindletop near Beaumont, Texas, in 1901 shaped the twentieth century development of the Gulf coastal region. The interdependence between the petroleum industry and the GIWW commands attention historically, economically, socially, and ecologically. Refineries and related industries situated their facilities along the coast to be near the source of supply and the availability of water transportation. Impetus provided by the petroleum and, later, the petrochemical industries has changed the

character of the coastal region, causing the emergence of major cities and transforming the Texas coast into an urbanized area.[11]

Petroleum and petroleum products have long dominated the commodity movement along the length of the GIWW. In Texas, petroleum products (33.3 percent), chemicals (21.9 percent), and crude Petroleum (21.6 percent) account for 76.8 percent of total GIWW tonnage. On the bustling channel segment between the Sabine River and Galveston Bay, these petrochemical products compose an even higher 87.2 percent of the total.[12]

The profound upheavals that rocked the petroleum industry during the 1970s are bound to carry implications for the GIWW as well. 'High prices have tamed the industrialized world's appetite for petroleum, restructured traditional energy and economic growth relationships, and triggered an unprecedented search for oil and gas."[13] Price-induced conservation, a frantic scramble for alternate sources of energy, and widespread recession, primarily in industrialized nations, have led to a '*marked decline in free world oil consumption since 1979."[14]

The lag-range effects of these shifts in petroleum prices and consumption are at present uncertain. "Economic forecasts . . . may take second place to political considerations over the coming decade in determining the course of energy balances."[15] Whatever happens probably will be reflected in some changes of commodity flow along the waterway and in changes in waterside plant facilities. Petroleum will almost certainly continue as the predominant commodity, but other commodity groups may well show appreciable relative increases.

KEEPING PACE WITH MARINE TECHNOLOGY

Channel and lock dimensions are the limiting factors determining what vessels can travel on the GIWW. In turn, innovations in vessel technology exert demands to improve the capacities of the waterway. New designs have led to production of larger barges and more powerful tugboats. The standard 900-ton hopper barges of the 1940s gave way to the 1,400-ton-capacity jumbo hopper barges introduced in the 1950s. Today, barges transport cargoes exceeding 2,000 tons on some of our inland waterways.[16] Advances such as containerization and assemblage of barges into integrated tows have further revolutionized waterway operations.

For water carriers to take advantage of these technological breakthroughs, however, the channels must be sufficient to accommodate the new vessels. Currently, navigational restrictions on the GIWW preclude the use of some of the larger barges already in service on other waterways. Lock restrictions present problems for the Louisiana canal. Width restrictions particularly handicap the busiest segment of the waterway--that between the Sabine River and Galveston Bay. The present width of 125 feet restricts maximum tows on the GIWW while other waterways wider than 200 feet can handle barge tows containing as many as forty barges. Congress recognized these limitations as early as 1962 when it approved legislation authorizing enlargement of

the GIWW segment between the Sabine River and the Houston Ship Channel to dimensions of 16 by 150 feet, but a snag in local sponsorship has delayed prosecution of the enlargement.[17]

Ordinarily, a local sponsor assumes responsibility for providing all land needed for construction and maintenance of the project at no cost to the federal government. Further requirements call for the local sponsor to alter pipelines, cables, and other utilities and to construct and maintain containment facilities for dredged material. Whatever requirements are involved, the federal government must be held free from any damage that might result from construction and maintenance of the project.[18]

Before 1975, the GIWW in Texas had no single local sponsor; diverse navigation districts and river and port authorities attempted to coordinate their local efforts with those of the federal sponsor, the Corps of Engineers. The Texas Coastal Waterway Act of 1975 authorized the state to act as local sponsor of the GIWW and designated the State Highway and Public Transportation Commission to act on behalf of the state in fulfilling the attendant responsibilities. The act further mandated the commission to carry out the state's coastal policy, emphasizing the importance of protecting the environment in conjunction with supporting shallow-draft navigation improvements.[19]

The Flood Control Act of 1979 (P.L. 91-611) required a written contract committing a local sponsor for a water resources project to have full authority and capability to pay damages incurred by the project, if necessary. This statutory requirement would pledge the credit of the state, thereby violating the Texas constitution. This conflict between state and federal law has delayed implementation of full state sponsorship in Texas. Senator Lloyd Bentsen attempted to resolve the dilemma by introducing an amendment that would make the payment of damages contingent on the state's legislative appropriations process, but the amendment failed. Until remedial action makes possible the formal conclusion of the necessary contract, the state cannot assume full local sponsorship and enlargement of the Texas GIWW cannot proceed.[20]

THE THIRD WATERWAY AGITATION

If the focus on national waterways policy during the first quarter of the nineteenth century and again during the first decade of the twentieth represented the first two ‘waterway agitations, "the United States may now be experiencing its third such agitation. In 1976, Congress authorized a large-scale, five-year study of the waterways, the first study of its scope since Theodore Roosevelt's administration. Meanwhile, the political climate surrounding navigation improvements and waterways policy has changed dramatically.

The crux of the change relates to the financial question of who will pay for the waterways. Historically, the inland waterway system of the United States has been operated free of tolls or other

charges. Federal costs of construction and maintenance have been funded from general tax revenues with no special contribution from the users of the navigation improvements. This policy was based on the rationale that not only the waterways operators but also the consumers and, thus, the entire country benefited from inexpensive water transporation. Today, an insistent effort to enable the federal government to recover at least a part of the project costs has resulted in the imposition of a four cent users' tax on marine fuel, first levied October 1, 1980.[21]

A bill (S. 1692) passed in November, 1981 by the Senate Water Resources Subcommittee calls for all harbor deepening projects to be financed locally with the federal government paying 75 percent of the operating and maintenance costs. This bill may presage the attitudes of congressmen in 1982 when they grapple with the issue of user charges to recovery similar public investments on the inland waterways. Various forms of cost recovery suggested include the marine fuel tax already in effect, lockage fees, license fees, freight surcharges, and waterway segment tolls. Some authorities claim that, for a waterway like the GIWW, localized fees associated with individual locks or waterway segments could be far more destructive to commerce than broad-based cost-recovery measures.[22]

Beyond these financial considerations, other changes lie ahead for the GIWW. Some mercely pose unanswered questions right now. Construction continues on the tremendous project to connect the Tennessee River with the Tombigbee River despite opposition in Congress, court suits, and huge cost increases. The "Tenn-Tom" waterway would provide the Tennessee Valley with an outlet to the Gulf through Mobile rather than via the virtually parallel Mississippi River, reducing the distance of probable shipments by an average of 40 percent. Proponents insist the Term-Tom, if completed late in the 1980s as projected, could drastically alter current traffic patterns and relieve some of the load on the lower Mississippi River. Also, it might bring some economic activity to the depressed Mississippi and Alabama backwoods through which it is being dug. Opponents argue the potential usage is trivial compared to the less costly Panama Canal. Meanwhile, some signs point to a relaxation of the stringent environmental regulation that have hamstrung so many waterways projects during the last decade. In any event, the movement of greater quantities of coal, as the nation's energy-use patterns respond to higher petroleum prices, may be expected to be a vital component in the development of this probable future tributary to the GIWW.[23]

Local sponsorship may become a more compelling issue in the future. Even if Texas resolves its current conflict, other problems remain ahead. Because almost all Texas exports travel the Louisiana portion of the waterway to the Mississippi River and on to the Midwestern trade markets, conditions on the Louisiana segment of the GIWW directly influence the commodity flow from Texas. The political atmosphere in Louisiana that prompted Roy Miller to campaign so strenuously in the 1920s has not disappeared. Louisiana's major ports

are located on the Mississippi River, not on the GIWW; therefore, Lousiana does not share the same degree of enthusiasm for promoting the canal that Texas does. Recognizing this problem, the Texas State Highway and Public Transportation Commission has announced plans to establish a permanent formal working relationship with its neighboring state to provide the impetus for improvements to the entire GIWW regardless of the state in which they are located.[24]

In the final analysis, the 1,000-mile "ditch" that is the GIWW, so unimposing as it runs quietly along the Gulf coastline, has profoundly affected regional and national economies. The many facets of its impact defy enumeration, much less precise measurement. The complex interrelationships among economic, political, social, and environmental factors that have contributed to the waterway's history will continue to fashion its future. In the face of the almost insurmountable obstacles that long blocked its creation, the transformation of this waterway from an extravagant concept into an invaluable reality may seem miraculous. Now that it is there and adaptable, the Gulf Intracoastal Waterway promises a future that should be fully as fascinating as its past.

CHRONOLOGY

1808 April 4 - Albert Gallatin, U.S. Secretary of the Treasury, submitted his historic report on "Public Roads and Canals" to the U.S. Senate. This important statement of national policy for internal improvements contained a long list of proposed road and canal projects to tie the young nation together.

1824 April 30 - General Survey Act authorized the president to survey routes for roads and canals that he judged to have national import and to employ Army Engineers in this work.

1826 March 3 - Congress authorized first survey for a canal between the Atlantic Ocean and the Gulf of Mexico.

1828 May 23 - Congress authorized the first improvement on the future GIWW, appropriating $18,000 to deepen the channel through Pass au Heron near Mobile Bay.

1830 May 31 - Congress appropriated $10,4OO to complete the survey of a canal to connect the waters of the Atlantic with the Gulf of Mexico.

1832 July 4 - Congress authorized survey for canals to connect bays and rivers from St. Andrew Bay to Apalachicola Bay and from Pensacola Bay to Mobile Bay under a $3,000 appropriation.

1845 Florida and Texas admitted to the Union.

1852 August 30 - Congress appropriated $20,000 for a survey for a ship canal. across the Florida peninsula. In the same act, Congress appropriated $25,000 for construction of a harbor on Lake Pontchartrain near New Orleans.

1873 March 3 - Congress authorized a survey for connecting the inland waters slag the margin of the Gulf from Donaldsonville, Louisiana, to the Rio Grade river, appropriating $20,000. This was the first survey for an inland waterway west of the Mississippi River.

1875 March 3 - Congress authorized a survey for a cross-Florida canal and for an inland waterway to connect that canal to the Mississippi River.

July 10 - Army Engineer Captain Charles W. Howell, reporting on the survey authorized in 1873, presented the first plan for an inland waterway west of the Mississippi River.

1878 June 18 - Rivers and Harbors Act authorized a survey for a "ship-canal" from the St. Marys River to the Gulf of Mexico.

1880 June 14 - Congress authorized another cross-Florida survey, this one for "steamboat communication" from the St. Johns River via Tohopekaliga Lake to Charlotte Harbor.

1887 Project adopted to improve Bayou Plaquemine with dredging and lock construction.

1888 Caloosahatchee Canal opened, linking Lake Okeechobee with the Gulf of Mexico.

1890 Congress authorized construction on Florida's Gulf coast of a 5-by-l00-foot channel from Tampa Bay to Sarasota and a 3-by-75-foot channel from Sarasota to Venice.

1892 Congress authorized a project to enlarge and straighten channel, previously dredged by the state of Texas in 1859, through West Galveston Bay. The new channel, terminating at Christmas point in Oyster Bay, was dredged to dimensions of 3-3.5 feet deep and 100-2OO feet wide between 1893 and 1895.

1897 February 11 - Galveston and Brazes Navigation Company offered its n-mile canal from the Brazes River to Oyster Bay to the federal government. Congress authorized the purchase at $30,000, and the federal government completed the transaction in December, 1902.

1900 Reports of surveys and examinations of certain adjacent streams in Texas-Caney Creek, the San Bernard River, and Oyster Creek--were made with a view toward incorporating them into a network of protected waterways.

1901 Oil discovered at Spindletop, near Beaumont, Texas.

1905 March 3 - Rivers and Harbors Act authorized a second comprehensive round of surveys, thirty years after those of 1873, for an inland waterway from the Rio Grande to the Mississippi River. Future Chief of Engineers Edgar Jadwin, looking at conservative dimensions of 5 by 40 feet, proposed taking advantage of the Bayou Plaquemine improvements and found much of Howell's earlier report still applicable. Jadwin cited coal, rice, oil, sugar, lumber, and cotton as products for which the waterway was likely to prove important.

August 8 - Convention in Victoria gave birth to the Interstate Inland Waterway League, pledged to the goal of a continuous system that would tie together the 18,000 miles of navigable waters extending from the Great Lakes, through the Mississippi Valley, and along the Louisiana and Texas coastlines. The league grew into the Intracoastal Waterway League of Louisiana and Texas, then changed its name to the Intracoastal Canal Association of Louisiana and Texas, and eventually became the Gulf Intracoastal Carol Association, as it is known today.

1907 March 2 - Congress appropriated $89,292 to connect the Bayou Teche at Franklin with the Mermentau River, providing for the first Louisiana segment in the GIWW Main Channel.

President Theodore Roosevelt established the Inland Waterways Commission in response to public pressure for a comprehensive plan to improve and control U.S. river system.

1908 November 30 - Statement by Gulf Division Engineer Colonel Lansing H. Beach favoring improvement of the segment between Brazes River and Matagorda Bay reflected a shift toward a more liberal approach:
"Even should local conditions not be such as to demand the improvement of this portion of the waterways, . . . the fact that it is one link in the chain of waterways paralleling the shore is sufficient . . . to cause the improvement to be made."

1909 March 3 - Rivers and Harbors Act contained a broad, new national policy on coastal navigation by ordering surveys for intracoastal waterways from Boston, Massachusetts to the Rio Grande. The surveys examined the feasibility of a 12-foot-deep channel across Florida and a 9-foot-deep channel along the Gulf of Mexico from St. George Sound, Florida to the Rio Grande.

1910 June 25 - Congress authorized several improvements along the Gulf Coast: from Clearwater Harbor to Tampa Bay, from the Apalachicola River to St. Andrew Bay, and through the Narrows in Santa Rosa Sound between Choctawhatchee Bay and Pensacola. West of the Mississippi River, the act authorized construction of the reach from the Mermentau River to the Sabine River and from the Brazes River to Matagorda Bay.

1912 July 25 - Congress appropriated $50,000 to complete the improvement to the channel connecting Mobile Bay and Mississippi sound .

1919 March 2 - Rivers and Harbors Act carried authorization and appropriation for waterway from the Mississippi River to Bayou Teche, providing the intracoastal waterway with a direct route west from the Mississippi to the Sabine.

1923 March 3 - Rivers and Harbors Act authorized examination and survey of the intracoastal waterway from the Mississippi River at or near New Orleans to Corpus Christi, Texas.

June 1 - In proposing the course of the channel from the Sabine River to Galveston, Gulf Division Engineer George M. Hoffman departed from the earlier principle of dredging through the open bays, defending instead the notion of a landlocked channel to run along and inside the shoreline. This change in philosophy led to eventual relocation of many older channels.

In July, the Intracoastal Canal Association of Louisiana and Texas engaged retired Army Engineer Major General George Goethals to study the commercial potential of a continuous canal through Louisiana and Texas. On November 27, Goethals reported that "the present tonnage possibilities of such a waterway are between 5 million and 7 million tons annually, and this statement is conservative."

1925 March 3 - Congress authorized construction of the "Louisiana and Texas Intracoastal Waterway" to extend as a continuous 9-by-100-foot channel from New Orleans to Galveston Bay. This was the first legislation that treated the waterway as a whole rather than addressing disconnected, discrete segments. At the same time, Congress also called for preliminary examinations and surveys east of the Mississippi River from New Orleans to the Apalachicola. River.

1927 January 21 - Congress authorized extension of the Louisiana and Texas Intracoastal Waterway as far west as Corpus Christi.

1930 July 3 - Rivers and Harbors Act contained the first appropriations for a 9-foot-deep intracoastal waterway east of the Mississippi River. This would afford improved continuous passage from Pensacola Bay to New Orleans. The act also authorized a number of examinations and surveys for various carol routes across Georgia and Florida to connect the Atlantic Intracoastal Waterway with the proposed Gulf Intracoastal Waterway, including a route from Stuart on the Atlantic coast of Florida via the St. Lucie Carol, Lake Okeechobee, and the Caloosahatchee River. Still. another survey called for study of a waterway from Pensacola along the western coast of Florida to the Caloosahatchee River.

1934 Completion of the Galveston-to-Sabine River segment united the Louisiana and Texas portions of the intracoastal waterway.

1935 August 30 - Rivers and Harbors Act provided for 9-foot construction on the remaining segments in the eastern leg of the GIWW, from Apalachicola River to Pensacola. Congress also authorized preliminary examinations and surveys along the western coast of the Florida peninsula from Apalachicola Bay to the Withlacoochee River and from the Withlacoochee River to the Caloosahatchee River "with a view to securing a waterway . . . for the purpose of affording suitable exit to the north for craft using the Okeechobee Cross-Florida Canal."

On Labor Day, a hurricane grounded the S.S. Dixie on French Reef in the Florida Keys. Within a day or two, President Franklin D. Roosevelt allocated $5 minim in relief funds to begin construction of a cross-Florida canal, a project still not authorized by Congress. On December 15, Roosevelt announced he would use no more relief monies for the canal and that Congress could determine the fate of the project.

1936 September - Work on the cross-Florida canal was discontinued as funds were exhausted.

A continuous 9-by-100-foot channel was completed between the Apalachicola River and New Orleans.

1942 The 9-by-100 foot project from New Orleans to Corpus Christi was completed.

July 23 - Congress authorized a high-level lock barge canal across Florida from the St. Johns River to the Gulf of Mexico and provided for enlargement of the existing GIWW to project dimensions of 12 by 125 feet. It also approved “the extension of the GIWW to the Mexican border.

1949 June 18 - Channel completed between Corpus Christi and Brownsville, affording a continuous waterway from Apalachee Bay to the Mexican border.

1962 Appropriations began for construction of the cross-Florida barge canal.

Congress authorized the enlargement of the GIWW between Galveston Bay and the Mississippi River to a 16-foot depth and 150-200-foot widths.

1964 Actual construction resumed on the cross-Florida barge canal.

1968 Waterway from St. Marks to Tampa Bay authorized but not funded.

1971 Work stopped on cross-Florida barge canal for environmental reasons.

1980 October 1 - First fee for GIWW users levied in form of a tax on marine fuel.

NOTES

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All rivers and harbors acts prior to 1938 may be conveniently found in the three-volune compilation, Laws of the United States Relating to the Improvement of Rivers and Harbors from August 11, 1790 to June 29, 1938. All Federal legislation appears in the United States Statutes at Large.

The proceedings of the annual conventions of the Gulf Intracoastal Canal Association provide a useful record of the waterways progress and problems in recent years. An interview with the associations President, Dale Miller, on September 24, 1981 and scrapbooks kept in its Houston office furnished valuable information on the early activities of this organization.

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