



Bird Key/Big Pass 1990



Bird Key/Big Pass circa 1927



Bird Key/Big Pass circa 1885

A Historical Geography of Southwest Florida Waterways

VOLUME ONE

Anna Maria Sound + Lemon Bay



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VOLUME ONE

Anna Maria Sound to Lemon Bay



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Anna Maria Sound to Lemon Bay

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Gus has boated in Florida for 25 years and has cruised the Caribbean, Bahamas and U.S. eastern seaboard aboard a Cheoy Lee Cruisair 35, *La Vida*, which also serves as a self-contained field station for the waterway research. Gus holds a Merchant Marine Master's Ticket (100 tons), and is a 25-year member of U.S. Coast Guard Auxiliary.

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U.S. DEPARTMENT OF COMMERCE
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Sarasota Bay has been described as “Paradise Found” because of the profound natural beauty of the system. The first explorers as well as the first European settlers of southwest Florida were drawn to Sarasota Bay because of the diversity and abundant productivity of the region’s natural resources. These same attributes continue to draw settlers. Whether or not this dramatic area continues to be both compelling and productive has a lot to do with our understanding of the complexity of the Bay system and the ways in which future development can impact the natural environment.

While portions of the Sarasota Bay system have changed little in the past 100 years, in some areas it appears as if society’s primary goal is to see how much we can change nature to meet our needs. Massive dredging and fill projects have reshaped the land and waterways. We have made land where nature did not, and dug waterways in areas nature picked to be seagrass beds.

A historical perspective is necessary if we are to grasp the real effects of this change, for alterations of this magnitude do not happen overnight. Change occurs in seemingly little, yet irreversible steps — a dredging project this year, new waterfront lots the following year. New spoil disposal sites are needed, the vegetation slowly changes and salinity and the natural flushing action of the small bays are altered.

As a society, we have traditionally depended on the geographer and the anthropologist to help us understand that which lies around us in the landscape but which is not readily observable or comprehensible. With this book, author Gustavo Antonini, Ph.D., is giving us a telescope that allows us to look at Sarasota Bay Past as we chart Sarasota Bay Future.

A Historical Geography of Southwest Florida Waterways, Volume One: Anna Maria Sound to Lemon Bay is about the strong relationship between human dreams and the endlessly changing coastal environment. Dr. Antonini unveils the complex story of the past one hundred years of human alterations to this interesting and beautiful area. For those of us who care about the Sarasota Bay system, the historical, environmental, cultural and geographic information provided in this book can help us realize how the aspirations of society can impact the future of this natural resource system. Armed with this information, citizens can do a better job of shaping a future that includes the safeguards needed to maintain a healthy environment and growing communities.

Margaret Davidson
Director, NOAA Coastal Services Center

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But the pull of the Mangrove Coast is not its history, for neither the historians nor its own people have laid claim or put great value on its past. Its attractions lie in its intangibles: the gleam of the white sand, the softness of southwest winds, pink and turquoise sunsets, and the abiding simplicity of its people. In some curious way, the coast has managed to retain a simplicity in standards and outlook that seems to date back to the early days of the century or, perhaps, instinctively to reach forward into the decades ahead of us all.

—The Mangrove Coast
Karl A. Bickel
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INTRODUCTION



The ship's figurehead is a statue or carving decorating the bow of a ship.

The Sarasota Bay system — barrier islands and estuaries from Anna Maria Sound south to Lemon Bay — is perhaps the most precious jewel of the southwest Florida coast. This 56-mile stretch of Gulf of Mexico coastline comprises a generally narrow and shallow string of bays, estuaries, lagoons, inlets and islands.

In some areas the human population densely occupies the shore and even the water; in others, the original occupants — most visibly shorebirds, fish, dolphins and manatees — are often sighted. Some areas have lush seagrass meadows and thriving mangrove islands, while others have barren bay bottoms and shores hardened by seawalls protecting fabulously expensive land that did not even exist mere decades ago. Some areas have shorelines and channels that have changed little in the past 100 years, and others now have extensive waterways created by man.

The Gulf Intracoastal Waterway (ICW) provides direct passage through the entire Sarasota Bay system, linking natural deep water sections through a series of manmade channels, canals and cuts. The ICW was originally intended to facilitate commercial shipping to and along the southwest Florida coast and to join the region with the rest of the intracoastal network that now stretches from Maine to Texas. Today, however, the vast majority of the Gulf ICW's functionality is devoted to recreational activities: power boating, sailing, fishing, water skiing, kayaking and canoeing.

When the U.S. Army Corps of Engineers began dredging in 1890 what would eventually become the ICW, they would hardly have imagined the ultimate extent of the task they had commenced. Alterations to the waterway continue today from Tampa Bay to Gasparilla Sound. The channel, which once hopscotched from one bay to another along sparsely populated mainland shores and virtually deserted barrier islands, punctuated by shallows, oyster bars, mangrove thickets and other barriers originally impassable, would eventually form a continuously navigable waterway for sizable vessels. The ICW's development paralleled — and contributed to — a population boom that remains one of the most vigorous in the United States. Shallow parts of the estuary bottom were dredged and redeposited to enlarge existing islands or create new islets and in many cases covering bay habitats. This newly created shoreline ultimately became highly valued waterfront home sites for thousands of people. At the same time, it altered the environmental characteristics of the estuary, where the fresh water from the land mixes with the saltwater from the sea.



Aerial views of Sarasota Bay.



Sarasota Island Park anchorage.



Sarasota bayfront. October 7, 1926.

Cad'Zan.
John and
Mable
Ringling
winter home.

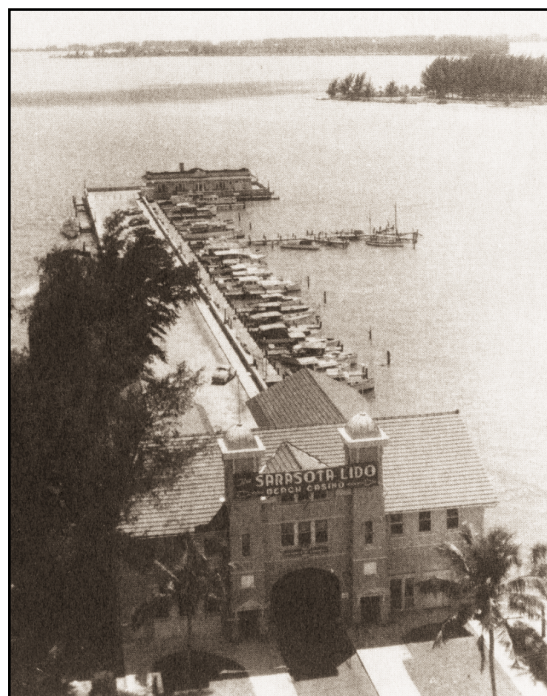


Some of most compelling attractions of the region are the bays and beaches. Sailors find the large, deep reaches of Big Sarasota Bay a perfect “lake” for afternoon regattas. Cruising mariners have safe anchorages scattered throughout the region, and fine waterfront amenities abound. Fishermen wade or boat to thousands of secret holes where they catch redfish, trout, snook, tarpon and many other species. Water skiers slalom in the protected areas near City Island or Skiers Island. The area near Long Bar Point in Big Sarasota Bay is ideal for canoeing and kayaking, and the winding shore of North Casey Key and the nearby Neville Marine Preserve offer some of the nation’s best birding.

From the vantage of the shore or a boat on the waters of the Sarasota Bay system, the dawn sun peeks through the trees on the mainland. During the day, the high buildings of Sarasota, seaside Venice and other urban areas glint kaleidoscopically. Sunsets on the sparkling Gulf of Mexico rival those anywhere on earth. Boaters and shore residents appreciate the beauty of the system, but also see the effects of man’s presence from waterfront development. They have expressed a desire for further insights into the region and for a means to share these insights with each other and with visitors.



Cortez fishing village.



The Hover Arcade, at the foot of lower Main Street in Sarasota, was built by Dr. Walter Hover and two of his brothers in 1913. It was later purchased by the city and housed City Hall. When Sarasota County was created in 1921, the arcade served temporarily as the courthouse. It was destroyed in the late 1960s.

This book and the pocket guide and map, “Sarasota Bay Blueways: Recreational Opportunities around the Bay” provide a window to the past and present Sarasota Bay system. Historical maps and photographs illustrate the changes occurring from the “pre-development” period of the late 1800s to today. The historical development of the ICW is explored, from the first major dredging effort in 1890 to the major residence and business developments of the 1960s and 1970s to the beach renourishment projects of today. Prominent features of the Sarasota Bay system from Anna Maria Island to Lemon Bay are described in words, pictures and maps.

A chapter is devoted to inlets, their dynamics and their importance to the bay system. Distances between these passes that link the bays and Gulf are provided from the mariner’s perspective, as well as to offer a better understanding of the vital role inlets play in the estuarine environment.

A “snapshot” of land-based coastal development and its importance to the bay system uses the city of Venice as an example. With more than 80 percent of the bay water area having changed (deepened, shoaled, disappeared, etc.) in its vicinity, Venice represents the extreme case of altering land and water for shoreline growth.



Beachcombers on Anna Maria Island in the early 1900s.

A juxtaposition of development practices other than Venice is provided in the working waterfront of the village of Cortez. This area, homesteaded in the 1880s by a group of fishermen originally from North Carolina, has changed little in the past 100 years, and many of the village's homes, shops and fish houses are included in the U.S. Registry of Historic Places.

Nautical charts are important tools mariners use to safely reach unfamiliar destinations and to find the way

home. Charting Sarasota Bay describes historical and modern means of determining water depths and locations of coastal landmarks. How marvelous today's hand-held Global Positioning Systems and solid state electronic depth sounders are, compared to the need for almost 7,000 "pole soundings" of Sarasota Bay depths in order to compile a hydrographic chart in earlier times!

Caspersen Beach



Anna Maria Pier and cottages in 1924. Stretching nearly 800 feet into Tampa Bay, the pier also served as a walkway for the two adjacent "cottages." The two cottages later fell into disrepair and were torn down prior to the piers being rebuilt in the 1930s.

The importance of seagrass beds and mangroves is also discussed, and the potential seagrass coverage of 1890s Sarasota Bay is illustrated for comparison with actual distribution today. A map also provides a look at areas of seagrass that have suffered damage, largely from propeller scarring.

The Sarasota Bay system of tomorrow? Through the efforts of federal, state, regional and local authorities, as well as private interests, the Sarasota Bay system is changing. The days of rampant waterfront growth through massive dredge and fill projects have come to a halt. Today, we focus on improving the quality of the bay while maintaining a delicate balance among shore development, waterway use and environmental integrity. We have learned that our actions on the land and water affect bay resources; to our regret, we see that the effects are usually adverse. A growing awareness exists among the area's residents that Paradise could easily be lost without a widespread feeling of stewardship and continuing efforts to restore and maintain the bay. Shorefront zoning changes and regional waterway management systems are being implemented to foster sustainable use, with the ultimate goal of attaining that balance where nature and people can coexist far into the future.



Venice Fishing Pier.

This is the first in a series of publications that will cover the waterways of southwest Florida. Other publications, produced by the West Coast Inland Navigation District and the Florida Sea Grant Program, will explore adjoining waterways. These publications are in support of the State of Florida's Blueways initiative, which is a program to encourage stewardship of the state's recreational waterways.



HISTORICAL DEVELOPMENT OF THE GULF INTRACOASTAL WATERWAY

The Boating Geography of Southwest Florida Before Coastal Development

One must go back in time to 1890 to regain a sense of the pre-development state of the waterway we refer to as the Sarasota Bay system. At that time, this 54-mile reach of the coast, from lower Tampa Bay to Gasparilla Sound, enclosed three separate inland bays of varying navigability (Map 1):

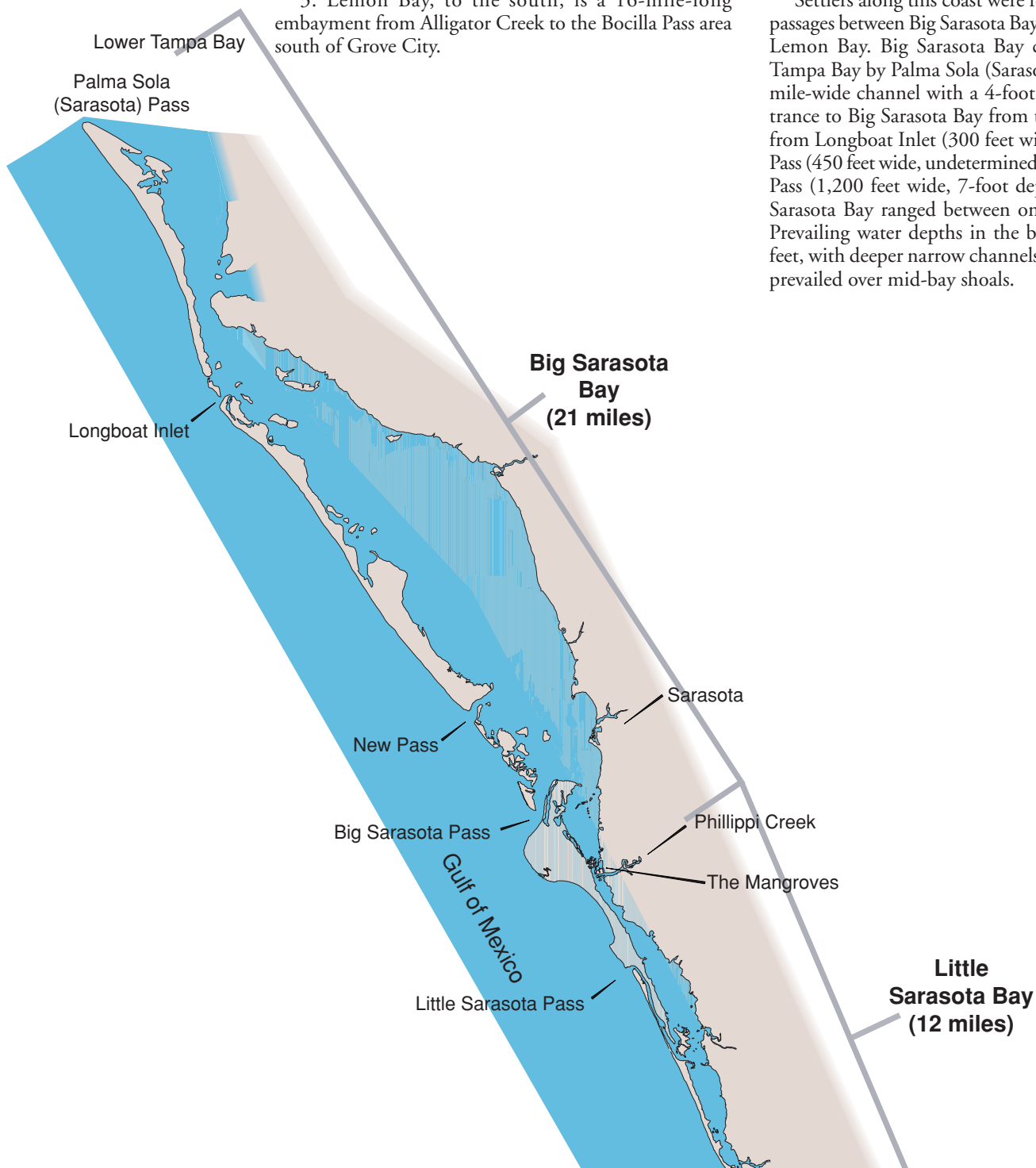
1. Big Sarasota Bay, on the north, is 21 miles long and stretches from Palma Sola (Sarasota) Pass at the mouth of lower Tampa Bay to Phillippi Creek (south of Sarasota);

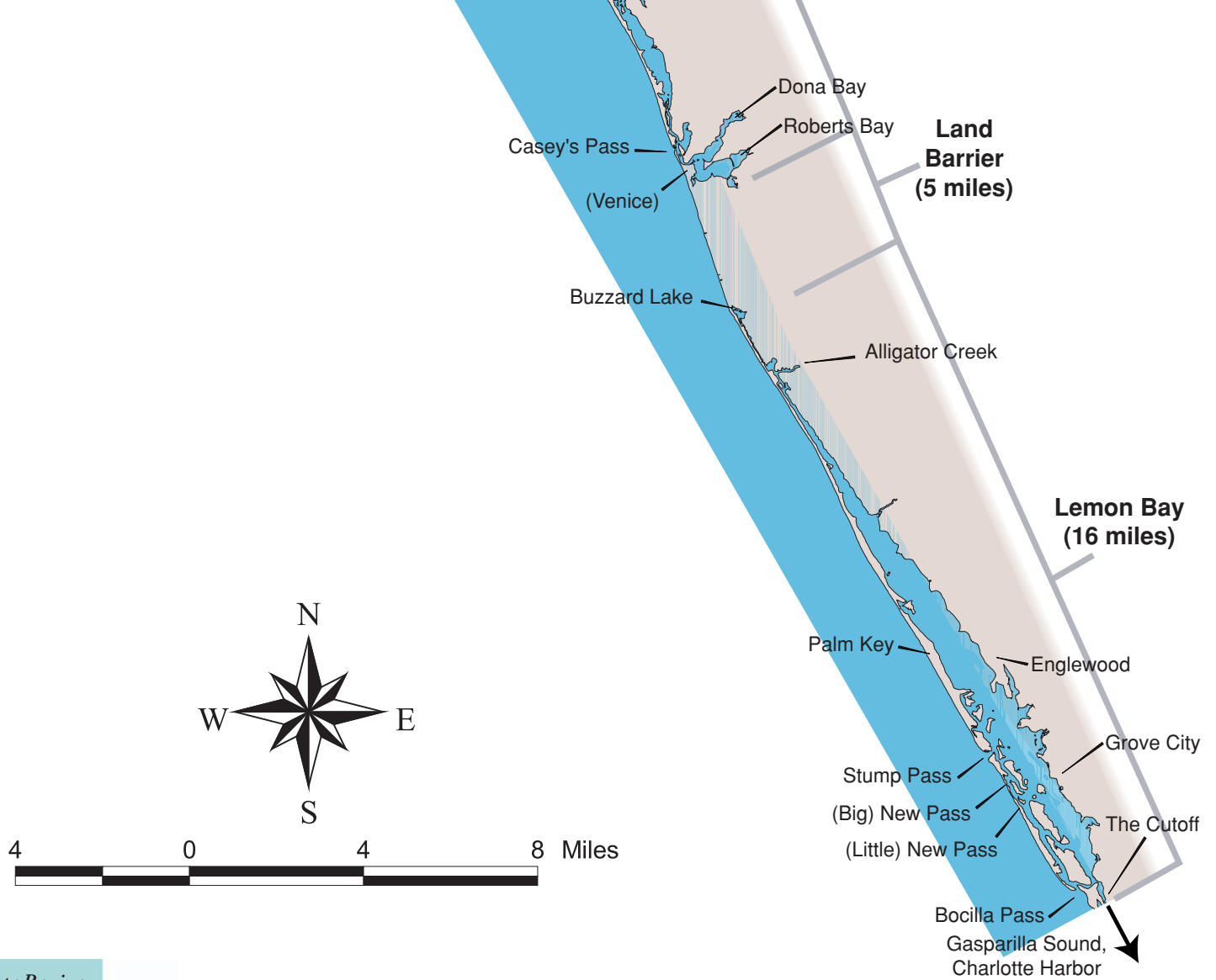
2. Little Sarasota Bay, in the middle, is 12 miles long and ranges from Phillippi Creek to Roberts Bay (present-day Venice);

3. Lemon Bay, to the south, is a 16-mile-long embayment from Alligator Creek to the Bocilla Pass area south of Grove City.

Each of these bays historically was separated from the others through a series of natural barriers. Boat traffic between Big and Little Sarasota Bays was impeded by “The Mangroves,” a cluster of islands at the mouth of Phillippi Creek. The only means of traverse was a crooked, narrow channel barely 50 feet wide and 0.3 mile long that was mostly obstructed by mangroves. The channel was non-navigable at low water. No inside waterway passage existed between Little Sarasota and Lemon Bays. A five-mile land barrier existed from Roberts Bay just below Casey’s Pass to Alligator Creek, which was the head of navigation of northern Lemon Bay.

Settlers along this coast were forced to sail the outside passages between Big Sarasota Bay, Little Sarasota Bay and Lemon Bay. Big Sarasota Bay could be entered from Tampa Bay by Palma Sola (Sarasota) Pass, a natural half-mile-wide channel with a 4-foot controlling depth. Entrance to Big Sarasota Bay from the Gulf of Mexico was from Longboat Inlet (300 feet wide, 5-foot depth), New Pass (450 feet wide, undetermined depth) and Big Sarasota Pass (1,200 feet wide, 7-foot depth). The width of Big Sarasota Bay ranged between one-half and three miles. Prevailing water depths in the bay were from six to 10 feet, with deeper narrow channels near the passes; six feet prevailed over mid-bay shoals.





Map 1.
Boating Geography Before Coastal Development

Sarasota Bay is an estuary — “a semi-enclosed body of water which has free connection with the open sea and within which seawater is measurably diluted by freshwater from land drainage.”

Estuaries are among the most productive of all the earth's systems: more than 80 percent of all fish and shellfish use estuaries either as a primary habitat or as spawning or nursery grounds.



Mariners entered Little Sarasota Bay from the Gulf either by Little Sarasota Pass (90 feet wide, 5-foot depth) or Casey's Pass (90 feet wide, 3-foot depth). These passes were subject to changes both in location and depth, and were entirely closed for short periods. The bay's width ranged from 300 feet to three-quarters of a mile. Depths in Little Sarasota Bay were from 4 to 8 feet, but shoals 1 to 2 feet deep created numerous obstructions. Little Sarasota Bay in the south broadened into two small bays, which extended in an easterly direction. To the west was Dona Bay, to the east Roberts Bay. Dona had a depth of about 5 feet and Roberts from 2 to 5 feet.

Lemon Bay — a long, narrow bay ranging from 200 feet to one mile wide — was separated from the Gulf at its upper end by a long peninsula (Palm Key, also called Palm Ridge), and at its lower end by a range of keys from 50 feet to one mile wide. Passage between the bay and Gulf was available at Stump Pass, 10 miles south of Alligator Creek (controlling depth from 4 to 7 feet), and at [Big] New Pass, a half-mile south of Stump Pass (depth of 7 to 10 feet). Periodically other inlets would be breached, such as at [Little] New Pass, 2.5 miles from the

south end of the bay (2.5-foot depth), and at Bocilla Pass (4-foot depth). Within Lemon Bay, depths ranged from 0.5 to 15 feet. A three-foot draft could be carried from New Pass north to about 2.75 miles above Englewood; from there northward to Buzzard Lake (today named Red Lake) depths gradually shoaled to 1 foot. The southern portion of the bay was also very shallow.

The channel connecting Lemon Bay with Gasparilla Sound to the south was an effective barrier to navigation. This one-mile-long channel, between 40 and 250 feet wide and which dried at low water, was known as “The Cutoff.” An alternate connector route, sometimes available depending on prevailing inlet openings and closings, could be followed by using relict inlet channels leading to and from old Bocilla Pass north to Lemon Bay and south to Gasparilla Sound. Only light-draft vessels drawing less than four feet made the trip from Tampa to Sarasota.

These were the general conditions that prevailed before changes were made by the U.S. Army Corps of Engineers with navigation improvements as the principal goal.

Dredging History of the Gulf Intracoastal Waterway

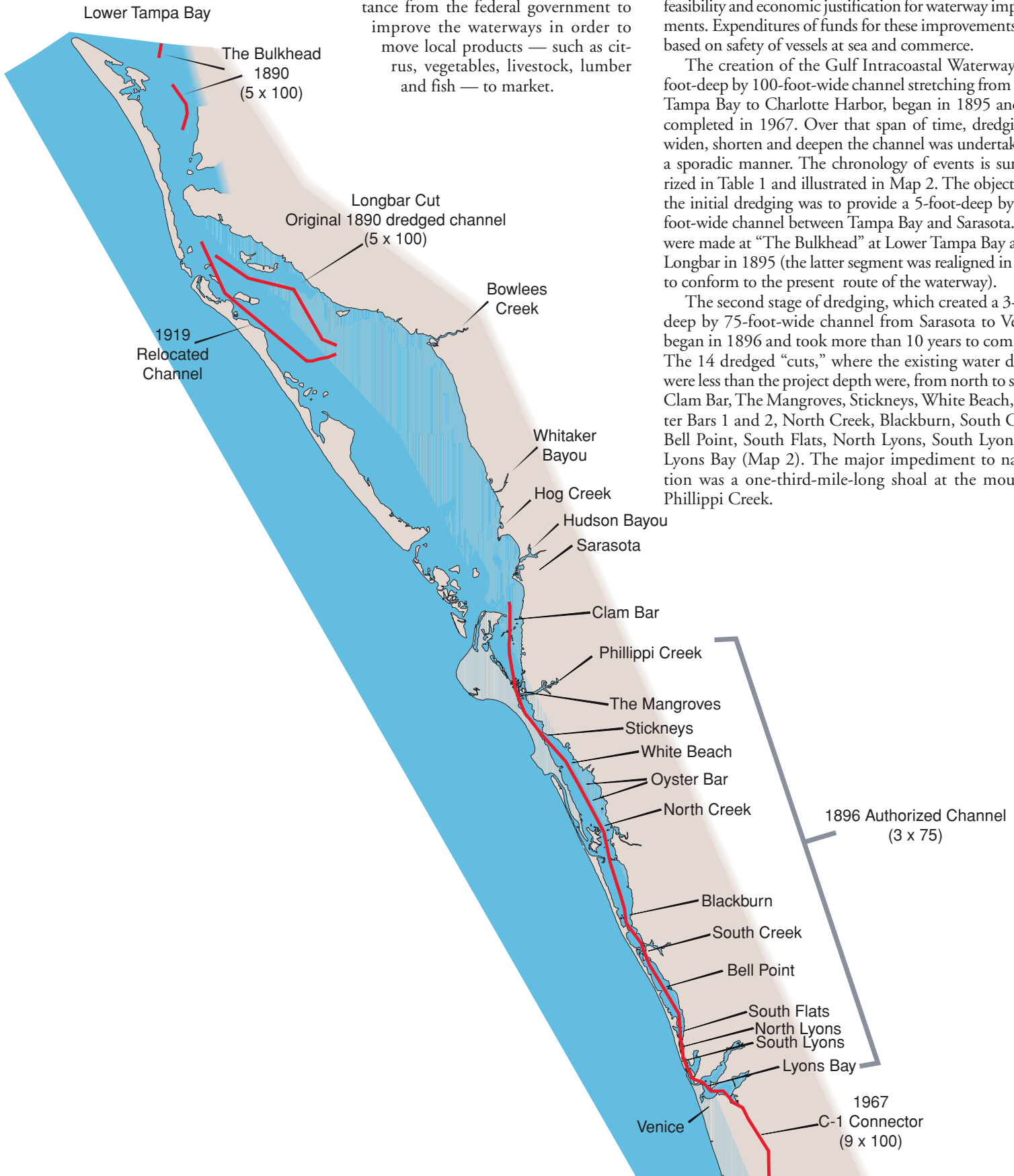


The region's settlers recognized the advantages afforded by an inland navigation route in sheltered waters that could provide safe passage to light-draft vessels unable to withstand the battering of the open Gulf of Mexico. Such an inside passage between Tampa Bay and Charlotte Harbor did not exist during the pre-development period in the late 1800s. As coastal settlements were established, the transport of goods and services became a high priority. Local communities requested assistance from the federal government to improve the waterways in order to move local products — such as citrus, vegetables, livestock, lumber and fish — to market.

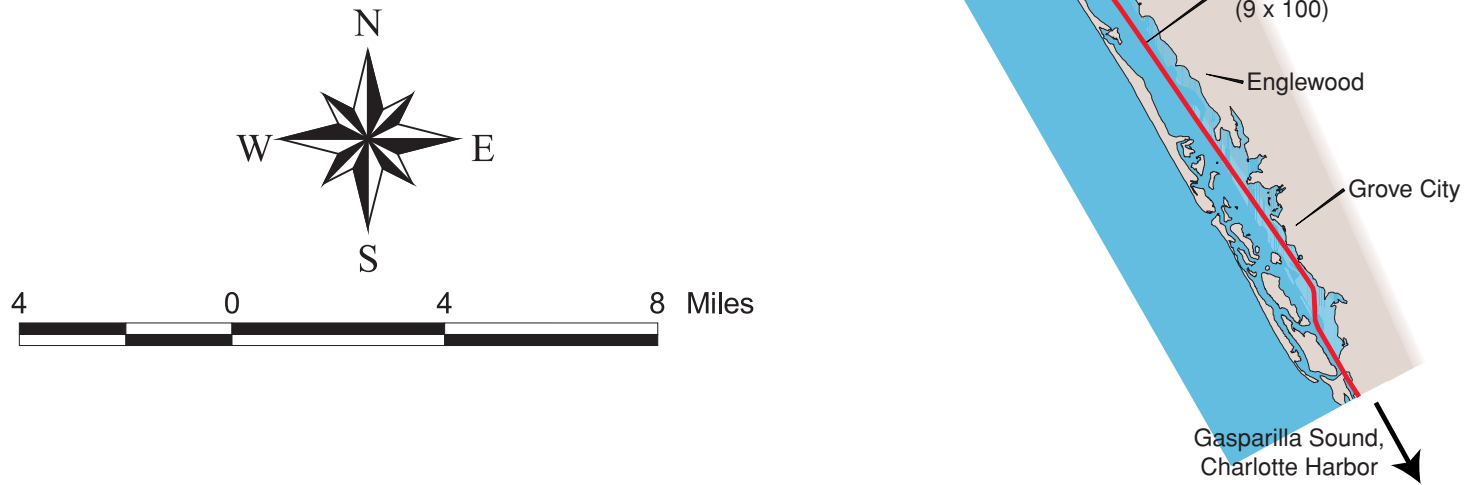
The hydrographic charts produced by the U.S. Coast and Geodetic Survey in 1883 provide an invaluable baseline of information on waterway conditions in southwest Florida. The U.S. Army Corps of Engineers was assigned responsibility for surveying and improving waterways judged to have national importance through the General Survey Act of 1824 and the Rivers and Harbors Act of 1878. In 1889 the Corps undertook the first in a series of detailed field studies to determine the engineering feasibility and economic justification for waterway improvements. Expenditures of funds for these improvements were based on safety of vessels at sea and commerce.

The creation of the Gulf Intracoastal Waterway, a 9-foot-deep by 100-foot-wide channel stretching from lower Tampa Bay to Charlotte Harbor, began in 1895 and was completed in 1967. Over that span of time, dredging to widen, shorten and deepen the channel was undertaken in a sporadic manner. The chronology of events is summarized in Table 1 and illustrated in Map 2. The objective of the initial dredging was to provide a 5-foot-deep by 100-foot-wide channel between Tampa Bay and Sarasota. Cuts were made at "The Bulkhead" at Lower Tampa Bay and at Longbar in 1895 (the latter segment was realigned in 1919 to conform to the present route of the waterway).

The second stage of dredging, which created a 3-foot-deep by 75-foot-wide channel from Sarasota to Venice, began in 1896 and took more than 10 years to complete. The 14 dredged "cuts," where the existing water depths were less than the project depth were, from north to south, Clam Bar, The Mangroves, Stickneys, White Beach, Oyster Bars 1 and 2, North Creek, Blackburn, South Creek, Bell Point, South Flats, North Lyons, South Lyons and Lyons Bay (Map 2). The major impediment to navigation was a one-third-mile-long shoal at the mouth of Phillippi Creek.



Note: (9 x 100) = Channel dredged to 9-foot depth and 100-foot width



Map 2.
Dredging History of the Gulf Intracoastal Waterway

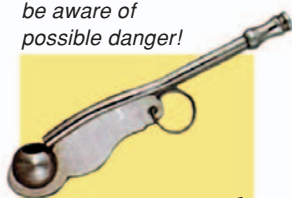
Historical Synopsis of the Gulf Intracoastal Waterway in Southwest Florida	
1895	First federal intracoastal navigation project in southwest Florida; Congress appropriated \$5,000 for dredging a 5-foot-deep by 100-foot-wide channel to run south from Tampa Bay to Sarasota Bay.
1896	Modification of initial Sarasota Bay project extended an improved channel 3 feet deep by 75 feet wide south to Casey's Pass.
1907	Project extended further to Venice.
1917	By this year, 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.
1919	Congress provided for a relocated 7-foot-deep channel above Sarasota.
1939	Board of Engineers for Rivers and Harbors recommended an intracoastal project, 9 feet deep by 100 feet wide, reaching from the Caloosahatchee River (Ft. Myers) north to the Anclote River (Tarpon Springs). World War II delayed funding until 1945
1945	Congress authorizes and funds a deepened and widened Gulf Intracoastal Waterway.
1948	Modifying legislation revised cost-sharing arrangements between the federal government and local interests; alternate route studied.
1959	Terms of local compliance resolved.
1960	Dredging begins on C-1 alternate route, five-mile alternate passageway inland of the city of Venice, connecting Lemon Bay with the original route north of Venice to Sarasota.
1962	Channel deepened (9 feet deep by 100 feet wide): dredge begins at "The Bulkhead" (lower Tampa Bay) and works southward, completes improvements to Venice in 1965.
1964	Channel improvement of Intracoastal Waterway begins in Gasparilla Sound; dredge completes 9-foot-deep by 100-foot-wide channel through Lemon Bay to Red Lake by 1965.
1967	Dredging is completed on the C-1 route between Red Lake and Roberts Bay.

Table 1.



Aerial photo of Intracoastal Waterway. Sister Keys, Sarasota.

Aboard ship, the boatswain (aka "bosun") is responsible for the hull, rigging and anchors. When he blows his whistle, sailors jump to be aware of possible danger!



Construction and maintenance of canals and channels permanently displace natural wetlands.

Continued spoil disposal prolongs and extends shoreline-wetland loses. Spoils placed in wetlands also promote invasive species of trees.

Channels can reverse local currents and change salinity and flushing in small bays.

All dredging was done by the U.S. steam snagboat and dredge "Suwanee," a shallow-draft, square-bowed scow 100 feet long, with a 24-foot beam and four-foot draft. Although under-powered, she was suited to her task. The "Suwanee" was put together inexpensively as an experiment in creating a general-purpose vessel for the varied minor works performed on bays and smaller rivers. Her suction dredges discharged the raised slurry upon the bay's shore through pipes swung perpendicular to her sides, while the "Suwanee's" derrick provided the lifting power to raise rocks and snags from the bay bottom. The ship's complement included a 10-man crew which operated the snagboat, a launch, float boat and two rowboats.

By just before World War I, a 5-foot-deep by 100-foot-wide maintained channel stretched from lower Tampa Bay to Sarasota, and a 3-foot-deep by 75-foot-wide channel existed from Sarasota to Venice. The Corps of Engineers surveyed Lemon Bay in 1899 but determined insufficient economic justification for dredging the southern inland waterway sector to Gasparilla Sound.

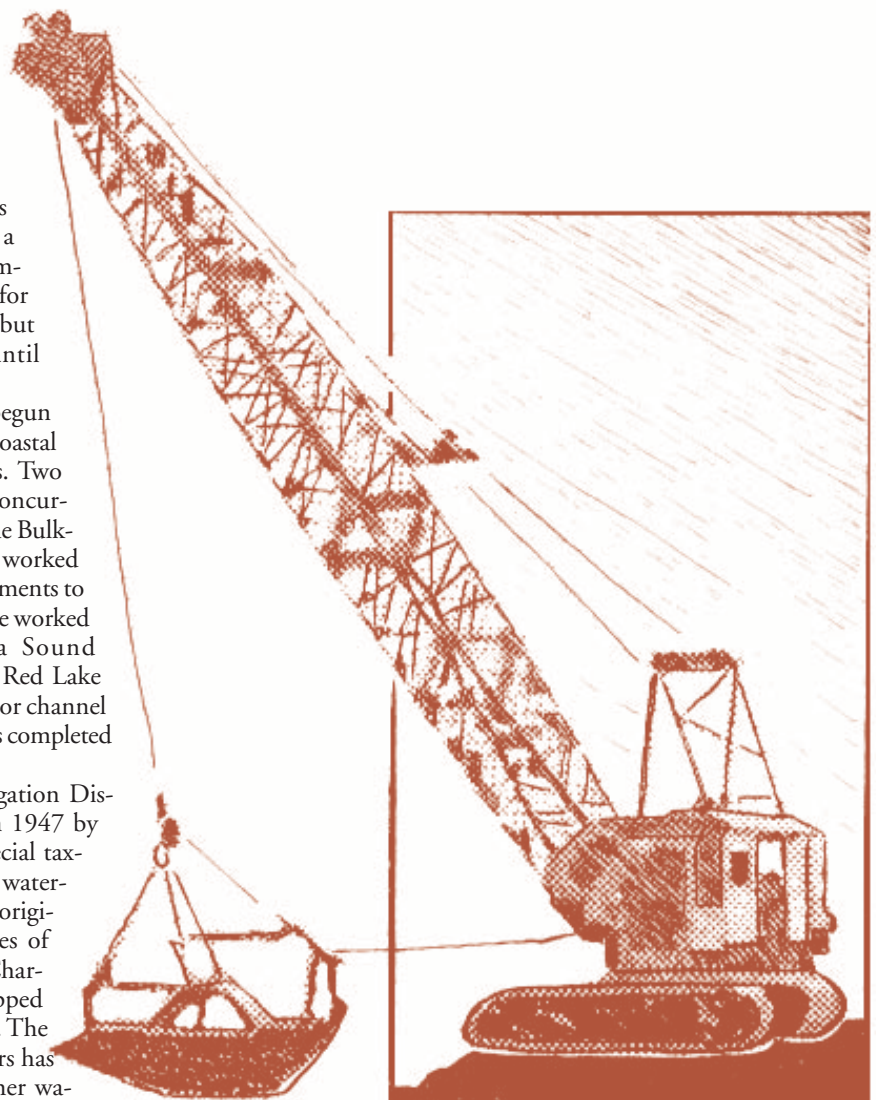
Initial channel improvements in Big Sarasota Bay before the turn of the century permitted an increase in steamer traffic to three sailings per week between Sarasota and Tampa. Small sailboats acted as feeders for the steamer line between Sarasota, Osprey, Venice and intermediate points. In the early 1900s, Englewood and Grove City were relegated to weekly sloop sailings that brought in supplies. By 1910, daily sailings were underway from Sarasota to Tampa. By the closing years of World War I, channel improvements had been completed between Sarasota and Venice; several boats operated regularly, probably 100 launches ran at irregular intervals and two regular boat lines carried freight and passengers. The auxiliary sloop "Phantom" made a regular weekly trip between Tampa and Osprey, and a gasoline launch made three trips weekly between Sarasota and Osprey with intermediate stops.

Except for stabilizing the inlet at Venice, very few additional waterway improvements were made during the period between the World Wars. The Board of Engineers for Rivers and Harbors did recommend a 9-foot-deep by 100-foot-wide improved Intracoastal Waterway for the Florida west coast in 1939, but funds were not authorized until 1945.

A second dredging period, begun in 1962, created the Gulf Intracoastal Waterway as it presently exists. Two dredges and crews operated concurrently. One dredge began at "The Bulkhead" at South Tampa Bay and worked southward to complete improvements to Venice in 1965; the other dredge worked northward from Gasparilla Sound through Lemon Bay, reaching Red Lake by 1965. The five-mile connector channel linking Red Lake and Venice was completed in 1967.

A West Coast Inland Navigation District (WCIND) was created in 1947 by the Florida Legislature as a special taxing authority to maintain the waterway right of way. The WCIND originally encompassed the counties of Pinellas, Manatee, Sarasota, Charlotte and Lee, but Pinellas dropped out of the District in the 1970s. The District's mandate over the years has been broadened to include other waterway management functions, such as dealing with anchorages, boat traffic, inlets and beaches.

After 75 years of sporadic waterway improvements, an inland passage was finally achieved, permitting safe navigation between Tampa Bay and Charlotte Harbor through the sheltered waters of Lemon Bay and Little and Big Sarasota Bays. Though the original concept was to create a commercial water thoroughfare for passengers, goods and services, the Gulf Intracoastal Waterway in this region of southwest Florida has helped stimulate a regional transportation infrastructure investment.



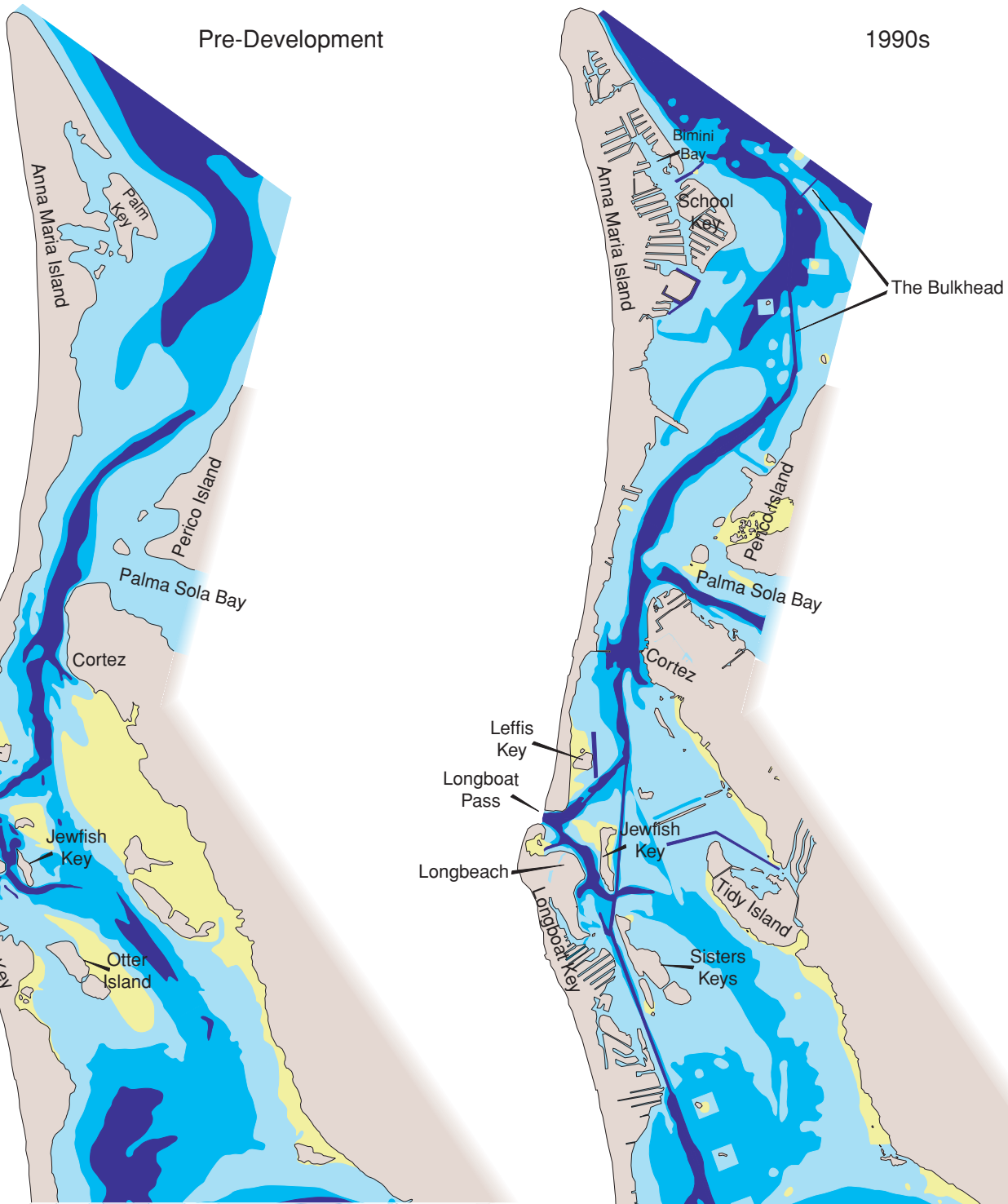
Dredging and filling along shorelines creates uplands and fingerfill canals for residential and commercial uses; these activities also cause permanent wetland loss. Construction promotes turbidity, and deep canals in the area are filled with "muck" that animals cannot inhabit.

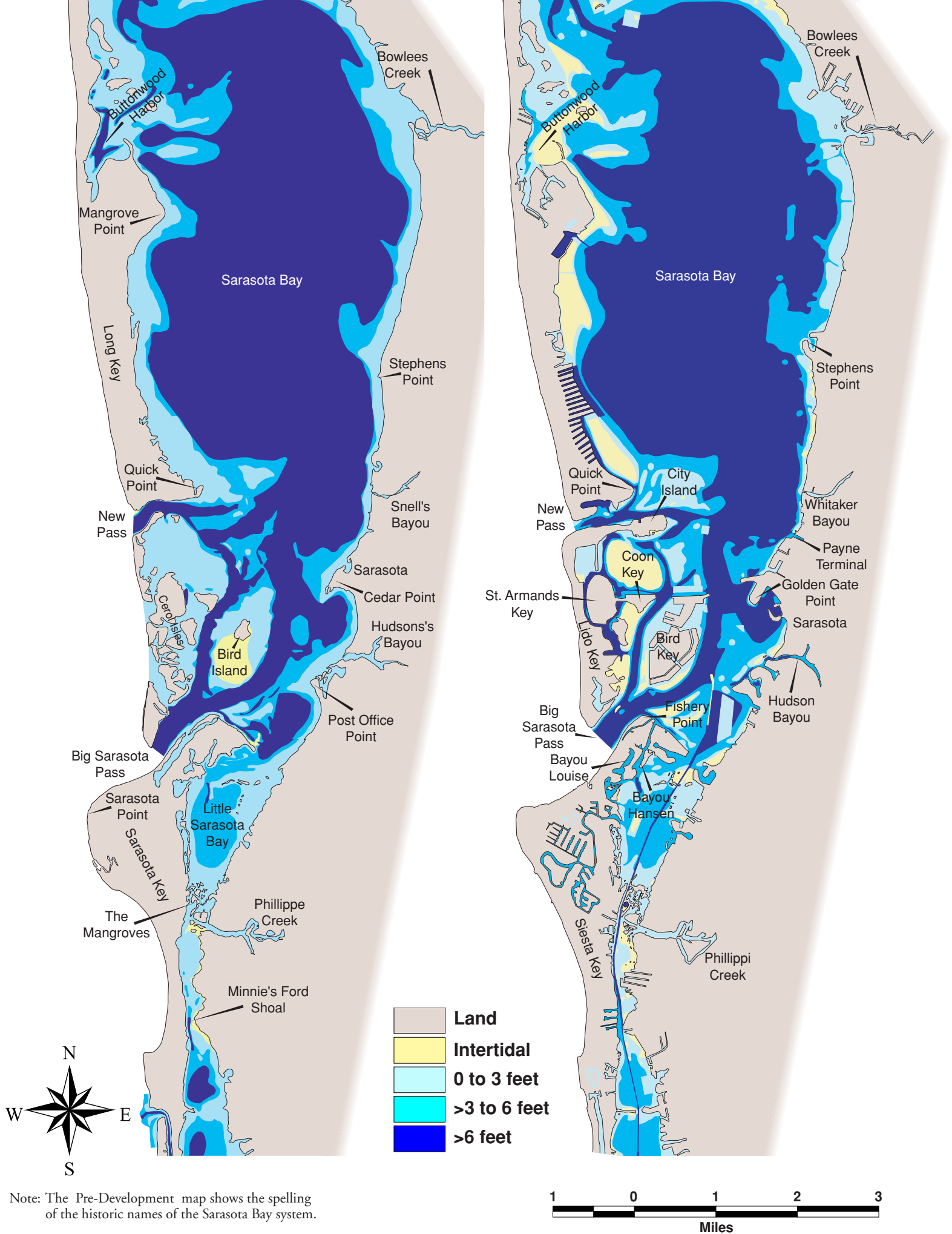


Dredging of Access Channels and Residential Canal Development

As the main intracoastal waterway channel was improved to connect lower Tampa Bay and Sarasota, little time was wasted before local land-development interests learned that dredging could create valuable waterfront home sites. Earliest dredge-and-fill work occurred in the pre-World War I years on the mainland in Sarasota, on Phillippi Creek, from Post Office Point to Hudson Bayou, Cedar Point, Stephens Point and on north Sarasota (Siesta) Key at Bayou Louise and Bayou Hansen (Map 3).

A second phase of activity, during the land boom of the 1920s, was associated with Calvin Payne and John Ringling, who transformed the barrier islands between Big Sarasota Pass and New Pass. Payne had the channel at New Pass dredged, creating City Island in the process; the deep-water harbor on the mainland (due east of the pass) was created to accommodate Sarasota's growing marine industry. Known as Payne's Terminal, this facility has housed boat construction and maintenance yards, provided fuel sales and served the boating public for decades.



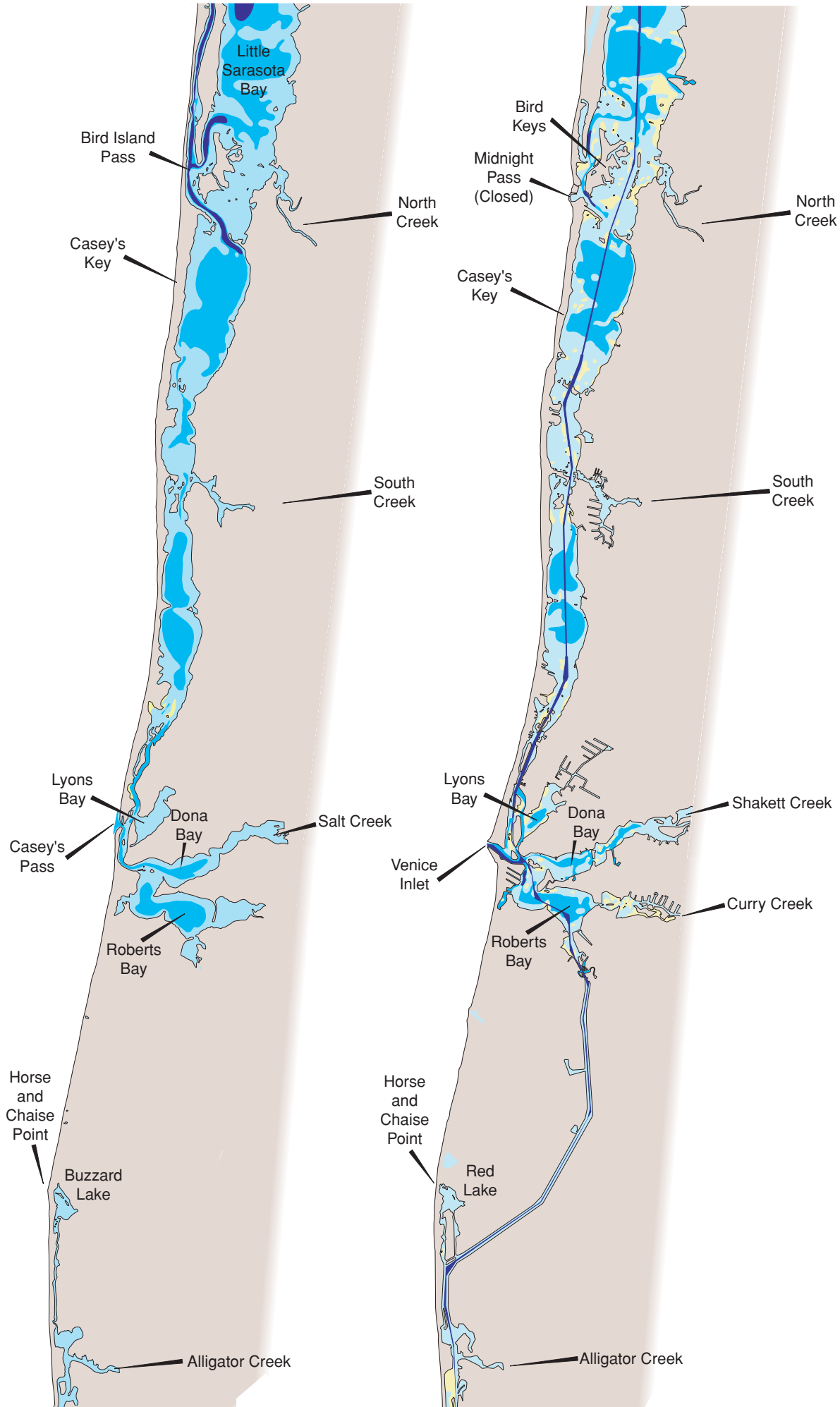


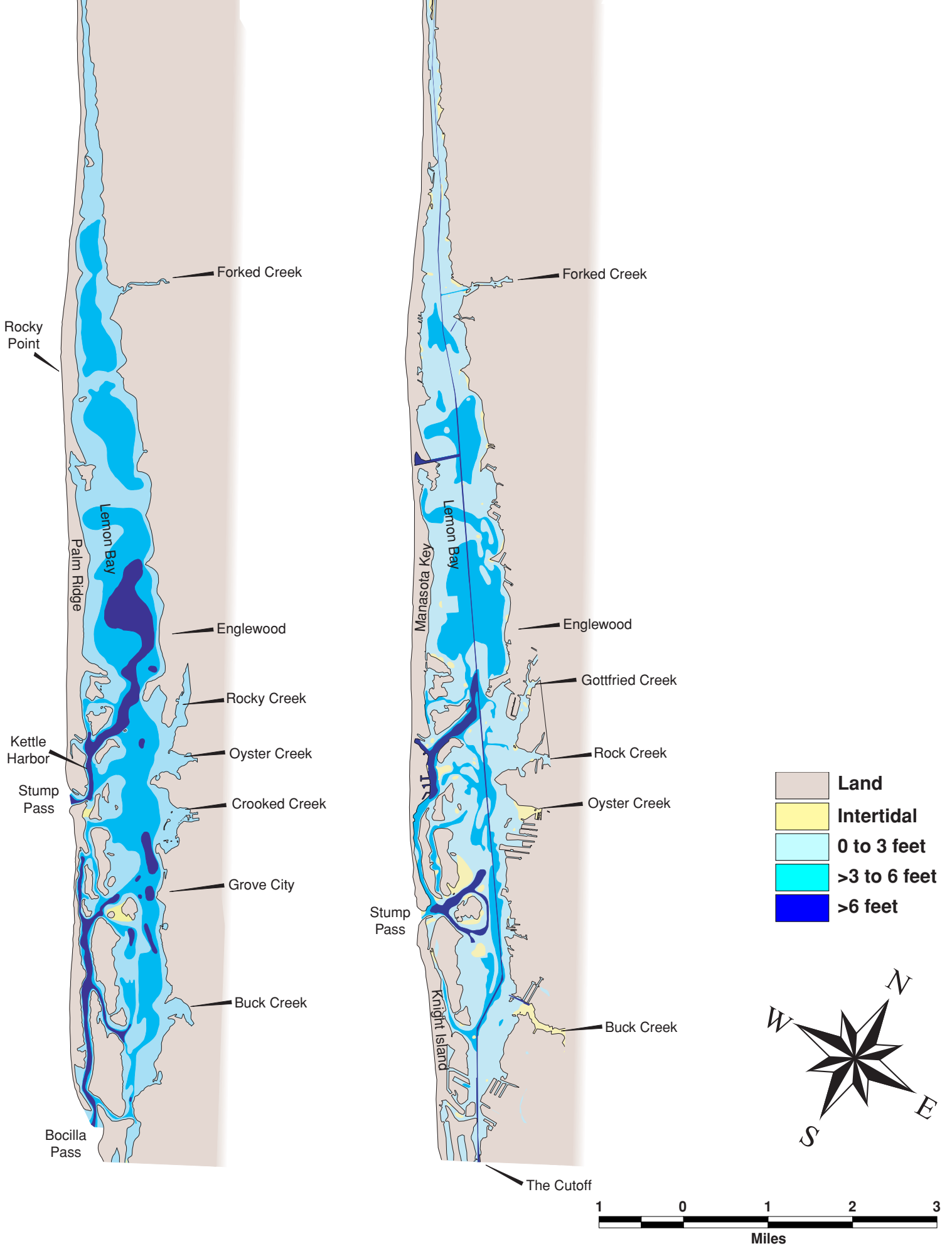
Note: The Pre-Development map shows the spelling of the historic names of the Sarasota Bay system.

Map 3.
 Waterway Conditions for the Pre-Development (1890) and
 Contemporary (1990) Periods
 (Map 3 continued on pages 18 and 19)

Pre-Development

1990s





Map 3.
 Waterway Conditions for the
 Pre-Development (1890) and Contemporary (1990) Periods
 (Map 3 continued from pages 16 and 17)



Map 4.
Ringling Isles Development Plan

The telescope, an instrument used for observation of distant objects.

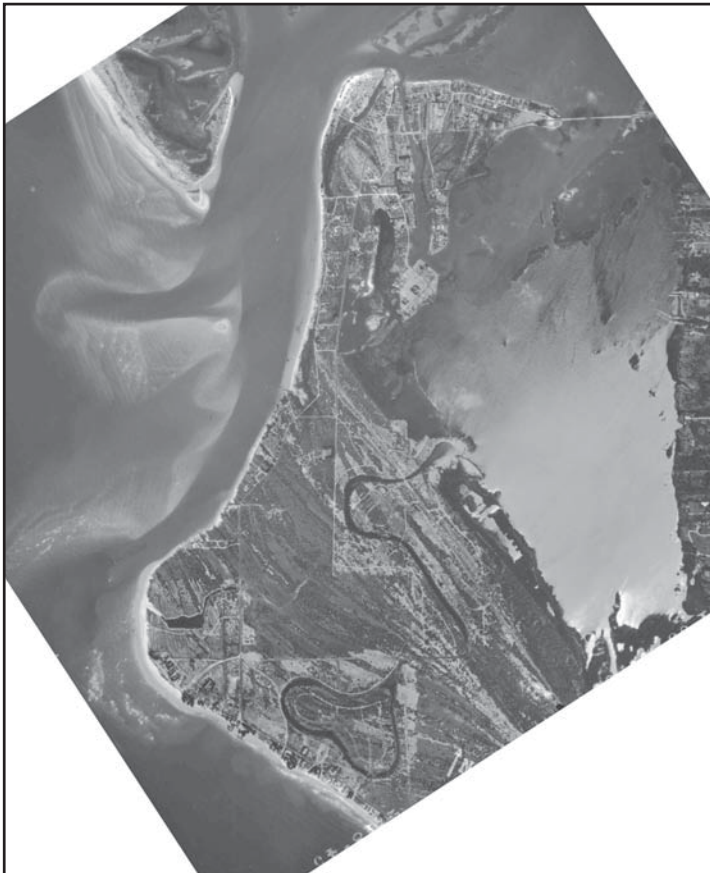


A conflict exists between access and habitat. On one side of the issue is the increasing population in the Sarasota Bay area, and the increasing demand for more access points so more people can use the bay and beach. On the other side is the importance of protecting and preserving the natural resources of the region, which are threatened by this increased use.

Lido Key and St. Armands Key illustrate some of the most dramatic changes resulting from dredge-and-fill activities in the Sarasota area. Those keys, as such, did not exist 100 years ago; instead, a loose group of small islets called the Cerol Isles were west of the mainland. During the 1920s, Ringling converted Lido Key into a continuous island, and in 1925 he built a causeway from the mainland to serve it. A feeder causeway was extended to Bird Key, and the first ambitious island home was built there in 1914. Ringling and partner Owen Burns dredged chan-

nels and filled land as part of the proposed Ringling Isles development (Map 4). For a time, they operated a dredge from Otter Key; the wrecked remains of the vessel's boilers are a popular fish haven today.

Ringling's dream failed in the real estate crash of 1929, but the boat channels adjoining the filled land on Lido, St. Armands, Otter and Coon Keys have left an indelible imprint of land and water changes. Dredged potholes and back-and-fill scars can be detected on the Sarasota Bay bottom to this day.



Siesta Key 1940



Siesta Key 1995



Map 5.
Proposed Development of Otter Key, 1971

The third, and by far the most extensive, phase of residential canal development, began in 1945 after World War II, accelerating in the 1950s and 1960s. Grand Canal, a 10-mile-long waterway system on Siesta Key, was created early in this period. Dredging on Curry Creek by the U.S. 41 bridge began in the 1940s as well. In the early and mid-1950s canal construction in the Grove City area was underway, and north Longboat Key was being dredged. Bimini Bay on north Anna Maria Island was deepened in the early 1960s, and the canal community of Key Royale transformed the former School Key. By 1969, work on the South Creek and Grand Canal (Siesta Key) systems appears to have been completed.

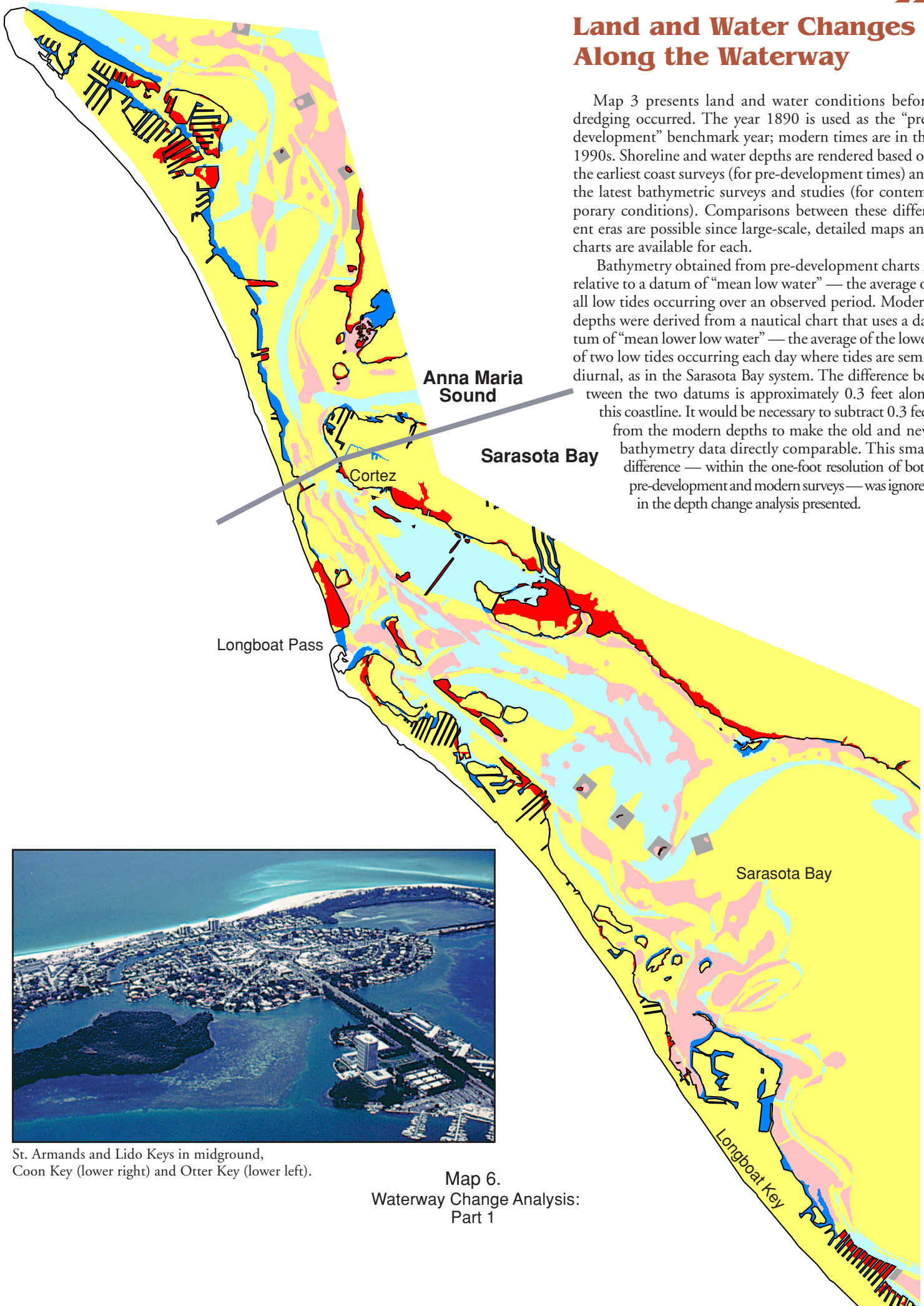
A major residential waterfront development of the 1960s was financed by the Arvida Corporation, which purchased the southern half of Longboat Key, most of Lido and all of Bird, Otter and Coon Keys from the Ringling estate for \$13.5 million. Bird Key was transformed into a waterfront community with five miles of interconnected canals; eight miles of residential canals and basins were dredged on south Longboat Key. In 1971, Arvida proposed an exclusive development on Otter Key (Map 5), but that effort failed and Sarasota County in 1974 purchased the land, including South Lido, and created a public park there. Otter Key has been left undisturbed.

By the early 1970s, public concern about this form of dredge-and-fill coastal development prompted legislation to control dredging and protect the environment. In 1972, Congress enacted the Clean Water Act, which effectively put a halt to dredge-and-fill activities and alteration of bay habitat. However, by that time approximately 26 percent of mangroves and 92 percent of salt marsh had been lost in the Sarasota Bay system.

Land and Water Changes Along the Waterway

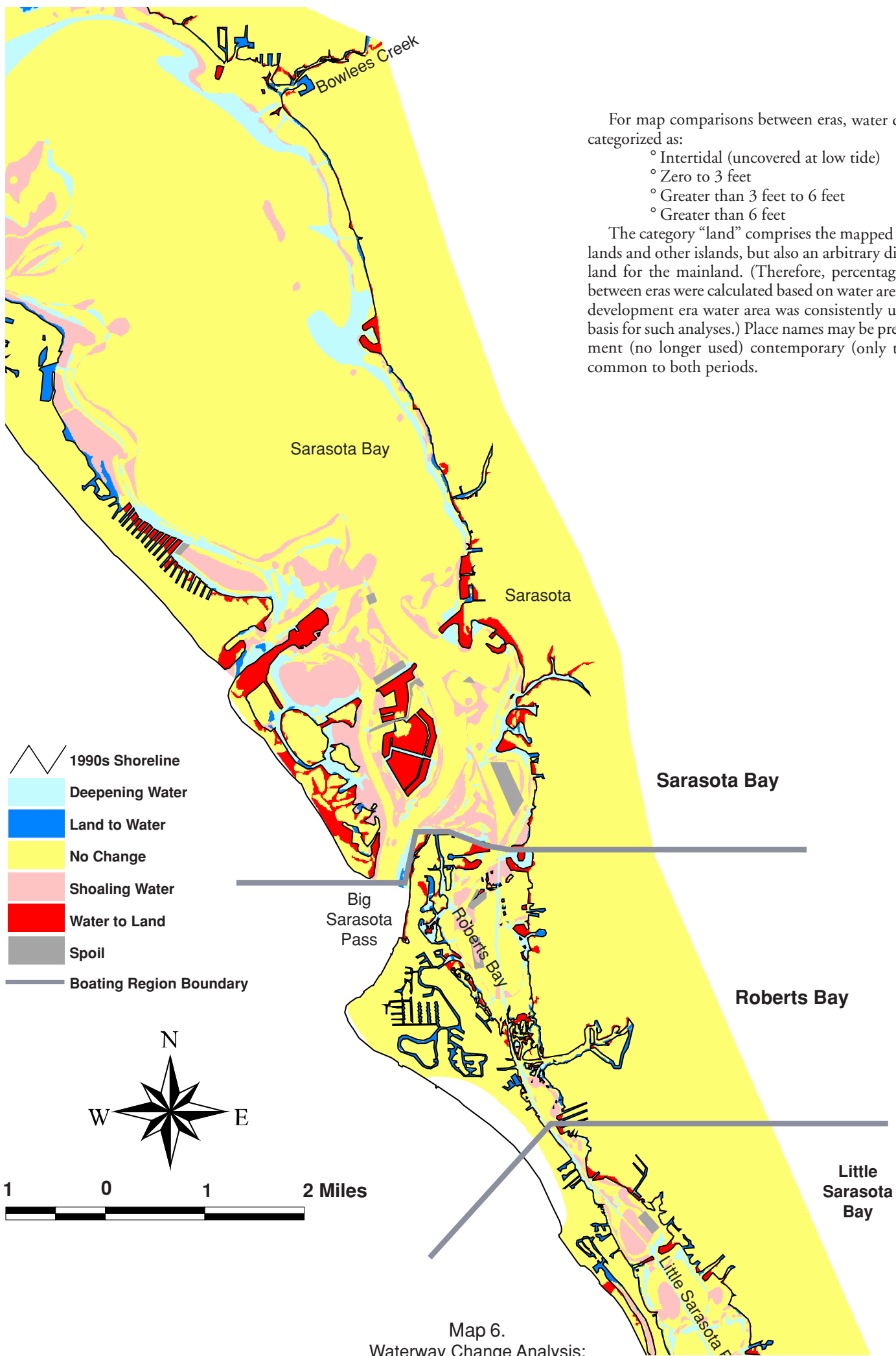
Map 3 presents land and water conditions before dredging occurred. The year 1890 is used as the “pre-development” benchmark year; modern times are in the 1990s. Shoreline and water depths are rendered based on the earliest coast surveys (for pre-development times) and the latest bathymetric surveys and studies (for contemporary conditions). Comparisons between these different eras are possible since large-scale, detailed maps and charts are available for each.

Bathymetry obtained from pre-development charts is relative to a datum of “mean low water” — the average of all low tides occurring over an observed period. Modern depths were derived from a nautical chart that uses a datum of “mean lower low water” — the average of the lower of two low tides occurring each day where tides are semi-diurnal, as in the Sarasota Bay system. The difference between the two datums is approximately 0.3 feet along this coastline. It would be necessary to subtract 0.3 feet from the modern depths to make the old and new bathymetry data directly comparable. This small difference — within the one-foot resolution of both pre-development and modern surveys — was ignored in the depth change analysis presented.



St. Armands and Lido Keys in midground, Coon Key (lower right) and Otter Key (lower left).

Map 6. Waterway Change Analysis: Part 1

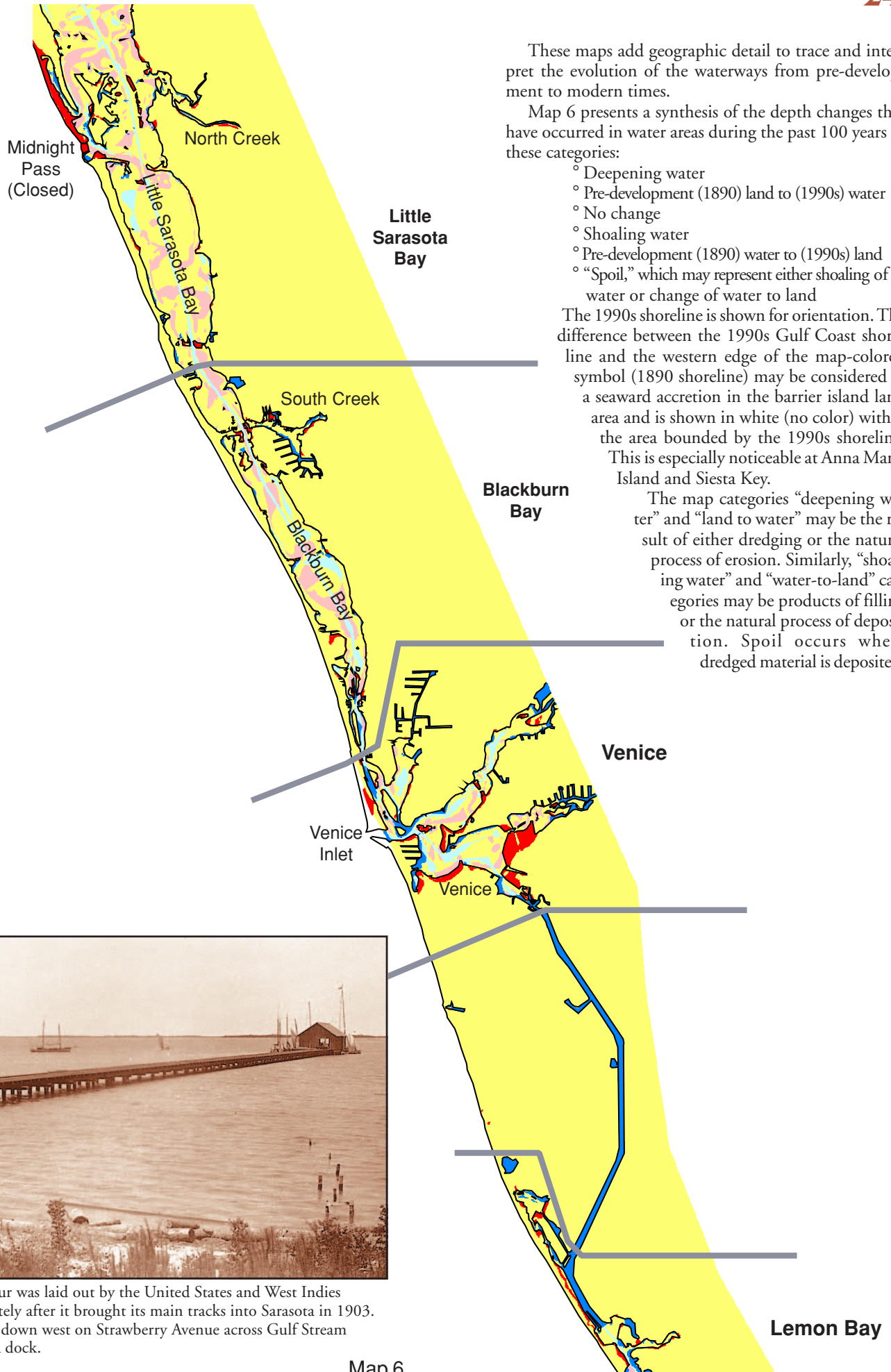


For map comparisons between eras, water depths are categorized as:

- Intertidal (uncovered at low tide)
- Zero to 3 feet
- Greater than 3 feet to 6 feet
- Greater than 6 feet

The category “land” comprises the mapped barrier islands and other islands, but also an arbitrary distance inland for the mainland. (Therefore, percentage changes between eras were calculated based on water area; the pre-development era water area was consistently used as the basis for such analyses.) Place names may be pre-development (no longer used) contemporary (only today), or common to both periods.

Map 6.
Waterway Change Analysis:
Part 2



These maps add geographic detail to trace and interpret the evolution of the waterways from pre-development to modern times.

Map 6 presents a synthesis of the depth changes that have occurred in water areas during the past 100 years in these categories:

- Deepening water
- Pre-development (1890) land to (1990s) water
- No change
- Shoaling water
- Pre-development (1890) water to (1990s) land
- "Spoil," which may represent either shoaling of water or change of water to land

The 1990s shoreline is shown for orientation. The difference between the 1990s Gulf Coast shoreline and the western edge of the map-colored symbol (1890 shoreline) may be considered as a seaward accretion in the barrier island land area and is shown in white (no color) within the area bounded by the 1990s shoreline.

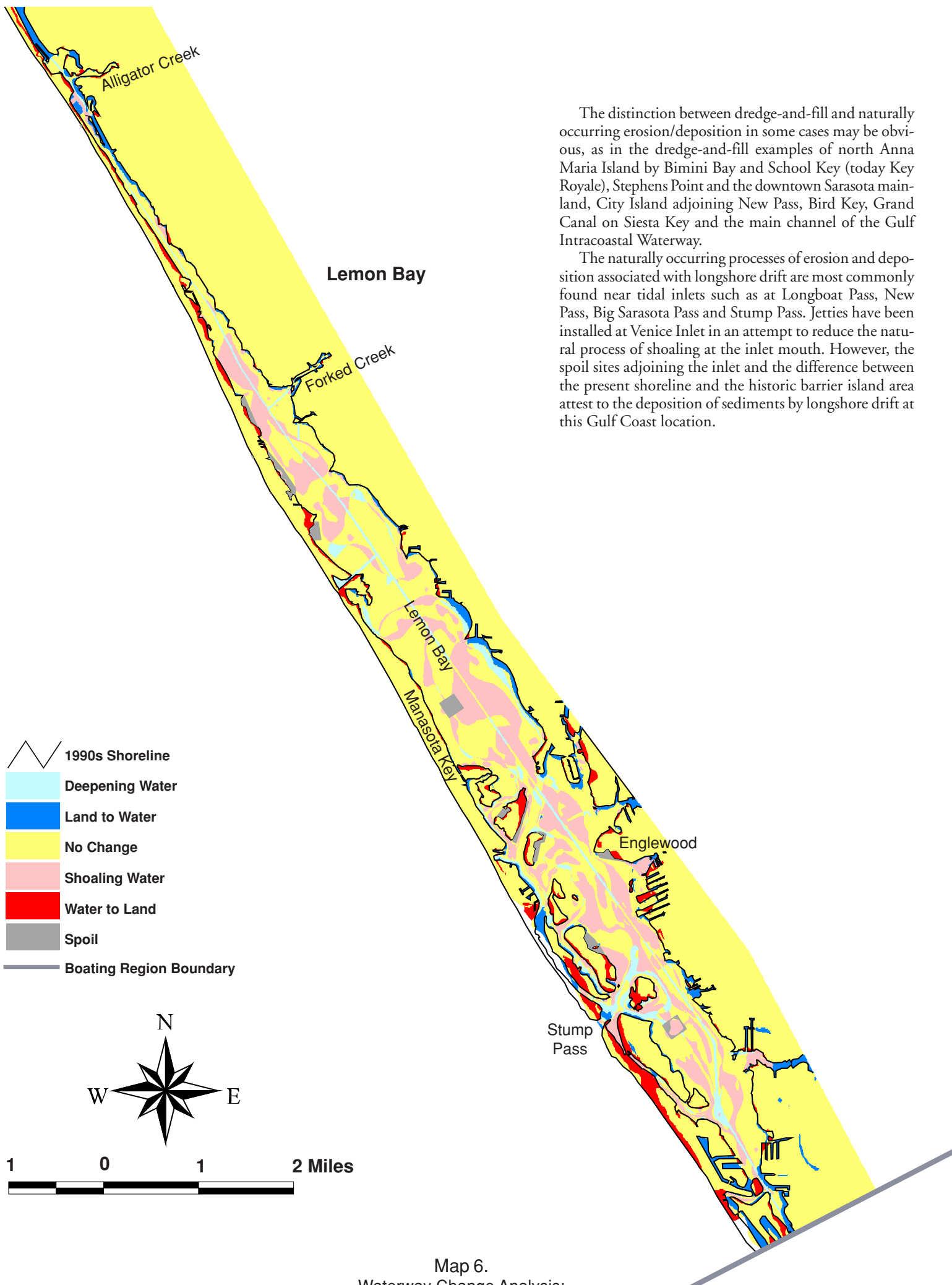
This is especially noticeable at Anna Maria Island and Siesta Key.

The map categories "deepening water" and "land to water" may be the result of either dredging or the natural process of erosion. Similarly, "shoaling water" and "water-to-land" categories may be products of filling or the natural process of deposition. Spoil occurs where dredged material is deposited.



The fish house spur was laid out by the United States and West Indies Railroad immediately after it brought its main tracks into Sarasota in 1903. The Spur was put down west on Strawberry Avenue across Gulf Stream Avenue out onto a dock.

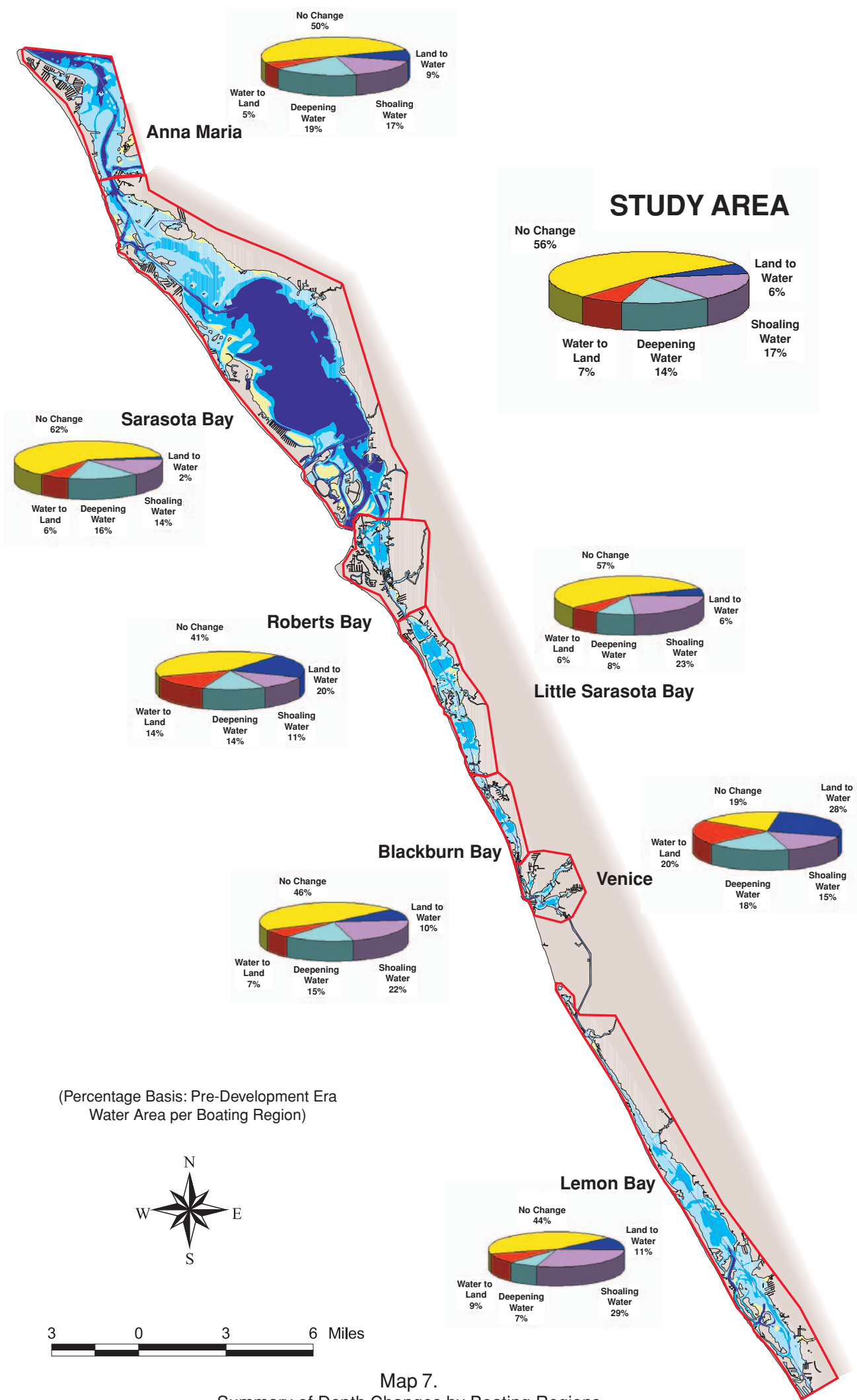
Map 6.
Waterway Change Analysis.
Part 3



The distinction between dredge-and-fill and naturally occurring erosion/deposition in some cases may be obvious, as in the dredge-and-fill examples of north Anna Maria Island by Bimini Bay and School Key (today Key Royale), Stephens Point and the downtown Sarasota mainland, City Island adjoining New Pass, Bird Key, Grand Canal on Siesta Key and the main channel of the Gulf Intracoastal Waterway.

The naturally occurring processes of erosion and deposition associated with longshore drift are most commonly found near tidal inlets such as at Longboat Pass, New Pass, Big Sarasota Pass and Stump Pass. Jetties have been installed at Venice Inlet in an attempt to reduce the natural process of shoaling at the inlet mouth. However, the spoil sites adjoining the inlet and the difference between the present shoreline and the historic barrier island area attest to the deposition of sediments by longshore drift at this Gulf Coast location.

Map 6.
Waterway Change Analysis:
Part 4



Map 7. Summary of Depth Changes by Boating Regions

Summary of Relative Changes in Water Depths Between 1890 and 1990.		
Region	No Change (%)	Change (%)
Anna Maria	50	50
Sarasota Bay	62	38
Roberts Bay	41	59
Little Sarasota Bay	57	43
Blackburn Bay	46	54
Venice*	19	81
Lemon Bay	45	55
Entire Region	56	44
*Excludes C-1 canal		

Table 2.

Map 7 summarizes relative (percentage) depth changes from the pre-development 1890s era to the 1990s for the entire region. Boating areas identified are Anna Maria Sound, Big Sarasota Bay, Roberts Bay, Little Sarasota Bay, Blackburn Bay, Venice and Lemon Bay. Table 2 shows the following overall trends. More of the water area (56 percent) has not changed in depth than has changed (44 percent).

Big Sarasota Bay (from Cortez Bridge on the north to Siesta Key Bridge to the south) and Little Sarasota Bay (Stickney Point Bridge at the north to Blackburn Point Bridge on the south) show the least change, largely because of the large bay areas where depths have remained the same. On the other hand, the most dramatic changes in the Sarasota Bay system have occurred in the Venice area (Albee Bridge on the north to Hatchett Creek Bridge to the south). There, 81 percent of the water area has been transformed by deepening, shoaling or the creation of land by fill or natural deposition.

The other boating regions follow the same overall trend. Where changes have occurred, the predominant processes in the boating regions have been through deepening of water, found in Anna Maria Sound, Big Sarasota Bay and Roberts Bay. Changes spurred by shoaling of water have occurred in the Roberts Bay, Little Sarasota Bay, Blackburn Bay and Lemon Bay; water-to-land transformation has taken place in the Venice area.



Sarasota bayfront. October 7, 1926.

Land Use and Land Cover Changes Along the Shoreline

A sparsely settled coastline greeted late-19th-century mariners nearing southwest Florida and what is today the Sarasota Bay system. Windswept dunes and beach vegetation such as sea oats and seagrapes covered the western shores of the barrier islands off the coast. Much of the barrier islands' eastern shore was fringed with mangrove, with shrub and brush land vegetation covering the islands' interior.



The Bay Island Hotel, built in 1912 adjacent to Hansen's Bayou. The Bay Island Hotel was one of the area's finest.

The mainland was largely covered with pine forest, but land along the bayside had been mostly homesteaded in small individual holdings (Map 8, Table 3). Sawmills were situated on Whitaker Bayou and later at Englewood; settlements had developed at Sarasota and Osprey. As the inland waterway was improved and road and rail connections established, the local economy expanded with citrus and vegetable production, lumber, naval stores and fisheries products. By 1900, Cortez was a fishing village of 150 people; Sarasota and vicinity had a population of 3,000 and were becoming a health and tourist resort, while 150 people lived at Englewood and another 80 at Grove City.

A striking difference is apparent between the predevelopment waterfront use of 1890 and that of the bayside and barrier islands in the 1990s. The most dramatic change visible on Map 8 is the phenomenal urban development. Table 4 summarizes the major changes in mangrove and salt marsh, two land-cover categories of special interest to boaters. The significant reduction in their distribution has implications for more than boating enjoyment, since these ecological niches are rich nursery habitats for many species of marine and bird life. Although the decrease in mangrove area has been ameliorated by the appearance of new colonies in spoil areas, a significant net loss still exists. Similarly, the considerable decline in salt marsh area has not been offset by the creation of new suitable areas, and its relative loss is considerably greater.

Homesteads and Boat Landings During the Pre-WWI Era									
Anna Maria Island	Cortez	Longboat Key	Sarasota (Mainland)						Siesta (Sarasota) Key
Illexhurst	Gulfview	Shore Acres White's Wharf Bean's Wharf Corey's Wharf Bishop's Wharf Wallace Lodge Olives' Wharf	North of Bowlees Creek	Bowlees Creek to Cedar Point	Cedar Point to The Mangroves	The Mangroves to North Creek	North Creek to South Creek	South Creek to Roberts Bay	Costello Bickford
			Spang Crowley Madsen Heiser	Riggin Dr. Dunham Bass Washington Grant Whitaker	E.W. Blair Willard Bidwell Greer Albee Butler Anderson Jones Hanson Jeffcott	Drumright Robinson Peterson Marsh Clower Brown	Webb Webb Jr. Griffith Huckleberry Camp Blackburn	Bacon Blackburn Jr. Lyons Jesse Knight Higel Roberts	

Table 3.

Prominent Features of the Boating Waterfront

These features, identified on Map 8, are described below from north to south.

1. Anna Maria Island is bounded on the north by Tampa Bay, on the east by Anna Maria Sound, on the south by Longboat Pass and on the west by the Gulf of Mexico. The island was homesteaded in the late 1880s and is today comprised of three municipalities: Anna Maria City, Holmes Beach and Bradenton Beach. Most of the western shore was the focus of a beach renourishment effort in 1993, while the eastern shore received major dredge-and-fill activities and canalization in the 1950s and 1960s.

2. Longboat Key is a barrier island bounded on the north by Longboat Pass, on the east by Sarasota Bay, on the south by New Pass and on the west by the Gulf. Homesteading took place in the northern part of the key in the late 1890s at an area known today as Longbeach Village. The eastern shore has been heavily dredged and filled through creation of canals, while the western beaches have been the recipient of two beach renourishment efforts since 1991.

3. The village of Cortez was founded in the late 1880s by a group of families from North Carolina. The village on the banks of northern Sarasota Bay was once one of the busiest commercial fishing locations on Florida's Gulf Coast. For more about Cortez, see the section devoted to the village elsewhere in this publication.

4. Palma Sola Pass was the first channel improvement made by the federal government to the intracoastal waterway in 1895. "The Bulkhead," a name originally applied to this improvement, also refers to another dredged cut a half-mile to the north, which was opened in the 1920s to shorten and straighten the approach from south Tampa Bay. The deepening of this pass provided shallow draft commercial vessels with access from Tampa to Sarasota. The steamer "Mistletoe," owned by John Savarese of Tampa, in 1895 provided the first scheduled transportation service for the Sarasota Bay area.

The steamer "Mistletoe," owned by John Savarese, was the first scheduled transportation to serve the Sarasota Bay area, beginning in 1895.



5. Manatee Avenue Bridge. The bridge, completed in 1957, was originally a toll bridge linking Holmes Beach to Perico Island and the mainland. After tolls were removed in the late 1960s, the bascule structure provided free access to the island. Florida Department of Transportation officials began discussing replacing the current bridge in 1988. In 1992, after receiving approval by regional transportation planners, plans were more-or-less finalized for a new, \$13.8-million bridge. The replacement bridge would have had a road bed about 78 feet above the water and would have been longer and wider than the current, with a fixed span in lieu of a draw.

Residents of Anna Maria Island objected to the larger bridge's height, ambience and impact on the environment. They challenged the DOT in court and through an administrative hearing process and, in 1998, were able to have the big bridge deleted from the DOT workplan.

DOT now plans to rehabilitate the current bridge in 1999.

6. Cortez Bridge. The first Cortez Bridge was a wooden-decked structure, built in 1921, that was the lone link between the mainland at Cortez and Anna Maria Island at Bradenton Beach. In 1957, the bridge was replaced by a concrete, bascule structure with tolls collected at its western end. The old bridge was partially demolished and used as a fishing pier; due to safety concerns, however, it was eventually demolished in 1978 and replaced with a 660-foot fishing pier, the current Bradenton Beach City Pier.

In 1988, the Florida Department of Transportation announced plans to replace the bridge with a high, fixed-span bridge similar to the one proposed at Manatee Avenue. Residents of Cortez and Bradenton Beach opposed the structure. DOT officials changed plans and rehabilitated the current bridge in 1996.

7. Longboat Pass Bridge, first built in 1927, washed away in a surge tide during the March 1932 storm. The pass had no bridge connection between 1932 and 1958, when the present structure was completed. The current bridge is scheduled to be renovated by the Florida Department of Transportation in 2003-04.

8. Jewfish Key today is one bay island situated off the area of Longboat Key called Longbeach; however, Jewfish comprised two islands 100 years ago. These islands were joined as a result of naturally occurring longshore deposition as well as dredging in the 1920s, which realigned the improved channel of the Intracoastal Waterway to a position along the island's eastern shore. The island is now home to a dozen single-family homes.

9. Sister Keys, formerly Otter Island, has been built-up along its western edge with "spoil" material dredged from the Intracoastal Waterway. Mangrove habitat is found on the natural Otter Island portion, while exotic species such as Australian pine (*casurina*) cover the spoil upland site. Sister Keys is currently a wildlife preserve owned by the Town of Longboat Key.

Mangrove and Saltwater Marsh Area Bordering the Sarasota Bay System: Pre-Development Era and 1990s

	Pre-Development*	1990s**	Change
Mangrove	4.2 sq. mi.	3.1 sq. mi.	26-percent decrease
Salt marsh	1.8 sq. mi.	0.15 sq. mi.	92-percent decrease

Sources:

*U.S. Coast and Geodetic Survey, T-Sheets No. 1517a, 1517b, 1518a, 1518b

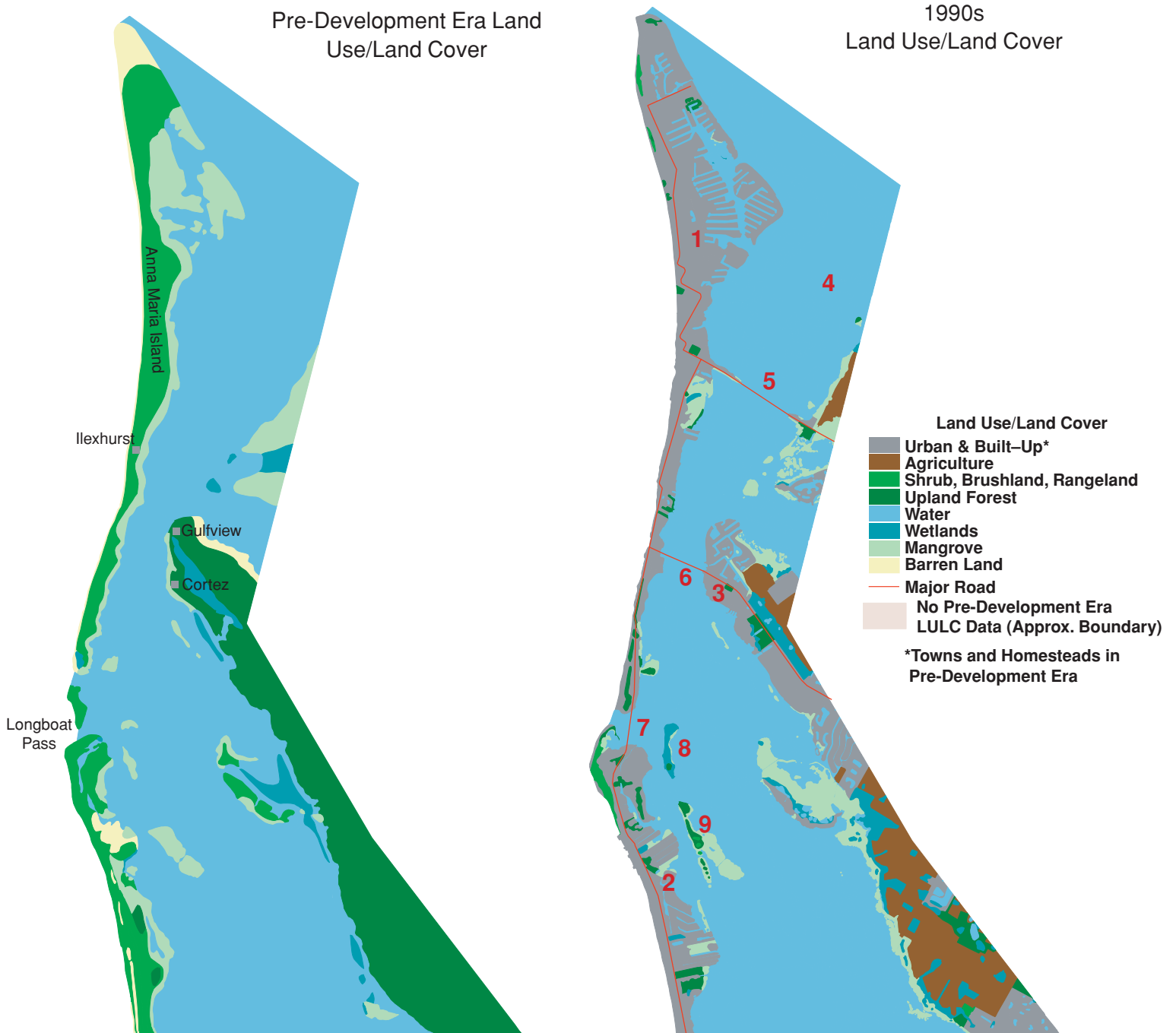
**Southwest Florida Water Management District, 1994

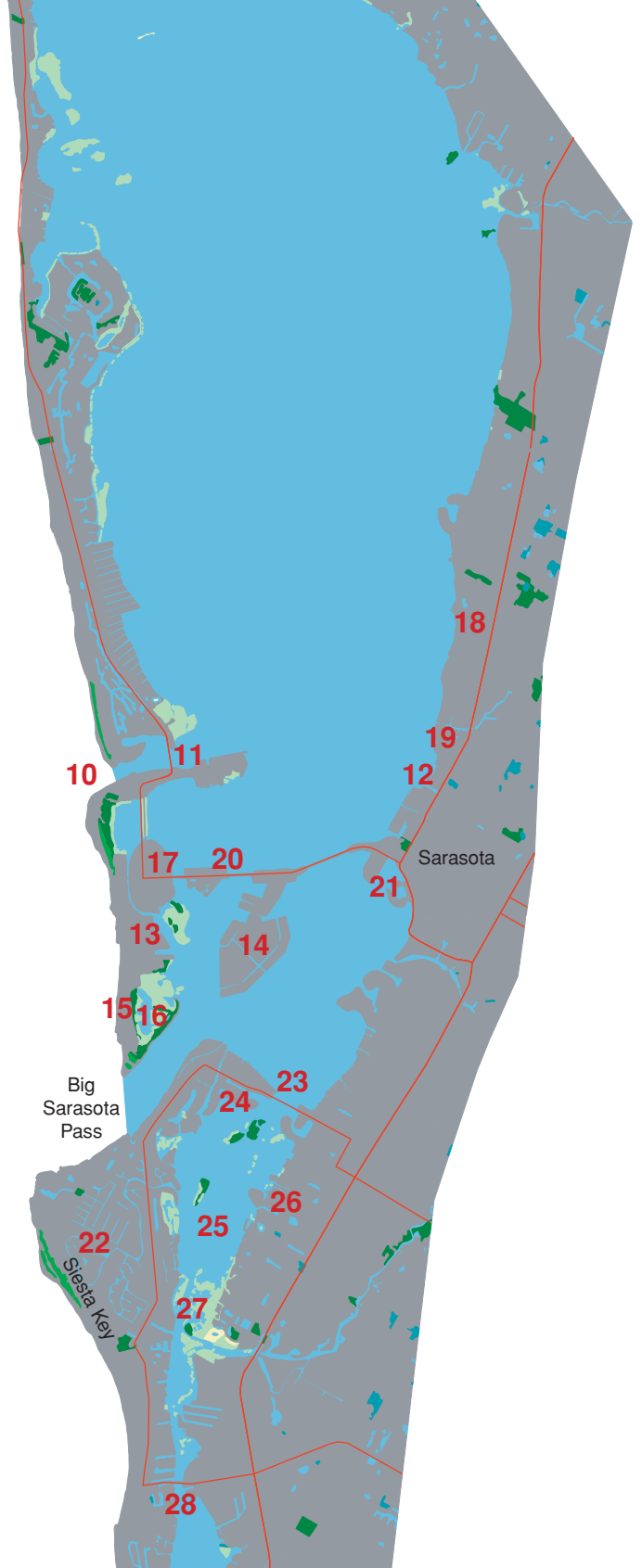
TABLE 4.

10. New Pass is believed to have been created by the hurricane of 1848 and named by pioneer William Whitaker. A channel was dredged in the 1920s from New Pass to Payne Terminal. Although the channel quickly filled in, the spoil removed during the dredging created City Island.

The following excerpts from historical documents tell the story of the dredging of New Pass.

“Sarasotans were not satisfied with a seven-foot-deep channel into New Pass and decided a deep-water channel was needed for the city to really expand. In a special election Jan. 12, 1926, Sarasotans agreed to sell the municipal power plant to Florida Power & Light for \$1 million. The proceeds went to R.A. Perry of United Dredging Co. of Tampa, to dredge a 10-foot channel through New Pass to Payne Terminal, now Centennial Park, at 10th Street.”

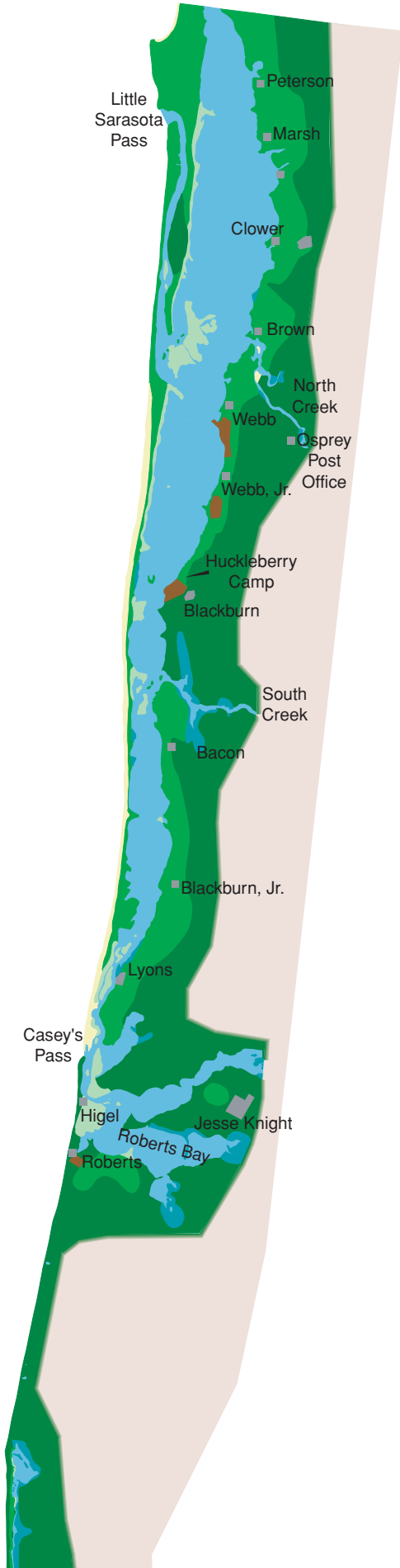




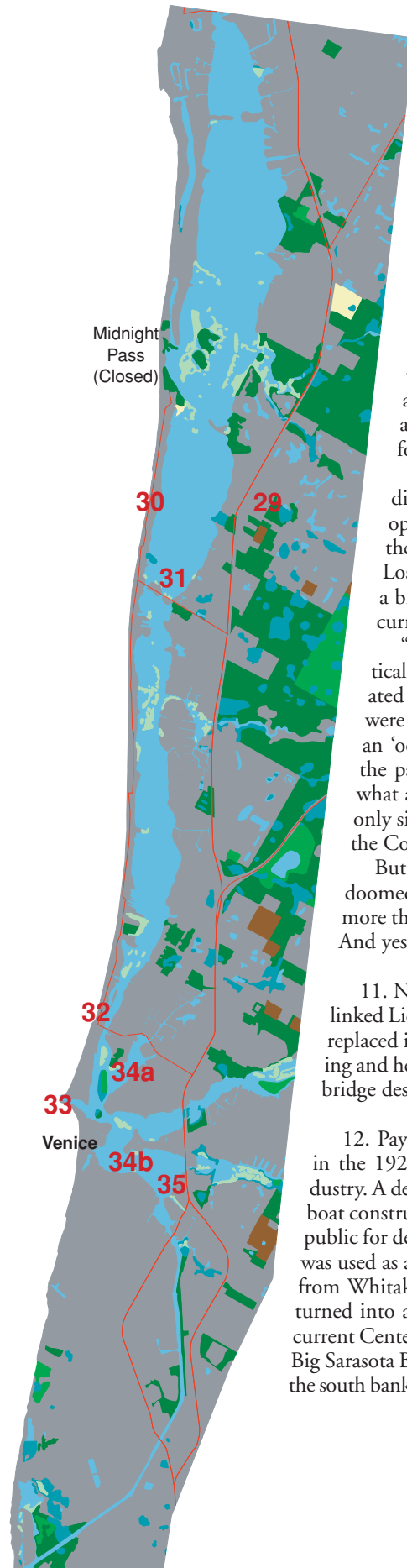
MAP 8.
Land Use and Land Cover Changes:
Part 1



Pre-Development Era Land Use/
Land Cover



1990s
Land Use/Land Cover



As the old *Sarasota Times* reported: “A huge dredge, with a capacity of 1,000 cubic yards an hour, is digging a channel through New Pass. Within eight months Sarasota will have one of the finest deep-water ports on the Gulf of Mexico. The city then will be in a position to bid for some of the big steamship business of companies operating vessels to all parts of the world.”

From the book *Story of Sarasota*: “The harbor expert who drafted plans for the port, and advocated the New Pass entrance, was Col. J.M. Braxton of Jacksonville. Old-timers who knew the coast and were familiar with Gulf currents warned Braxton time and again that the New Pass entrance and channel eastward to the mainland were impractical — that shifting sands, carried by currents, would fill up the pass and harbor as sure as fate unless long jetties were built into the Gulf and Bay. Braxton brushed their arguments aside — who were they to argue with him, a former government engineer?”

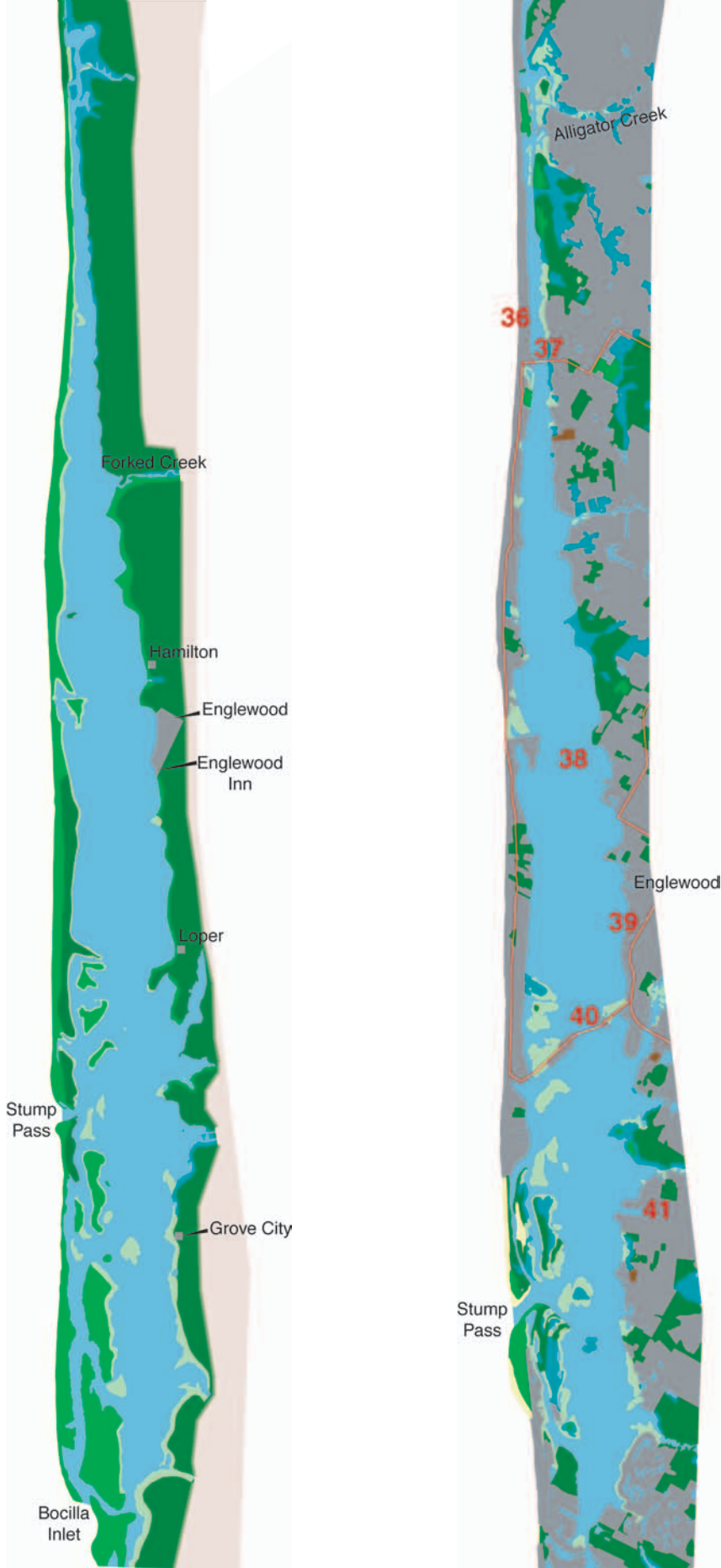
“The logic of the old-timers’ reasoning didn’t change the minds of the starry-eyed optimists, mostly newcomers, who then ruled the city. They envisioned Sarasota as another Los Angeles — and they were determined that a big league harbor must be built, willy-nilly, currents or no currents.

“By autumn of 1926, the dredging was practically completed, a 58-acre ‘city island’ was created at the east end of New Pass and bulkheads were constructed. On Friday, March 18, 1927, an ‘ocean-going’ ship crept cautiously through the pass and anchored at Payne Terminal. But what a ship! It was only 100 feet long and drew only six feet of water: the ‘City of Everglades,’ of the Collier Line.”

But railroads, trucks and the silted channel doomed the \$1-million deep-water port, and no more than 50 tons of freight ever came through it. And yes, the pass did eventually fill in with sand.

11. New Pass Bridge was first built in 1927 and linked Lido Shores to Longboat Key. The bridge was replaced in the 1980s after years of debate on its siting and height. The current bridge is a bascule draw-bridge design with a center clearance of 23 feet.

12. Payne Terminal was created by Calvin Payne in the 1920s to accommodate Sarasota’s marine industry. A deep-water harbor, fuel sales and facilities for boat construction and maintenance served the boating public for decades. The area at 10th Street and U.S. 41 was used as a spoil site in the 1960s, when silt dredged from Whitaker Bayou was placed there. The area was turned into a public boat ramp in the mid-1980. The current Centennial Park provides deepwater passage into Big Sarasota Bay; a U.S. Coast Guard Auxiliary station on the south bank of the boat basin offers boating instruction.



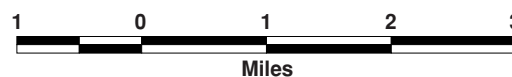
13. Lido Key was created in the 1920s from fill dredged around the former Cerol Isles, as discussed elsewhere in this chapter. Several homes were built on St. Armands, a bathing pavilion was built on Lido in 1940 and construction of a hotel, the Ritz-Carlton, was begun on Longboat Key.

14. Bird Key originally was a small island on which the first home was built in 1914. John Ringling dredged and filled an extension of the island northward in 1926 to connect to the causeway he built from the mainland to Lido Key. The present Bird Key development was dredged to its present size in 1959.

15. South Lido was homesteaded by Otto Schmidt Zoldan (Otto Smith) in the early 1900s. He operated a motor-launch charter business and advertised locally to "... take a trip to the Gulf in the launch 'Ada,' reasonable rates for parties to any part of the bay." Newspaper accounts confirm that passengers "... chartered the launch 'Ada,' with Captain Otto Smith in command, and were soon speeding down Sarasota Bay." This prime location changed ownership several times, in the process being held by the Ringling family and Arvida Corporation (responsible for developments on Bird Key and Longboat Key during the 1960s and 1970s). In 1974, Sarasota County purchased the land and created South Lido Park.

16. South Lido Park contains 100 acres bordered by the Gulf of Mexico, Sarasota Bay and Big Sarasota Pass. Goals established for this park are to provide, protect and maintain a high-quality, environmentally sensitive area and open space that serves passive recreational needs of county residents and visitors. The park has a number of pristine habitats, now becoming extremely limited elsewhere in the Sarasota area. Brushy Bayou, in the center of the park, is a unique estuarine environment of exceptional diversity; the presence of certain species of marine life reflects its healthy ecosystem. Park users may enjoy bathing in the Gulf and Big Pass, picnicking in the wooded areas and hiking, bird watching and canoeing in the Brushy Bayou area.

MAP 8.
Land Use and Land Cover Changes:
Part 2





Sarasota bayfront.
Golden Gate Point,
Cedar Point and Sunset
Park, 1895.

17. St. Armands Key was named for the island's pioneer resident, Charles A. St. Amand, who gained title to the island in 1893. The island was purchased by John Ringling in the 1920s along with property on Longboat, Lido and Bird Keys.

18. Indian Beach was platted in 1891 and named for the abundance of Indian mound remnants in the area.

19. Yellow Bluffs, a prominent yellow limestone bluff when Sarasota's first pioneers, William Whitaker and Hamlin Snell settled in 1843, can still be seen today.

20. The Ringling Causeway was completed on January 1, 1926, to link John Ringling's island development with the mainland. Ringling himself was the first to cross the 8,300-foot span that linked Cedar Point (now Golden Gate Point) to Bird Key. Ringling donated the bridge to the City of Sarasota in June 1927. The bridge fell into disrepair, and the current bridge was built in 1959.

Florida Department of Transportation officials proposed replacing the four-lane, bascule bridge linking Sarasota with Bird Key with a high, fixed-span structure in the early 1990s. The decision on bridge replacement was still pending in 1999.

21. Marina Jack occupies the site of Sarasota's Main Street dock, built in 1886 by a group of Scottish immigrants. The steamers and sailing vessels that docked here provided Sarasota's primary transportation link to the outside world. The original wooden dock was replaced by one made of concrete in 1912; this became Sarasota's City Pier. The Marina Jack facility, originally called Marina Mar, was completed in 1965. The boat docks at Marina Jack have expanded several times in the past 30 years, and a renovation of the restaurant was completed in 1998.

22. Siesta Key was known by several names in the 1800s, including Clam Island, Muscle Island, Little Sarasota Key and Sarasota Key. The name "Siesta" was assigned to the island's northern tip in 1907 by developer Harry L. Higel. Higel's Siesta development boasted tropical surroundings, bathing beaches, excellent fishing, a large hotel and a post office. Over the years the name Siesta was applied to the entire island.

23. The current Siesta Key Bridge replaced one built in the 1920s, which in turn replaced the original "Bay Bridge" built in 1917. The Bay Bridge was the first bridge linking the mainland to a barrier island in the Sarasota area.

24. Bay Island is separated from Siesta Key by a man-made canal, Hansen Bayou. The Bay Island Hotel, built here in 1912, was one of the area's finest.

25. Roberts Bay is named for Captain Lewis Roberts, who was among the earliest residents of Siesta Key. He built the first hotel on the island and later was a partner in Harry Higel's Siesta development.

26. The Field Club was originally the estate of Stanley Field, founder of the Field Museum of Natural History in Chicago. He used the estate as a winter residence from 1927 until 1957, when it was converted to a private boating club. The Field Club today also has tennis courts and a restaurant.

27. "The Mangroves" and "The Narrows" are two names given to the part of Sarasota Bay where in pioneer days it was possible to walk to Siesta, or Sarasota Key from the mainland. To those on foot it was a blessing, but to boaters it was a curse, as it was impossible to navigate the bay at low tide, forcing early boaters to take a long detour in the open Gulf. After several attempts to open a channel through "The Narrows," a navigational passage became a reality in the early 1900s, allowing travel between Roberts Bay and Little Sarasota Bay.

28. Stickney Point Bridge was named for Uncle Ben Stickney, an early resident whose home was located south of the current bridge on the bayfront of Siesta Key. Stickney arrived in Sarasota in 1894 and managed Sarasota's finest hotel, the DeSoto. He later moved to the key, where his home and grounds became the scene of numerous community picnics. The first Stickney Point Bridge was installed in 1926; the present pair of two-lane bridges was opened to the public in 1968.

29. The name "Osprey" was chosen by John Webb, an early settler, for this community's first post office.

30. Casey Key was named in honor of Captain John Casey, a significant figure in bringing the Seminole Indian Wars to a close.

31. Blackburn Point Bridge is named after the Blackburn family, this area's pioneers. John S. and his sons, Benjamin Franklin and George Washington Blackburn, owned considerable bayfront acreage in this area. The bridge, installed in 1926, is the only remaining swing bridge on Florida's west coast.

32. Albee Road Bridge was named to honor a noted surgeon, Dr. Fred Albee, who was responsible for the large-scale development of Nokomis and Venice during the 1920s. In 1922, a private toll bridge was constructed to link the Treasure Island subdivision on Casey Key to the mainland. The present bridge was built in 1963.



It was a wild and beautiful land along the west coast of what would become Florida, and it beckoned early man with its lush landscape and warm sun. Prehistoric people surveyed the land from their mounds and left their unnamed history in the earth itself. When the Spaniards appeared on the new world horizon, they found a native people who were fiercely independent and not easily conquered. It was a trait that characterized the men and women who would follow in centuries to come.

—Edge of
Wilderness:
A Settlement History
of Manatee River
and Sarasota Bay
1528-1885
Janet Snyder Matthews
© 1983

33. Venice Inlet is situated south of the former Casey Pass. The federal government created the Venice Jetties in 1937 to maintain this navigational link to the Gulf of Mexico.

34. Lyons Bay (a) and Roberts Bay (b) were named after early pioneers of Venice, who settled here in the 1870s.

35. Eagle Point Club was originally owned by leading Sarasota resident and developer Bertha Potter Palmer. She acquired the club property in 1916 and designed the land to meet the needs of potential real estate investors. In 1923 the property changed hands when it was acquired by Cornelius and Kingsbury Curtis, who added two residences. Guests came to vacation during the winter, enjoying horseback riding, golf, hunting and sailing. When the Curtis family heirs sold the property to Glenn Goodman and Danny Overstreet in 1989, Eagle Point was the oldest continuously operated resort in Sarasota County. Today, the property's 24 acres retain much of the flavor of early 20th-century coastal Florida. The original heart-of-pine clubhouse and surrounding cottages have been restored and are listed in the National Register of Historic Places. The property is being developed to accommodate 50 homes that feature deep water boat dockage, tennis courts and cypress fencing to ensure privacy.

36. Manasota Key takes its name from the old community of Manasota on the mainland. When residential lot sales failed, Manasota became a timbering community that thrived in the early 1900s. The key, originally called "Palm Ridge," was the scene of many Englewood community picnics.

37. Manasota Key Bridge was originally a wooden bridge built by Sarasota County in 1926. The present bridge was built in 1965.

38. Lemon Bay appears on maps as early as 1883, yet the origin of its name is unclear. Some say early settlers had lemon groves along the shore; one account credits the abundance of lemon sharks in the bay in the early days for how the area received its name.

39. Englewood was settled in the 1870s, yet was not named until 1897, when a town site was developed by the Nichols brothers of Englewood, Ill. Englewood's chief industry in the pre-development period was fishing.

40. Tom Adams Bridge links Englewood with Manasota Key. The current bridge was built in the 1960s.

41. Grove City, established in the 1880s, attracted nationwide attention in 1893 through promotional exhibits at the Columbia Exposition in Chicago. The community boasted a large hotel and sought to attract the attention of wealthy sportsmen.



The Whitaker family

1. North Longboat Key

2. South Sector of Big Sarasota Bay

3. Otter, St. Armands, and Lido Keys

4. Sarasota Bayfront, Ringling Causeway, and Bird Key

6. Roberts Bay

5. North Siesta Key and Grand Canal

7. Dredge "Charleston"

8. Dredge and Spoil Site

10. Intracoastal Dredging and Residential Waterway Development

9. Dredge and Dike

11. Natural and Spoil-Altered Conditions at Leachs Key, Lemon Bay

12. Intracoastal Dredging and Landfill at Tom Adams Bridge, Englewood



13. The Cutoff at Placida

Map 9.
Dredge-and-Fill Photograph Locations
along the Gulf Intracoastal Waterway

Photographic Record of Waterway Changes

1. North Longboat Key. Aerials show 1998 (color) and 1940 (black-and-white) conditions. These photographs illustrate both naturally occurring and human-induced changes in the waterways. Longbar Cut (a), dredged five feet deep by 100 feet wide by the U.S. Army Corps of Engineers in 1890, is still clearly visible in 1940, but more diffuse today. The present channel (b), dredged in 1919 to nine feet by 100 feet wide, shows as a strikingly demarcated dark-tone (deep water) zone in 1940. The dredged material, called spoil (c), was placed side-cast and parallel to the channel, creating a linear north-west-southeast trending extension to Sister Keys, where upland exotic vegetation, such as Australian pine, is now the predominant cover.

The dredging, both at Longbar Cut and along the relocated Intracoastal Waterway channel, removed seagrass habitat. A side channel at (d), which served to connect Longboat Inlet channel to the ICW in the early 1900s, has shoaled and no longer exists. Jewfish Key (e) and Picket Key (f), which appear on 19th-century charts, remained as individual islands in 1940, although a build up of sediment was taking place (white tone in photo), in part due to the islands' location by the inlet and to nearby dredging. Today, these islands are one feature (ef). The striking changes in the size and shape of the north end of Longboat Key (g) and the south end of Bradenton Beach (h) are due to erosion and deposition of sediments at Longboat Inlet. The south end of Bradenton Beach also was artificially filled to provide a foundation for the bridge at Longboat Inlet. Beach renourishment commenced in 1992-93 along much of the Bradenton Beach-Holmes Beach shore.



Figure 1. 1998 Aerial view of North Longboat Key

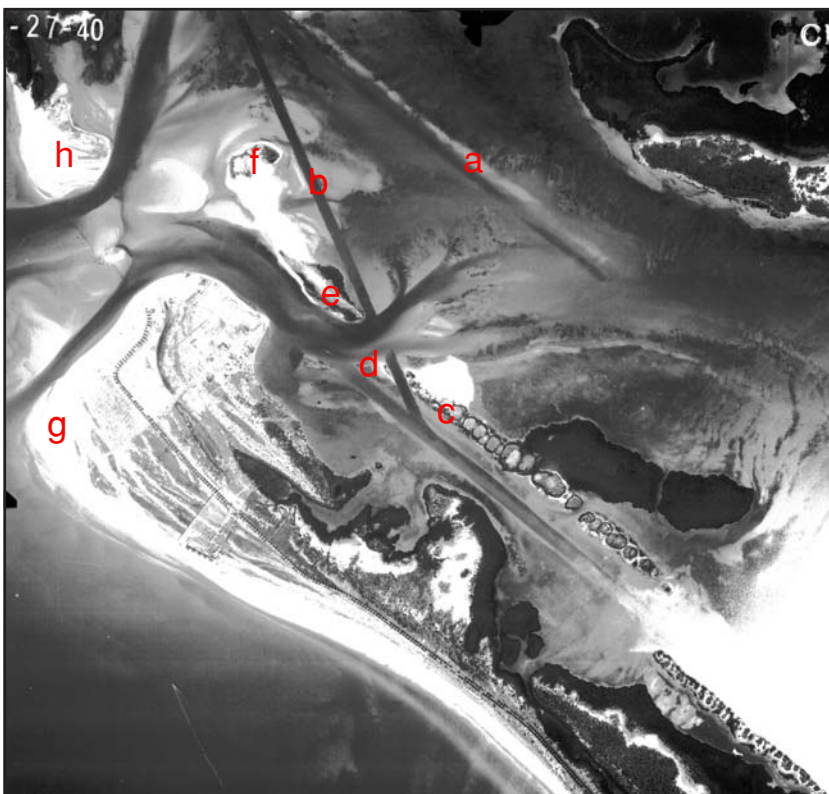


Figure 1. 1940 Aerial view of North Longboat Key



Figure 2. 1920s condition of the south sector of Big Sarasota Bay

In Sarasota Bay, seagrass dwellers generally inhabit an area from the water's edge at low tide to, in some cases, as deep as seven feet. This area is home to the four common seagrass varieties and the more than 170 species of fish that inhabit the bay.

Seagrasses also provide some of the oxygen required by much of the bay's marine life.



2. South sector of Big Sarasota Bay. The high, oblique black-and-white aerial illustrates late-1920s conditions. Bird Key (a), midground, was originally a small island (Map 3, Pre-development Conditions). John Ringling dredged and filled an extension of the island (b) northward in 1926 to connect to the causeway (c) he built from the mainland to Coon Key (d) and Lido Key (e). A dredged channel (f) provided nearshore access for the one residence on Bird Key. The extensive seagrass area, locally referred to as the "Middle Ground" (g), was an important sport fishing locale. Big Sarasota Pass (h) is in the background.



Figure 3A. 1920s Otter Key, St. Armands and Lido Key

3. Otter Key, St. Armands and Lido Key: Late-1920s dredge-and-fill and land clearance. Figure 3A is a high, oblique black-and-white aerial taken during the same period as the one of South Big Sarasota Bay (Figure 2 on previous page). St. Armands (a) is under development (smoke from land clearance). New Pass (b) has been dredged and the spoil, side-cast from the dredge, has formed City Island (c). A causeway (d) has been built from dredging the bay bottom along the north shore of St. Armands. The dredge used by the developers, John Ringling and Owen Burns, is moored off the south shore of Otter Key (e). The entire area between Otter Key and Lido Key (f) has been dredged to create fill for waterfront development. Figures 3B and 3C are vertical black-and-white aerial enlargements, taken in 1948, which show remnant dredged scars (g) in the bay bottom.



Figure 3B. 1948

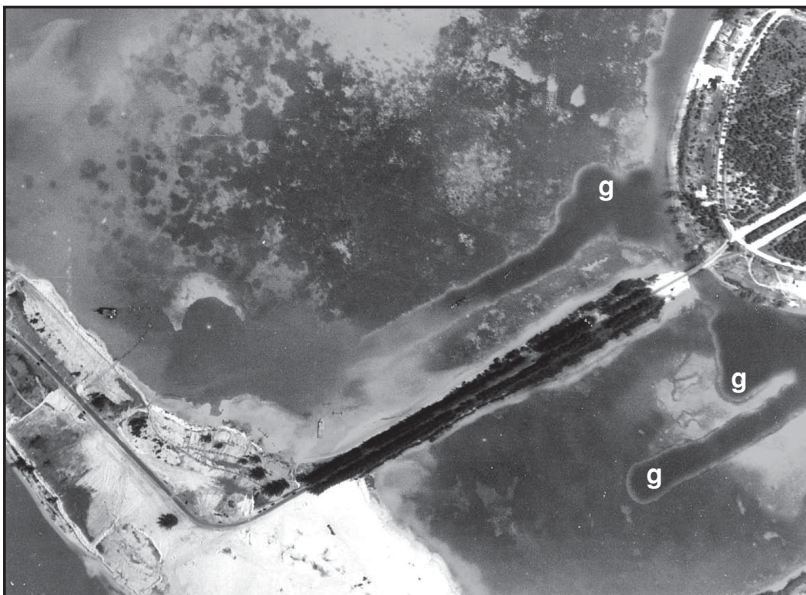


Figure 3C. 1948



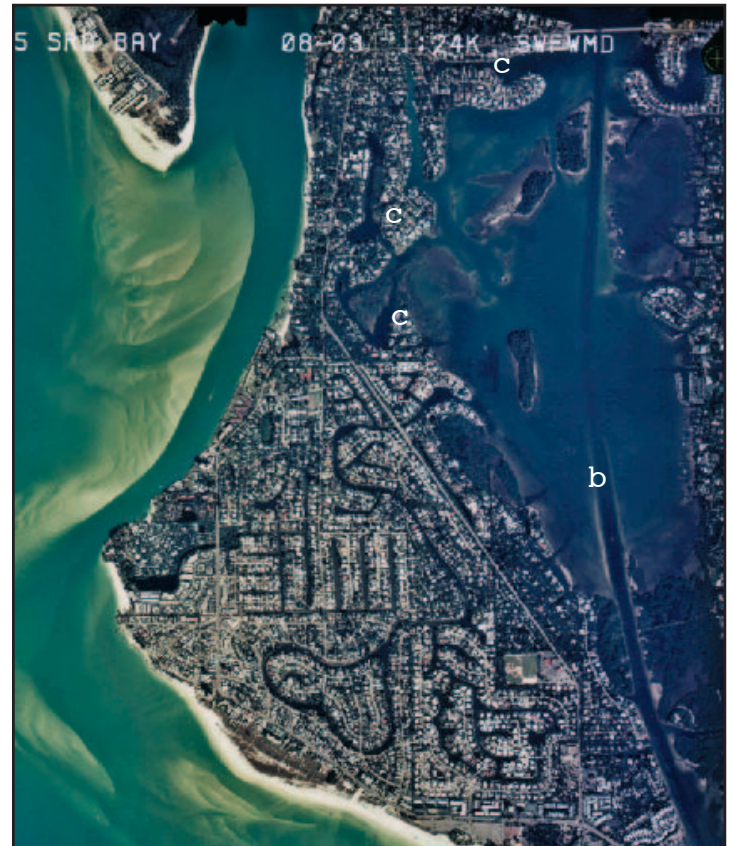
Figure 4. 1960 aerial of Sarasota Bayfront, Ringling Causeway and Bird Key

4. Sarasota Bayfront, Ringling Causeway and Bird Key. High, oblique black-and-white aerial photography taken in June 1960. Bird Key (a), midground, was filled to its present size in 1959 by dredging the bay bottom. The new Ringling Causeway Bridge (b) was opened in 1959. The Sarasota bayfront (c) was dredged and filled and U.S. 41 was re-routed along the shoreline. This photo predates Island Park and Marina Jack.

5. North Siesta Key and Grand Canal. Aerials show 1995 (color) and 1945 (black-and-white) conditions. Beach ridges (a) are clearly visible on the 1945 photo; they mark former beach deposits along the Gulf shore. The Gulf Intracoastal Waterway (b), marked by the dark tone and parallel white border areas in 1995, did not exist in 1945. Shoreline residential developments (c), the product of dredge-and-fill, were created after 1945. The creation of the Grand Canal, an extensive waterfront canal community on Siesta Key (d), had begun in 1945; the feeder canal and inner loop had been dredged, but work was still progressing at the mouth and apparently no water connection had yet been excavated to deep water. Residential development on Siesta Key in 1945 (e) was limited to scattered beach cottages along the Gulf shore.



1945



1995

Figure 5. North Siesta Key and Grand Canal



Figure 6. Roberts Bay

6. Roberts Bay. Low, oblique black-and-white aerial shows 1962-65 conditions. Phillippi Creek is in the foreground. The 9-foot-deep by 100-foot-wide Gulf Intracoastal Waterway has cut through “The Mangroves” (a), a tidal delta deposit where the creek flowed out into Roberts Bay. Spoil, consisting of bay bottom sediments dredged along the waterway, has been deposited at mid-bay locations (b). Landfill on Siesta Key (c) was for residential development. Bird Key is under construction (d) in the background.



Figure 7. Dredge “Charleston”

7. Dredge “Charleston.” This equipment was used beginning in August 1966 to excavate the C-1 connector canal, which linked the Gulf Intracoastal Waterway at Roberts Bay (Venice) with Red Lake at the north end of Lemon Bay.

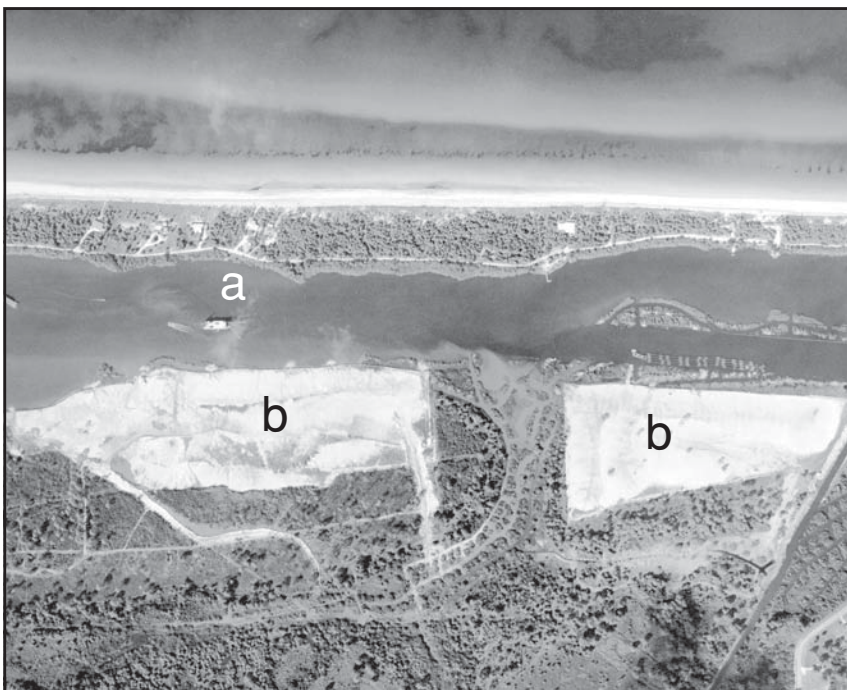


Figure 8. Dredge and spoil site

8. Dredge and spoil site. Near-vertical aerial view south of Alligator Creek, Lemon Bay, 1965. Dredge (a) is operating in the long, narrow waterway separating the mainland from Manasota Key. Suction dredge is transferring slurry by pipeline to upland sites (b).



Figure 9. Dredge and dike

9. Dredge and dike. Low, oblique aerial view north from Manasota Beach, taken circa 1964-65. Manasota Key Bridge is in the midground. This photo shows dredge (a), pipeline (b), dike or containment wall (c) and back-filled/spoil (d). This phase of dredging the Intracoastal Waterway, with the use of back-filling land along the shoreline, differed from the early dredging where spoil was side-cast in strips or islands parallel to the route taken by the dredge.



Figure 10. Intracoastal dredging and waterway development

10. Intracoastal dredging and residential waterway development. Near-vertical aerial shows a location at the junction of the Intracoastal Waterway and Forked Creek (bottom of photo), north Lemon Bay, 1964-65. A diked area (a) for containing spoil (b) from the dredging of the ICW is along the bayfront of Manasota Key (formerly Palm Ridge). A residential canal (c), constructed near the mouth of Forked Creek, occupies a natural drainage channel (d). Only a few waterfront homes have been built; the photo shows many empty lots.

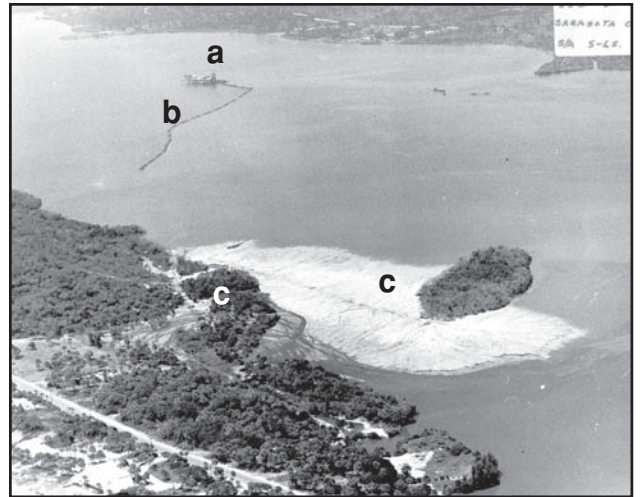
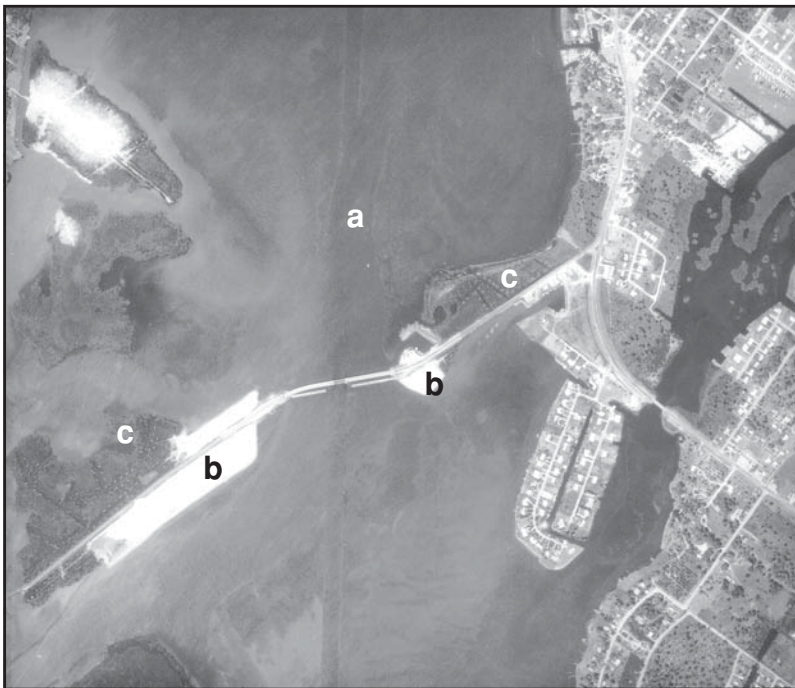


Figure 11. Natural and spoil-altered conditions at Leachs Key, Lemon Bay

11. Natural and spoil-altered conditions at Leachs Key, Lemon Bay. Low, oblique aerials, taken in 1965, show the effects of spoil deposition on shallow water and intertidal habitats. The aerial at left is of the site before spoil deposition occurred. In the photo at right, the dredge (a) is operating in the Intracoastal Waterway channel, using a floating pipeline (b) to transport the slurry to a waterfront site where deposition is filling in the area between Leachs Key and Manasota Key (c).



12. Intracoastal dredging and landfill at Tom Adams Bridge, Englewood. The Intracoastal Waterway (a) was dredged through extensive seagrass beds, and spoil was deposited on several mid-bay islands. The causeway (b) connecting the mainland with Englewood Beach is built on spoil landfill. Wetlands have been ditched (c) for drainage and mosquito control.

Figure 12. Intracoastal dredging and landfill at Tom Adams Bridge, Englewood

13. "The Cutoff" at Placida. This high, oblique aerial shows waterway conditions before dredging occurred. The Cutoff (a), about one mile long, bared at low water. Access to Don Pedro Island from the mainland was at point (b), approximately the location of the present-day car ferry. A relict channel (c) from Bocilla Pass has been diked and land clearance is underway.

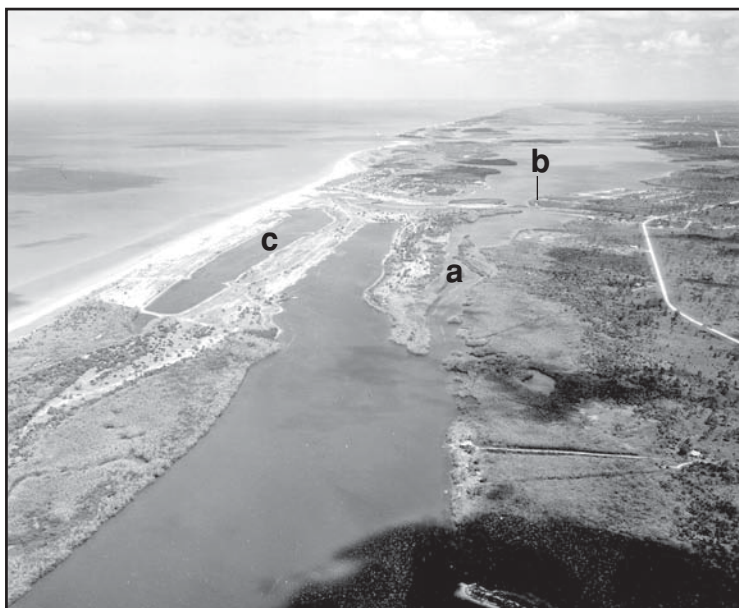


Figure 13. "The Cutoff" at Placida

Epilogue

The past 100 years witnessed the creation of a navigable waterway system in the Sarasota Bay region. The Gulf Intracoastal Waterway, designed to improve coastal navigation for safety and commerce, served as a catalyst to spark shorefront land development. Access channels were dredged, bayfront property was filled and finger canals and basins were cut to extend available waterfront for residential purposes.

Today, the area includes the 45-mile-long ICW arterial, some 75 miles of collector (access) channels and 180 miles of residential canals and basins. The inland waterway has helped transform the region's physical landscape and local economy in many ways.

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Miss Florida hopefuls pose in front of the Lido Casino in 1967. This was the site of many beauty pageants.





INLET DYNAMICS

Tidal inlets — Floridians sometimes call them passes — are highly dynamic and visible features of Southwest Florida's geography. Inlets provide strategic points of entry and egress between the Gulf of Mexico and the inland waterways, but can be intimidating to navigate because of their shifting nature, strong ebb and flood currents and wave action — including breakers, which may extend clear across the inlet mouth even in a buoyed channel.

Waves propagating into an opposing current experience an increase in height and a decrease in length, resulting in steeper waves that are more difficult to navigate. Offshore shoals continually shift because of the moving beach sand, and it is sometimes not feasible to keep buoys in the best water. Local boaters, under such conditions, often leave the buoyed channel guided by their knowledge of local conditions and of the dynamic history of inlet development, which enables them to pick the best depth and avoid uncharted obstructions.

An understanding of why inlets develop their distinctive forms, coupled with a knowledge of inlet history, is a useful tool that can aid the eco-tourist mariner to fathom the behavior and navigable condition of inlets.

Inlet Locations and Status

Five inlets are currently used by boaters to transit between Gulf and bay waters in the Sarasota Bay system: Longboat Pass, New Pass, Big Sarasota Pass, Venice Inlet and Stump Pass (Map 1). Distances for traversing the outside (Gulf of Mexico) and inside (Intracoastal Waterway) routes, and the intervening inlet access channels, are given in Table 1 (a-d). Outside route distances for mariners are slightly longer, but travel time under favorable conditions is usually less, especially for high-performance cruisers. Cruising sailboats often choose the outside route to catch a better breeze and to avoid bridges with restricted openings.

Longboat Pass, New Pass and Venice Inlet are federally maintained waterways between the Sarasota Bay system and the Gulf. They are periodically surveyed and, when shoaling occurs to a point where actual depths are less than the designed project depths, are dredged by the U.S. Army Corps of Engineers in cooperation with the West Coast Inland Navigation District (WCIND). Big Sarasota Pass and Stump Pass are not federally designated inlets, although Stump Pass was dredged by the WCIND in 1998.

The U.S. Coast Guard maintains aids to navigation at all the inlets except Stump Pass, which as of the summer of 1998 was unmarked on the Gulf side.

Two inlets — Longboat Pass and New Pass — have single-span lift bridges situated near the inlet mouths. The bridge at Longboat opens on demand for boaters from 6 a.m. to 6 p.m. and afterwards on three hours' notice. The New Pass bridge has restricted openings for boaters from 7 a.m. to 6 p.m. on the hour and every 20 minutes.

Six inlets have closed during the past century on this reach of the Florida coast: Bradenton Beach, Little Sarasota Pass, Midnight Pass, Casey's Pass, [Old] Stump Pass and Bocilla Inlet (Map 1). Another historic inlet probably existed at Buttonwood Harbor prior to 1883.

Both current and historic inlets have formed, closed and reopened over their life spans, due to natural processes as well as human intervention. Such events directly affect the amount of water flowing through an inlet during a tidal cycle, referred to as a tidal prism. Dredging inlet "A" can rob some of the tidal prism from inlet "B," situated several miles down the coast. Similarly, the tidal prism of an inlet may be affected by changing the area of the bay adjacent to it; an inlet may close due to an abundance of sediment and strong longshore drift coupled with a small tidal prism.

Considerable debate continues regarding the effects of the dredging and filling of mangrove and marsh environments along bay margins on decreasing the tidal prism and the related closing of inlets. Little disagreement exists, however, about the potential for storm overwash of the barrier islands and the creation of new inlets. Sixteen sites along this stretch of the coast are particularly vulnerable to storm overwash (Map 1). These locations are prone to overwash because of the narrow width of the barrier island, low elevation and orientation to storm-wave attack.

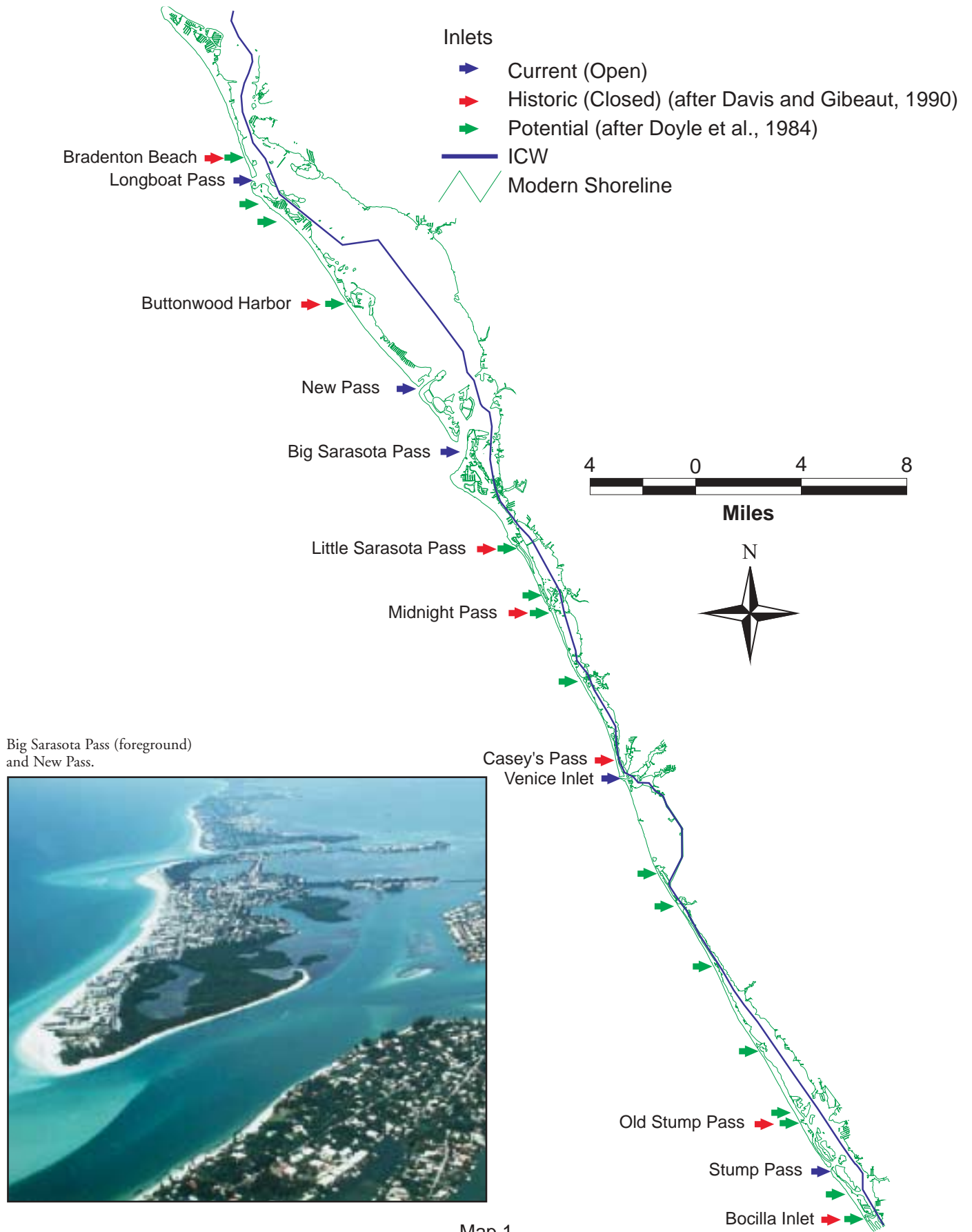
Table 1.
Route Distances
Between Inlets

a. Gulf of Mexico (Outside) Route to Inlet (Sea Buoy) Entrance (Distances in Statute Miles)					
Pass/Inlet	Longboat	New	Big Sarasota	Venice	Stump
Longboat		11.3	15.3	28.0	46.0
New	11.3		4.0	16.7	34.7
Big Sarasota	15.3	4.0		12.7	30.7
Venice	28.0	16.7	12.7		18.0
Stump	46.0	34.7	30.7	18.0	

b. Intracoastal Waterway (Inside) Route to Inlet Access Channel (Distances in Statute Miles)					
Pass/Inlet	Longboat	New	Big Sarasota	Venice	Stump
Longboat		11.6	13.6	28.6	45.9
New	11.6		2.0	17.0	34.3
Big Sarasota	13.6	2.0		15.0	32.3
Venice	28.6	17.0	15.0		17.3
Stump	45.9	34.3	32.3	17.3	

c. Inlet and Access Channels From Gulf to Intracoastal (Distances in Statute Miles)			
Pass/Inlet	Inlet Channel	ICW Access	Total
Longboat	1.3	1.0	2.3
New	0.87	2.0	2.7
Big Sarasota	3.3	1.7	5.0
Venice	0.3	0.2	0.5
Stump	1.5	0.8	2.3

d. Outside Route, including Runs from and to the ICW (Distances in Statute Miles)					
Pass/Inlet	Longboat	New	Big Sarasota	Venice	Stump
Longboat		16.3	22.6	30.8	50.6
New	16.3		11.7	19.9	39.7
Big Sarasota	22.6	11.7		18.2	38.0
Venice	30.8	19.9	18.2		20.8
Stump	50.6	39.7	38.0	20.8	



Map 1.
Inlets of the Sarasota Bay System

Inlet Features

Inlets are natural or manmade channels connecting the coastal Gulf to estuaries with strong tide-induced currents that build up supplies of sand, called shoals, just inside or adjacent to their channels. Inlets may close, open, migrate or stabilize in response to changes in sediment supply, wave climate, tidal regime and back-bay filling or dredging. Changes in inlets occur at different time scales, ranging from hours during severe storm events to decades or even centuries.

For the mariner running the inlet, the most recognizable feature is the steep groundswell that builds up across the inlet mouth, caused by resistance created by the sea bottom where offshore swells run into shoal water. Figure 1 is a perspective drawing of tide-generated and wave-generated transport features in a representative inlet system. The transport of sediment along the beach face, referred to as longshore drift, occurs on the Gulf side of barrier islands and is depicted to be moving from top to bottom. Figure 2 shows the elements of an inlet system; some features may or may not be present or well-developed in all inlets.

Sand is deposited as shoals just inside and outside the inlet because of the reduction in current speed in these areas. Ebb-tidal deltas occur at the seaward margin — outside — of the inlet and retreat or bend in response to the interaction between incoming waves and ebb tides. Large inlets, such as Big Sarasota Pass, build extensive, visible, ebb-tidal deltas. Sediment sources include material washed out from the bay, material eroded from the main ebb channel and longshore drift. Longshore drift is sand that moves up and down the coast between the beach and the outer edge of the breaker zone due to waves approaching the shore at an angle.

Material brought out on the ebb tide is deposited on the swash platform. The breaking waves that the mariner experiences at the inlet entrance are a dominant feature on swash platforms and help to create swash bars. Marginal channels may develop along the ends of barrier is-

lands where incoming (flood) tidal flow is reinforced by wave-generated currents; the swash channel at Boca Grande is a good example of this phenomenon. From boat-deck level, these channel features appear to have the smoothest water surface and absence of breakers and, under favorable weather, may offer the mariner an alternative shorter route through the inlet.

Spits occur in areas with a high rate of sediment transport alongshore and a small tidal prism; spit growth eventually may restrict tidal flow in the main channel and cause downdrift migration or closure of the inlet. Migration of barrier island spits along this reach of the Florida coast is southward, in the direction of net longshore transport. The build-up of Englewood Beach on south Manasota Key adjoining Stump Pass illustrates this process.

Flood (incoming) tide transports sediment landward through the inlet via the main channel, producing a similar shallow-water, delta-like feature on the bay side of the pass. The interplay of ebb and flood tides on this bayside delta creates spits and spill-over lobes where ebb currents run strong. However, flood-tidal deltas are less prone to change than ebb-tidal deltas along this reach of the coast. Over time, they become stabilized by seagrasses and mangroves; they serve as nurseries for juvenile fish and are important fishing grounds.

Flood-tidal deltas, because of their bayside location, have been subjected to heavy land-development pressure. Much of the New Pass flood delta is covered by City Island; that of Big Sarasota Pass is occupied by Bird Key. Natural and improved (dredged) flood channels are marked with aids to navigation. The bayside flood channels may carry additional signage advising the mariner to avoid wandering outside the channel and on to the flood-tidal delta, where propeller scarring of sensitive bay bottom habitat may occur.

The intertidal community is one of Sarasota Bay's most biologically productive.

This fringe area is a mix of land and water, where creatures of the land and water most often converge.

The mangrove trees found here serve as home for birds, and the jutting prop roots of the red mangrove offer shelter to small fish and shellfish.

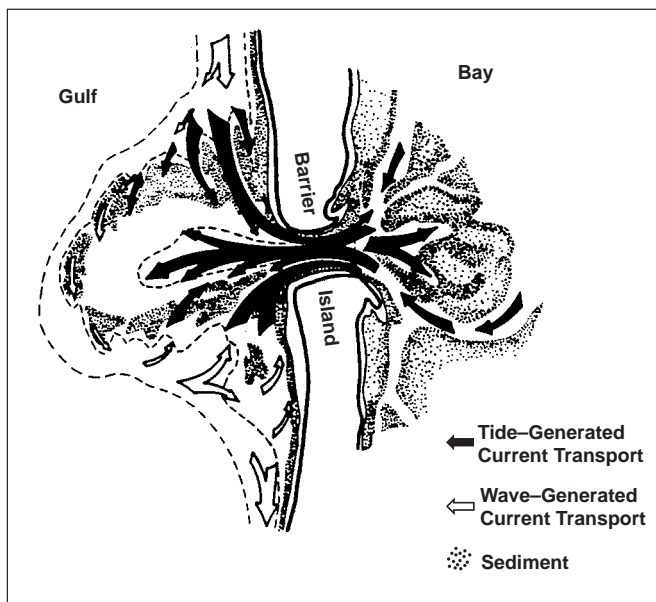


Figure 1.

Tide-Generated and Wave-Generated Transport Features in a Representative Inlet System (from Smith, 1984)

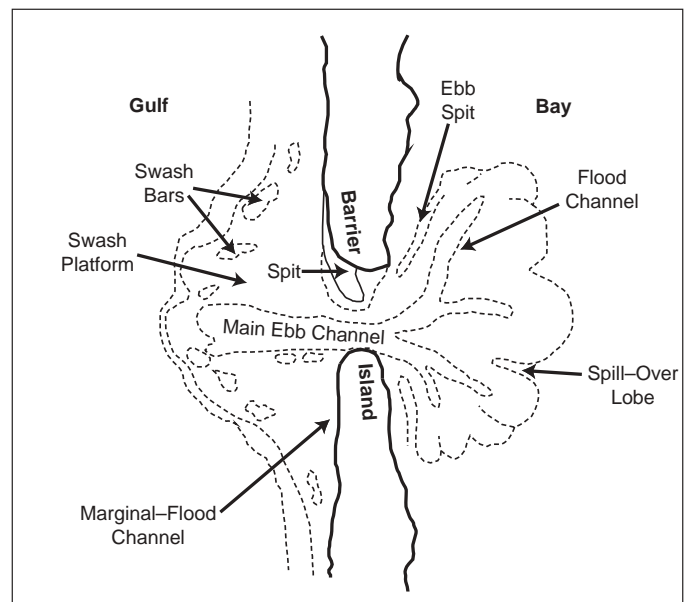


Figure 2.

Tidal Inlet Features (from Smith, 1984)

Types of Inlets

Tidal and wave energies determine the form of seaward flowing ebb-tidal deltas. The varying mix of these two forces determines the movement and deposition of sediments. The character of an inlet — its shape, dynamics, navigability — may change over time as the inlet adjusts to changes in the way tides and waves interact. Since Southwest Florida is a low-wave-energy coastline and the mean tidal range is relatively small (two feet), a delicate balance exists between tide- and wave-dominated conditions. A slight decrease in tidal prism (e.g., due to bayside filling) may cause a change from tide-dominated to wave-dominated conditions in inlets. Likewise, a change in wave energy due to sediment accumulation and spit development along the beach face may cause development of an offset alignment to the ebb delta.

In addition to these natural forces, shoreline engineering through the construction of groins, jetties and bulkheads — features designed to stabilize the shoreline by holding beach sand in one place — can dramatically alter the supply of sediment and the course of development and shape of an inlet. Another factor leading to inlet alteration is beach renourishment activities, which can contribute to pass shoaling through sand transport via longshore drift.

The drawings in Figure 3 depict four types of inlets found in Southwest Florida, based on the shape of ebb-tidal deltas: tide-dominated, wave-dominated, mixed-energy with straight shape and mixed-energy with offset shape. The Gulf is to the left side of the diagram and the bay is to the right, as in Figures 1 and 2.

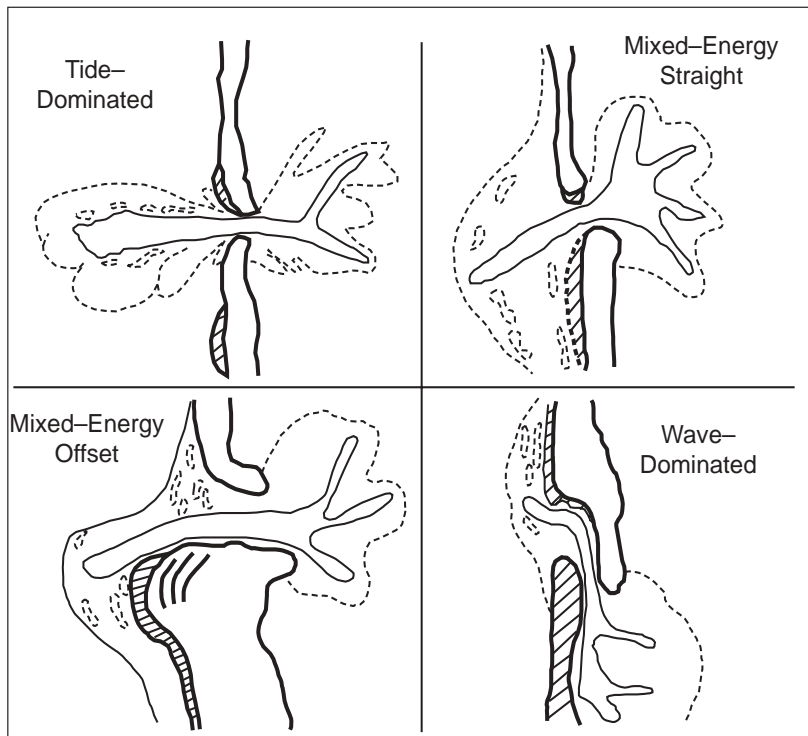


Figure 3.
Inlet Types Along the Southwest Florida Coast
(from Davis Jr. and Gibeaut, 1990)

The signature feature of tide-dominated inlets is a well-defined main ebb channel with deposits of beach sand on adjacent Gulf shores. Longboat Pass and Venice Inlet fall under this category; these inlets have relatively stable ebb-tidal deltas. Mariners should exercise caution in approaching tide-dominated inlets from the Gulf under ebb-tidal conditions, because maximum ebb current velocities are considerably higher than currents at flood stage at these locations. A combination of strong on-shore winds and peak ebb tide can be especially hazardous because of the amplitude and steepness of the waves. Furthermore, the Longboat Pass entrance channel is over one statute mile long, and a lift bridge must be negotiated within the throat of the main ebb channel, an area where currents are particularly strong. Venice Inlet is jettied and, while passage through this entrance channel is less than 0.5 statute miles, currents and eddies adjacent to the rock revetments make for potentially precarious conditions.

Wave-dominated inlets are very unstable and prone to migration. As wave-dominated inlets migrate along the coastline, their main channel is lengthened and becomes hydraulically inefficient for tidal exchange. Sometimes referred to as “wild inlets,” no such passes currently exist in the Sarasota Bay system, but historically such an inlet existed at Little Sarasota Pass in 1883. Wave-dominated inlets are susceptible to closure by the formation of new, more hydraulically efficient inlets, formed when storms breach spits on the updrift side. Such an event occurred when Little Sarasota Pass closed and Midnight Pass formed during the hurricane of 1921.

Mixed-energy inlets have ebb-tidal (outside) deltas shaped by a combination of tidal and wave forces. Their maximum ebb- and flood-tidal current velocities tend to be equal, with a lower magnitude than those of other inlet types. The main ebb channel may shift its location as a result of drifting beach sediment.

Where longshore drift is pronounced, a channel offset may occur. New Pass is an example of a mixed-energy inlet with a straight ebb-delta shape. Its main ebb channel is periodically dredged on an alignment perpendicular to the shore (east-west heading). Net longshore drift, from north to south, builds a shoal over the swash platform. When this occurs, the best water for boaters is usually found along the marginal flood channel, which follows the north end of Lido Key into the throat of the main ebb channel.

Big Sarasota Pass and Stump Pass are mixed-energy systems with offset alignments. The approach from the Gulf to the main ebb channel at Big Sarasota Pass is from the south off the north end of Siesta Key. Once inshore of the swash bar shoals, the channel parallels the curved north shore of Siesta Key. Stump Pass was dredged in 1998 to offset the deposition of sediment southward from Englewood Beach. This is an unmarked channel and should be approached from the Gulf with extreme caution.

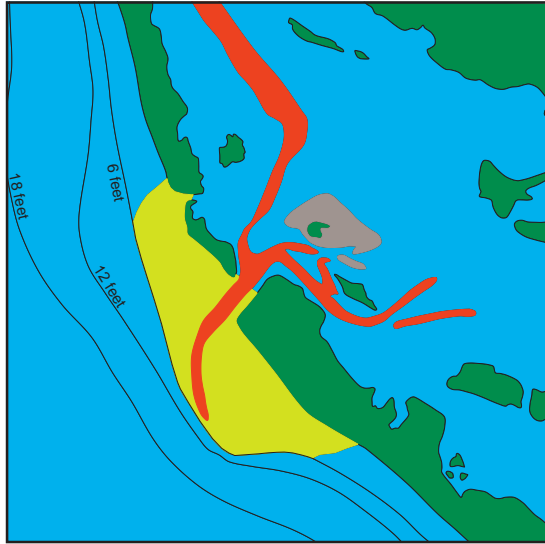
Historical Changes

Changes in inlets are revealed by historic charts and aerial photographs that provide an indelible image of the location and shape of these highly dynamic, visible features of the region's boating geography. The following section offers a description of these changes as seen through a selection of maps that recreate antecedent inlet features plus contemporary aerial photographs illustrating current conditions.

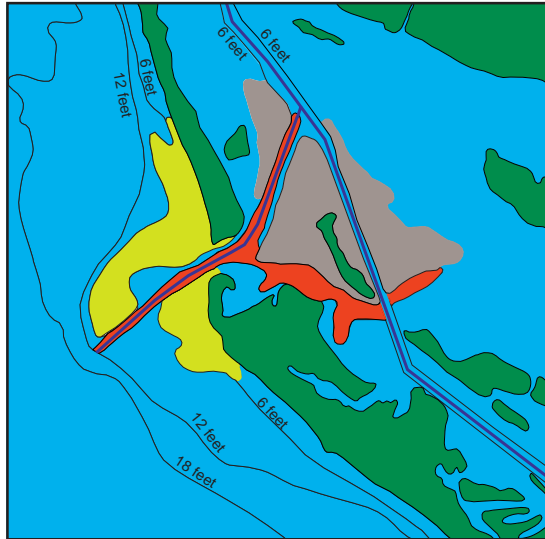
Longboat Pass

Pre-development conditions in Longboat Pass (Map 2) are shown by the 1883 map, in which the inlet ebb-tidal delta appears to have a mixed-energy offset form. Flood channels on the bay side are extensive north and south of the inlet; storm overwash may have created the small inlet approximately 0.5 mi. to the north. In the 1977 map, the inlet has a similar shape and is in approximately the same location. The channel has been dredged: on the bay side it follows the natural flood course, but on the Gulf side it cuts directly across the swash platform. A recurved spit (Beer Can Island or Greer's Island) has developed at the north end of Longboat Key and is a popular destination for weekend boaters. The flood (bayside) tidal delta is extensive, and the Intracoastal Waterway has been dredged through the shoal. The 1995 aerial view shows present conditions at Longboat Pass. Note the dredged access channel (a) leading from the Intracoastal Waterway to the inlet. An alternate route (b) follows the southerly natural flood channel, but requires running close and parallel to the bridge, which can be hazardous under ebb tide conditions. Two popular anchorages are adjacent to the (b) route. The flood-tidal delta is also a popular boating destination on weekends and holidays.

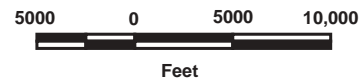
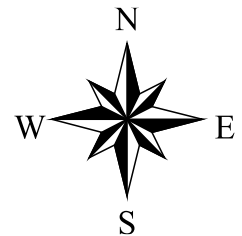
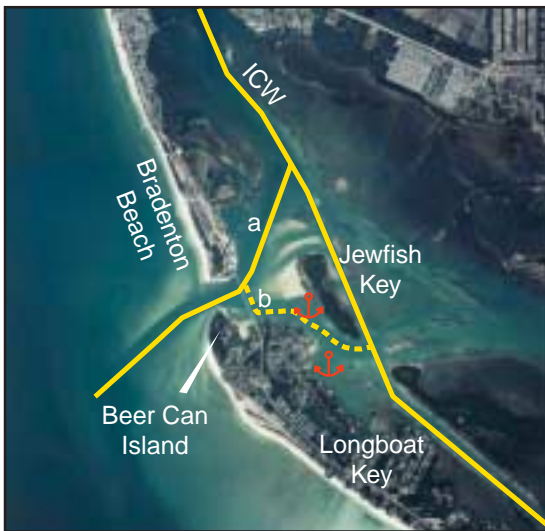
1883



1977

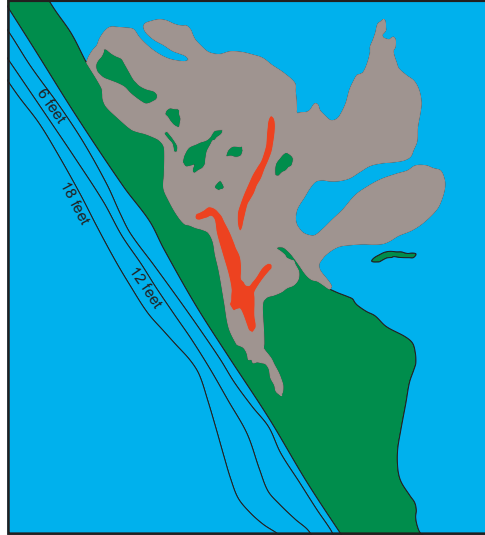


1995



Longboat Pass
Map 2.

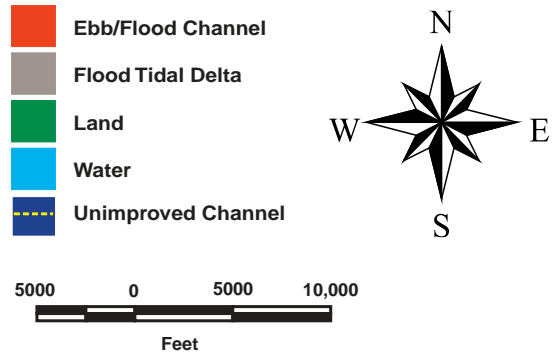
1883



Buttonwood Harbor

Buttonwood Harbor (Map 3) on Longboat Key retains many bayside features of a historic antecedent inlet. The flood-tidal delta is one of the largest of all the inlets along the Sarasota Bay system. Extensive beds of seagrass cover this feature, a prime recreational fishing area in Big Sarasota Bay. The access channel from the Bay to Buttonwood Harbor follows the relict flood channel. The barrier island at this location is prone to beach erosion, storm wave attack and potential breaching, and is one of the narrowest points on the key.

1995



Buttonwood Harbor
Map 3.

1883



1977

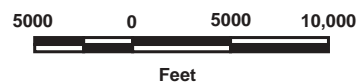
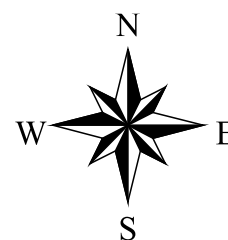


1998



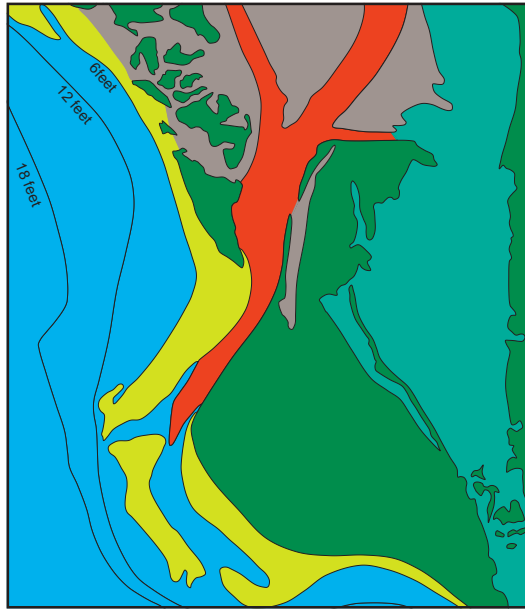
New Pass

New Pass (Map 4) was well developed in 1883. A comparison with the 1977 map shows substantial changes to the Lido Key barrier island and to the bayside flood delta and channel features due to dredge-and-fill development in the 1920s. The flood delta area has been reduced substantially by creating City Island and, as a result, one can surmise that a similar reduction has occurred in seagrass habitat. Tidal exchange also has been reduced: before development (1883 conditions), the flood channels were linked between New Pass and Big Sarasota Pass, and overwash from the Gulf to the Bay probably occurred between the islets south of Lido Key. The inlet has been dredged since 1926. The 1998 aerial shows the effects of longshore drift from Longboat Key and sediment accumulation on the swash platform. The marginal flood channel that parallels the north Lido shore is used under these conditions by boaters with local knowledge. An anchorage, popular with weekend recreational boaters, is situated inside the recurved spit on the south end of Longboat Key.

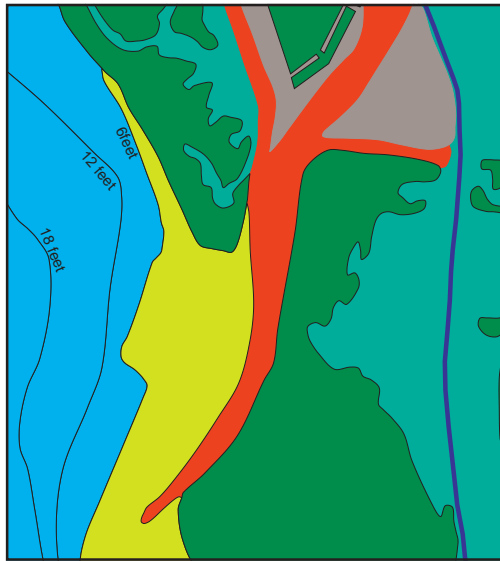


New Pass
Map 4.

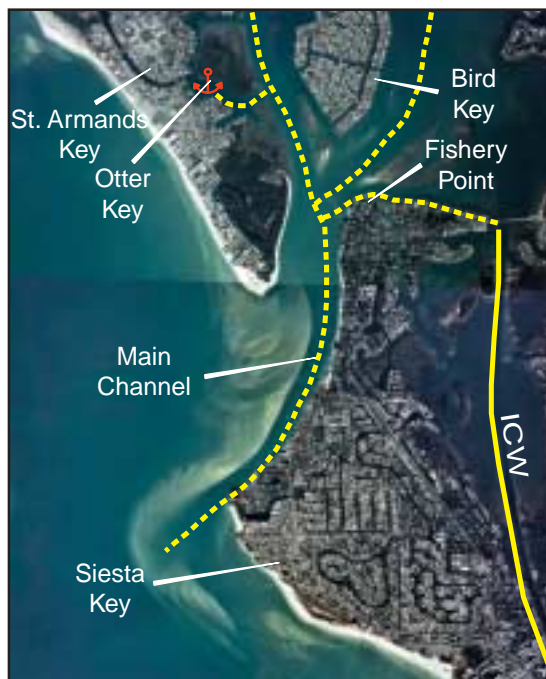
1883



1977



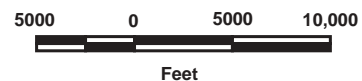
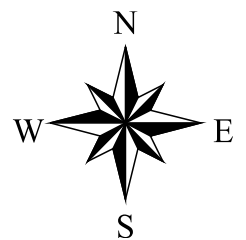
1995



Big Sarasota Pass

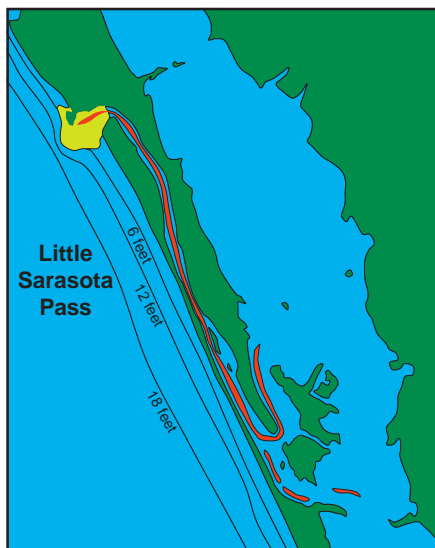
Big Sarasota Pass (Map 5) on the Gulf side retains much of its pre-development (1883) form with a large ebb-tidal delta and large main channel. It is on the bayside, where large changes are manifest (1977) due to extensive dredge and fill that has dramatically reduced the flood-tidal delta at Lido and Bird keys. In the early 1900s, these areas were expansive seagrass habitats and popular sportfishing locales. Land development on Lido Key occurred in the 1920s and on Bird Key in the 1960s (1977 map). The 1995 aerial shows the presentday swash platform and current extent of the southward trending sediment drift. The northwest shore of Siesta Key has been bulkheaded, which has stabilized the position of the main channel. There are three natural flood-channel tributaries: northwest leading to the Sarasota Yacht Club (SYC), northeast to the Intracoastal Waterway and the City of Sarasota and east around Fishery Point and along the north shore of Siesta Key to the Siesta Key Bridge and the Intracoastal Waterway. A pocket anchorage behind Otter Key is reached off the SYC flood channel.

- Flood Tidal Delta
- Ebb/Flood Channel
- Land
- Water
- Ebb Tidal Delta
- Shallow Bay
- Dredged ICW Channel
- Unimproved Channel
- Anchorage



Big Sarasota Pass
Map 5.

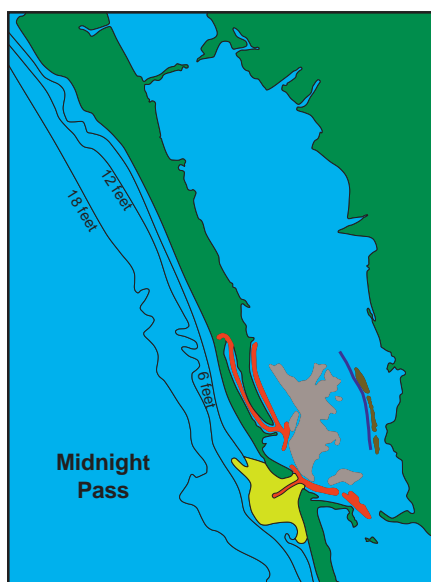
1883



Little Sarasota Pass and Midnight Pass

Little Sarasota Pass and Midnight Pass (Map 6) are closed inlets. Little Sarasota Pass on Siesta Key ceased to exist when the hurricane of 1921 created Midnight Pass, which in turn was closed in 1984 by bulldozers. Blind Pass is another former inlet. Heron Lagoon (1995 aerial) is a remnant flood channel of Little Sarasota Pass, which is an enclosed water body. Another portion of the old flood channel (1955 map) is a navigable arm of Little Sarasota Bay (1995 aerial). The flood delta is large and upland vegetation is present on Bird Keys, also called the Jim Neville Marine Preserves, a marine park and bird sanctuary. Neville Preserve, which received extensive spoil during the dredging of the Intracoastal Waterway, is inhabited mostly by exotic plant species, inhibiting its use by birds and other Bay life. The aerial shows the course of the ICW, which was widened and deepened in 1963-64; the 1955 map shows the spot dredging and spoil placement from the earlier 1900s waterway improvement. The bay side of these historic inlets is important for its recreational fisheries and bird rookeries, habitats that owe their existence to antecedent inlet conditions.

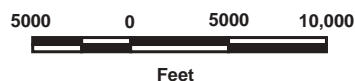
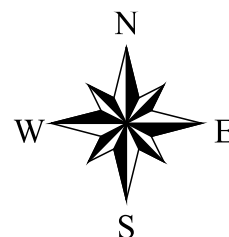
1955



1995

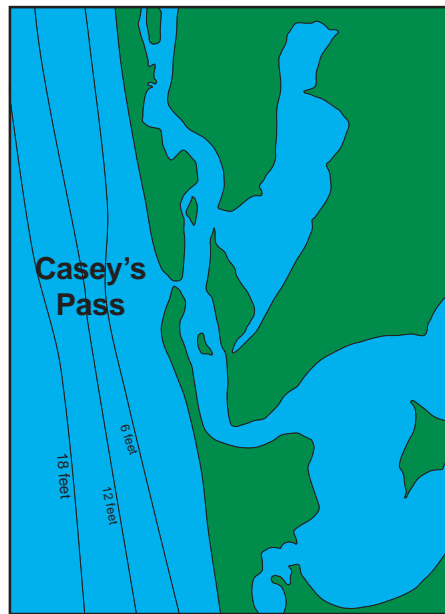


- Flood Tidal Delta
- Ebb/Flood Channel
- Land
- Water
- Ebb Tidal Delta
- Spoil
- Dredged Channel

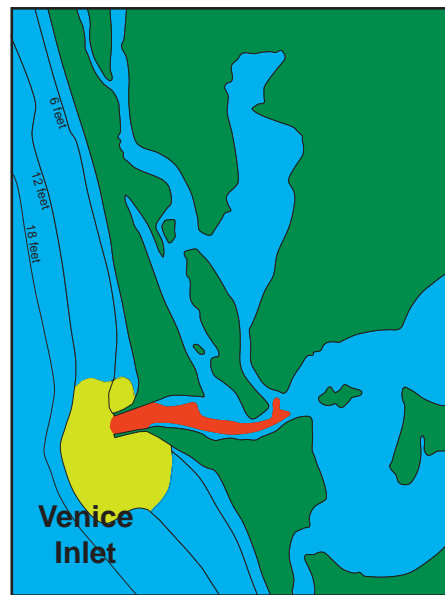


Little Sarasota and Midnight Passes
Map 6.

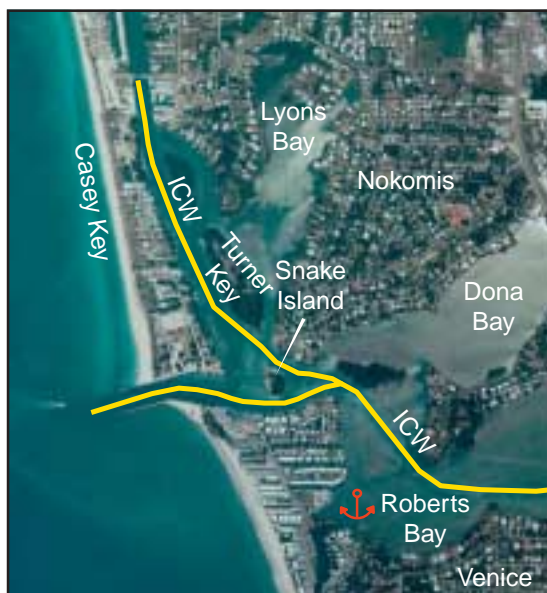
1883



1955









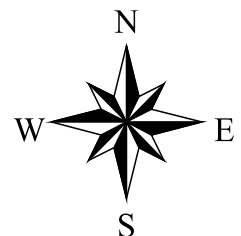
1998



Casey's Pass (Venice Inlet)

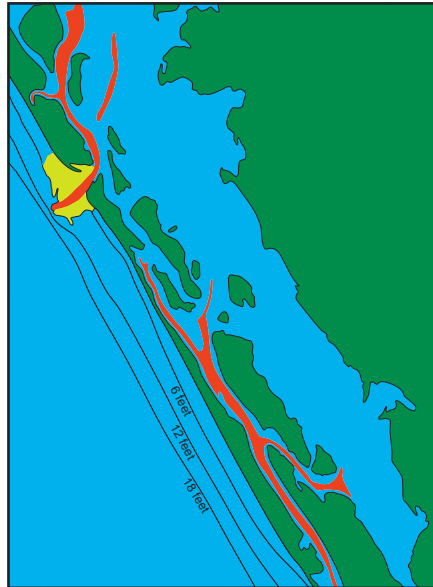
Casey's Pass and Venice Inlet (Map 7) are situated midway along the Sarasota Bay system. Casey's Pass was an unimproved inlet that provided access between the Gulf and Lyons, Dona and Roberts bays. It was susceptible to repeated closing and reopening over its history as it migrated up and down the coast. In 1883, Casey's Pass was about a quarter-mile north of its present location. The pass was jettied in 1937; since 1945 it has been maintained by the U.S. Army Corps of Engineers, and is commonly referred to today as Venice Inlet. It is navigable under most conditions because of the straight, short channel. The Intracoastal Waterway (1998) runs between Turner Key and Casey Key before turning east by Snake Island and south into Roberts Bay. Ebb currents run strong between Turner Key and Snake Island, and a shoal has built up between Snake Island and the southern end of Casey Key. The north shore of Venice has been bulkheaded; the main channel follows close to this shoreline. A small anchorage in southwestern Roberts Bay, adjacent to the Venice Yacht Club, can be approached either from the north along the bulkheaded eastern shore of Venice or by the yacht club channel from Roberts Bay.

-  Ebb/Flood Channel
-  Land
-  Water
-  Ebb Tidal Delta
-  Dredged Channel
-  Anchorage

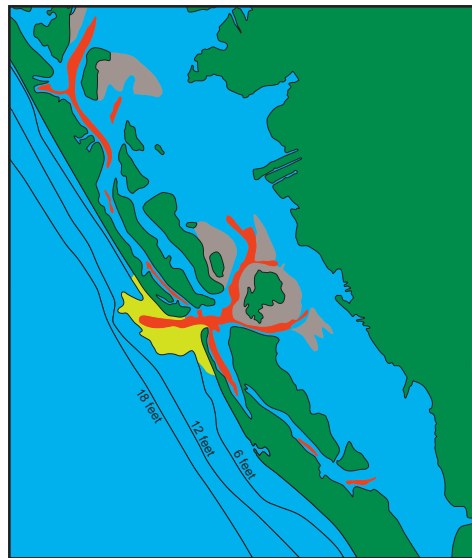


Casey's Pass and Venice Inlet
Map 7.

1884



1956



1998

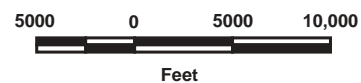
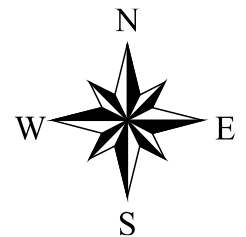


Stump Pass

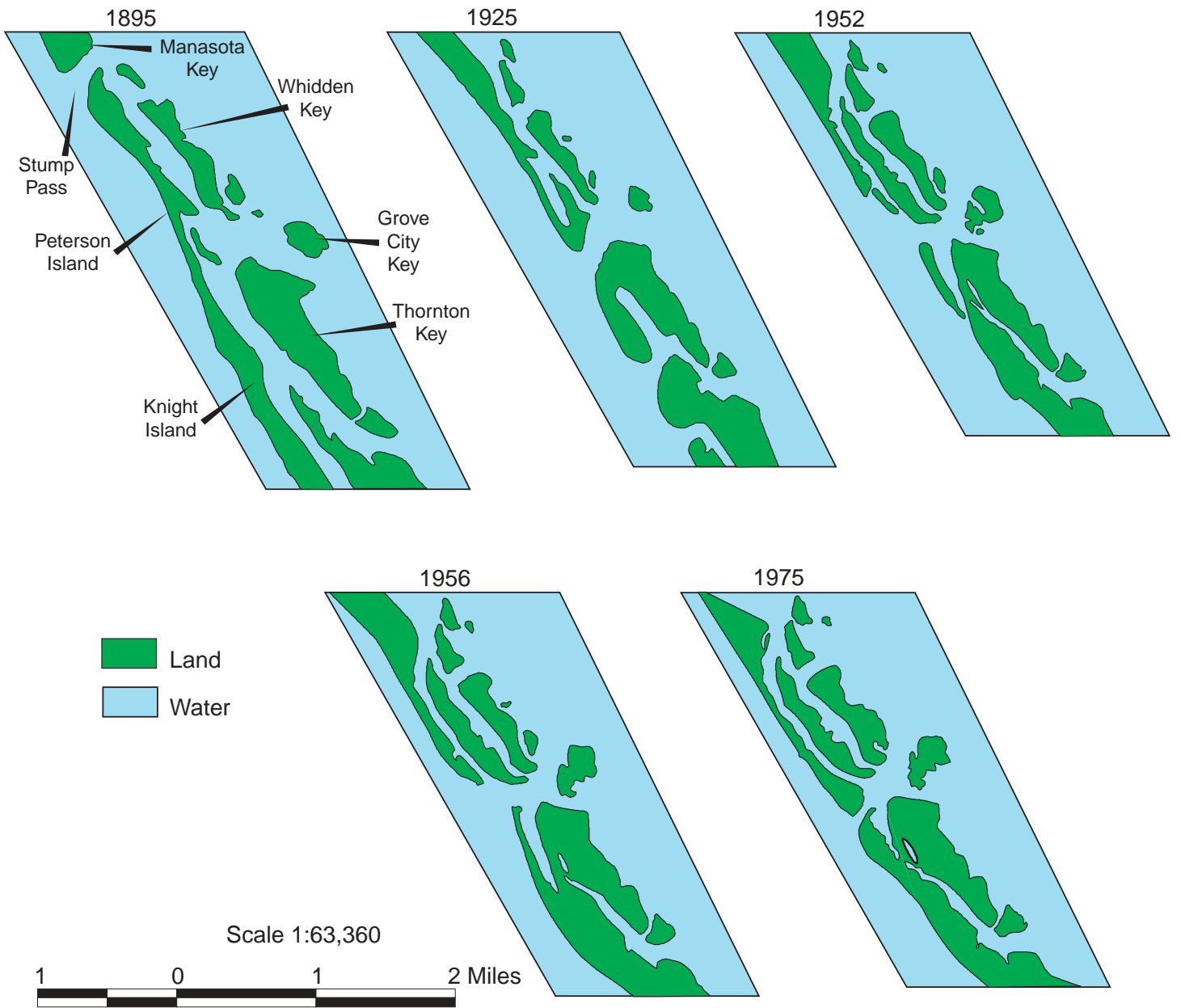
Stump Pass (Maps 8 and 9) is probably one of the most dynamic inlets in Southwest Florida. Evidence exists on the bay side of a former inlet location, which today is a popular recreational anchorage, approximately two miles north of the present inlet. Several flood-tidal deltas in Lemon Bay near the inlet have been stabilized over the years and are covered with extensive seagrasses. Some of the deltaic deposits have become intertidal and are vegetated with mangroves. Lemon Bay, for these reasons, is a prime recreational fishing locale in the Sarasota Bay system. Several anchorages are near the present inlet: one between Peterson Island and Englewood Beach, the other between Grove City Key and Thornton Key. The 1998 aerial shows the significant southerly longshore drift that was closing off the inlet and prompted the recent dredging.*

- Flood Tidal Delta
- Ebb/Flood Channel
- Land
- Water
- Ebb Tidal Delta
- Dredged Channel
- Unimproved Channel
- Anchorage

*Photo predates latest dredging



Stump Pass
Map 8.



Map 9.
Historical Changes at Stump Pass

Epilogue

The Sarasota Bay inlet system has experienced many changes in its location, shape and dynamics during the past 100 years. These changes have affected mariners' ability to enter and leave inland waters and make passages in the Gulf of Mexico. Natural processes and human intervention have influenced the evolution of these inlets.

Notwithstanding the history of change, mariners can use this knowledge of inlet history and understanding of the inlet forms and features to determine their behavior and navigable condition. While the focus of concern for safe navigation often is on the Gulf side, it is important to remember that the bay sides of inlets, particularly their flood tidal deltas, play a significant role in the creation of important recreational fisheries and bird rookery habitats.

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ALTERING LAND AND WATER FOR COASTAL DEVELOPMENT: VENICE, FLORIDA

The Venice area is a microcosm of the entire Gulf Intracoastal Waterway region in Southwest Florida, in which multiple interests — striving to develop shorefront real estate, to create new land from formerly pristine estuarine and shore ecosystems and to increase and improve the navigable waterways — have propelled coastal development in many profound ways. The area between the Albee Bridge (north) and Hatchett Creek Bridge (south), including Lyons Bay, Dona Bay, Roberts Bay and those freshwater streams extending east and north, has been selected to illustrate the effects of land drainage and waterway construction policies — both latent and direct — on waterfront and bay water uses (Map 1).

Physical Geography

The Venice-area estuary comprises three interconnected shallow bays — Lyons, Dona and Roberts — separated from the Gulf of Mexico by a barrier island (Casey Key). There is a semi-diurnal (two times per day) tidal exchange with the Gulf of Mexico through Venice Inlet (historically named Casey's Pass). The Gulf Intracoastal Waterway, originally dredged in the early 1900s and widened and deepened in 1965, aids in maintaining salinity levels in the estuary.

Freshwater discharge by low-gradient, short coastal streams is an important aspect of the hydrological regimen of two of the bays. Shakett Creek (formerly Salt Creek) flows into Dona Bay; Curry Creek is a tributary of Roberts Bay. Lyons Bay has no freshwater streams.

The surrounding upland has a low elevation (about four to five feet above mean low water) and is underlain by limestone. Many seasonal wet depressions reflect a high water table and an absence of — or poorly developed — surface drainage. Rainfall averages about 53 inches per year, concentrated in the May-October wet season.

Historically, during the wet period the surrounding low, swampy land was inundated and surface water flowed in meandering streams or sloughs that linked the many seasonal wet depressions. In the pre-development era, Knight's Slough extended from the head of Curry Creek off Roberts Bay east to the Myakka River, while Cowpen Slough linked Salt Creek and Dona Bay with freshwater drainage from Sarasota County's northern lands. The area was covered with pine, scattered patches of water oak and numerous small swamps. The bay shoreline was an extensive growth of mangroves and marsh.

Lyons, Dona and Roberts bays are very shallow, with numerous oyster bars projecting from their bottoms. Physical land barriers built into the bays affect tidal exchange; those barriers include deposition of spoil on Turner Key at the mouth of Lyons Bay and land filling for highway and railroad causeways in Dona and Roberts bays. These manmade features impede freshwater discharge and encourage lowered salinity levels during the rainy season.

The net effect of these constrictions — both natural and manmade — is to create a "stilling basin," an ideal settling condition for suspended solids that are transported by Cowpen Slough and Curry and Shakett creeks, especially during heavy rainfall periods. Low salinity and suspended solids may preclude growth of desirable seagrasses. Algae forms of vegetation predominate; their growth is fostered by the input of nutrients from septic tanks of waterfront homes as well as by stormwater runoff from roads and lawns.

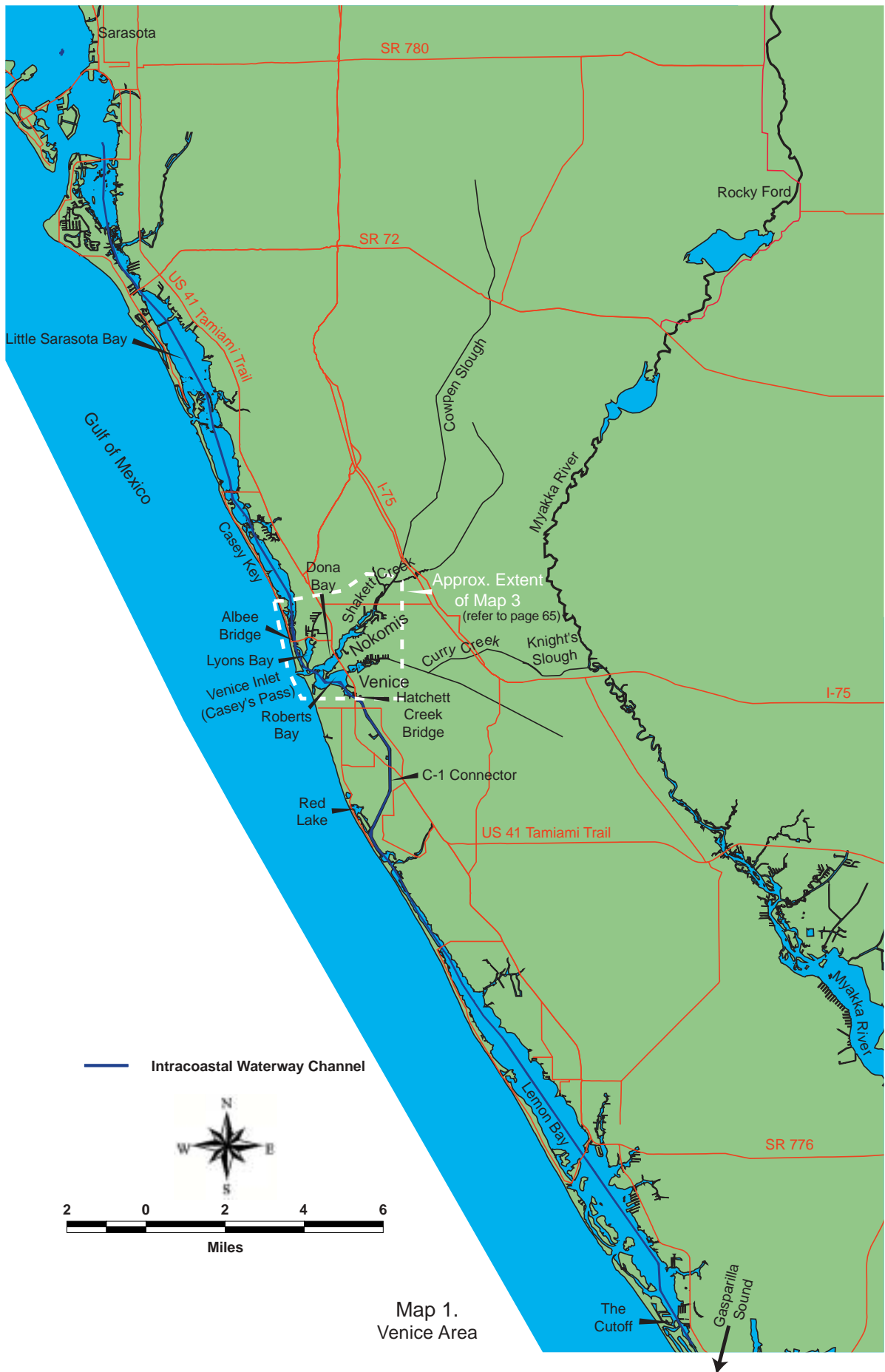
Another effect of restricted water flow in these bays, related to lowered salinity levels, is the fact that the rate of deposition of silt is increased. This silt increase comes about because of a process called flocculation, in which small particles carried in tidal waters tend to clump and settle at the freshwater/saltwater interface.



Venice Jetty Park.



Venice fishing pier.



Map 1.
Venice Area

Land Reclamation or Waterway Navigation?

The development history of the Sarasota Bay system is a record of competing and conflicting interests, some wanting to control flooding by upland drainage and others striving to build a protected inland waterway for either pleasure boating or commercial use.

Settlers who established Nokomis and Venice in the late 1800s had a strong interest in finding relief from flooding during the rainy season. They recognized the low-lying areas adjacent to the sloughs as potentially rich farm and pasture lands, but these lands were too wet to cultivate or utilize for cattle grazing except in occasional abnormally dry years.

When the Intracoastal Waterway was dredged between Sarasota and Venice in the early 1900s, local community leaders in Venice began seeking ways to achieve construction of the “missing link” in the waterway south to Charlotte Harbor. Settlers also wanted reclamation of swamp land for agricultural development. They convinced the federal government to examine the engineering feasibility and economic justification for such a multipurpose project in 1915.

Two routes were considered: Knight’s Slough, between Roberts Bay and the Myakka River at a point about 19 miles above the river’s mouth, and Cowpen Slough by way of Salt Creek (Shakett) to Dona Bay and to the upper Myakka River above Rocky Ford (Map 1).

The Knight’s Slough connection at that time was navigable by small boats during the wet season. Little Sarasota Bay had an available depth of about 3 feet at mean low water, and somewhat less at extreme low tide. In Dona Bay and Roberts Bay, where depths were considerably less, it was determined that dredging would have to be done to connect with the southern terminus of the Intracoastal Waterway at Casey’s Pass. The Myakka River between Knight’s Slough and the river mouth had a least-reported depth of 2.5 feet at low water on one broad sand flat and 3 feet on several other bars. The river above the point where the Cowpen Slough would strike it had only a small low-water discharge, which ceased altogether in the dry season.

The 1915 federal study concluded that the proposed waterway had nothing to recommend it either as a highway for commerce or as a pleasure boat route. Dredging also did not meet engineering and cost feasibility tests of combining, into a single project, navigation improvement while ameliorating flood conditions. The proposed Knight’s Slough improved navigation route would be of no value for drainage and reclamation of lands subject to overflow; Cowpen Slough, while serving the purpose of drainage and reclamation, would be cost-prohibitive and useless for commerce and navigation, federal officials determined.

The proposed Cowpen Slough route would reach the upper Myakka Valley, but without extensive and costly improvement of the river itself — involving locks and dams and regulating works for the storage of water — both the river and the proposed connection with the bays would be non-navigable for most of the year. For several months the route would have no water at all except in detached pools and in the tide-level portion.

Curry Creek’s history after 1915 is one of repeated attempts by local landowners to divert surface flooding by diking and ditching the land. The Curry and Knight families may have constructed small-scale drainage improvements during the subsequent decade. The Brotherhood of Locomotive Engineers, which purchased extensive land holdings in Venice and east to the Myakka River, engaged in large-scale land reclamation projects in the mid-1920s. In the late 1950s, the Blackburn family may have constructed a shallow ditch and dike along the route of an old drainage ditch that emptied into Curry Creek and Roberts Bay.

Shakett Creek received more direct public attention because of the encroaching urbanization from Sarasota within the area adjoining Cowpen Slough. The region had developed into an important farming and grazing economy during the 1940s. A small-scale system of large drainage ditches was constructed during that period. In the early 1960s, a flood-control plan was established to accommodate urban development, protect the vegetable-producing area and provide adequate drainage for pasture lands lying along the stream channel. A major feature of the plan was replacing the natural meandering slough with a straight, box-cut channel and rechannelizing the drainage ditches at the lower reaches. The net effects increased the drainage area of Shakett Creek and increased freshwater runoff from its watershed under storm conditions, approximately doubling the carrying capacity of the channel and its discharge into Dona Bay. The maximum discharge occurs about once in four years. Construction of engineering structures upstream of Shakett Creek has had a decided effect on the natural ecology of this estuary (see Physical Geography).

Surface-water drainage and land reclamation along Knight’s Slough and Cowpen Slough have contributed to altering the coastal landscapes downstream along Curry Creek and Shakett Creek. However, neither Curry nor Shakett Creek evolved into the connector link between Venice and Charlotte Harbor for the Intracoastal Waterway system. That link was achieved in 1967 by completion of the alternate route, a five-mile connector channel from Roberts Bay to Red Lake, along with dredging the length of Lemon Bay through “The Cut-off” to Gasparilla Sound.

A porthole is a round window in a ship’s side, fitted with glass and metal covers.



Sea-level rise will be a continually important issue, not only for beach erosion but also for eastward migration of the shoreline. Although estimates vary widely, some indicate that the sea level in the Gulf of Mexico and bay could rise between three and five feet during the next 100 years, altering the boundaries of Sarasota Bay and changing the lifestyles of area residents.

Changes on the Waterways and Along the Waterfront

The Intracoastal Waterway has had a profound effect on coastal development in Venice. At the beginning of the 20th century, it provided an all-weather “inland” water route to Sarasota. As Venice became the southern terminus of this waterway, its location justified stabilizing the inlet at Casey’s Pass (Venice Inlet today) to assure access to the Gulf of Mexico. The natural pass was dredged around 1925, but this measure proved to be a temporary solution (Photo 1). Construction of the jettied Venice

- A. Roberts Bay
- B. Dona Bay
- C. Original ICW Channel
- D. Turner Key
- E. Bird Island
- F. Casey’s Pass
- G. Nokomis



Photo 1.

Aerial view of Casey’s Pass, looking east from the Gulf of Mexico, around 1925 (Source: Edward Ral)



Photo 2.

Dredging of Venice Inlet upon completion of jetty construction, around 1937 (Source: Eugene Maier)

Inlet was completed in 1938 (Photo 2). Prior to World War II, the waterfront north and south of the jetties retained a natural appearance with a vegetation-lined shoreline. The original road from downtown Venice to the south bank of the inlet bridged the mouth of Pelican Cove near present-day Higel Park (Photo 3).

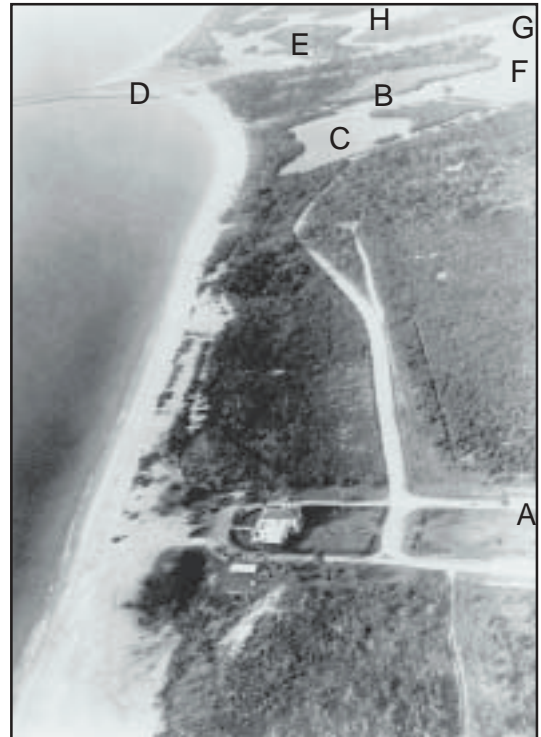


Photo 3.

Aerial view looking north toward Venice Inlet, around 1940, showing road from Venice Avenue to Inlet Circle, with bridge across Pelican Cove

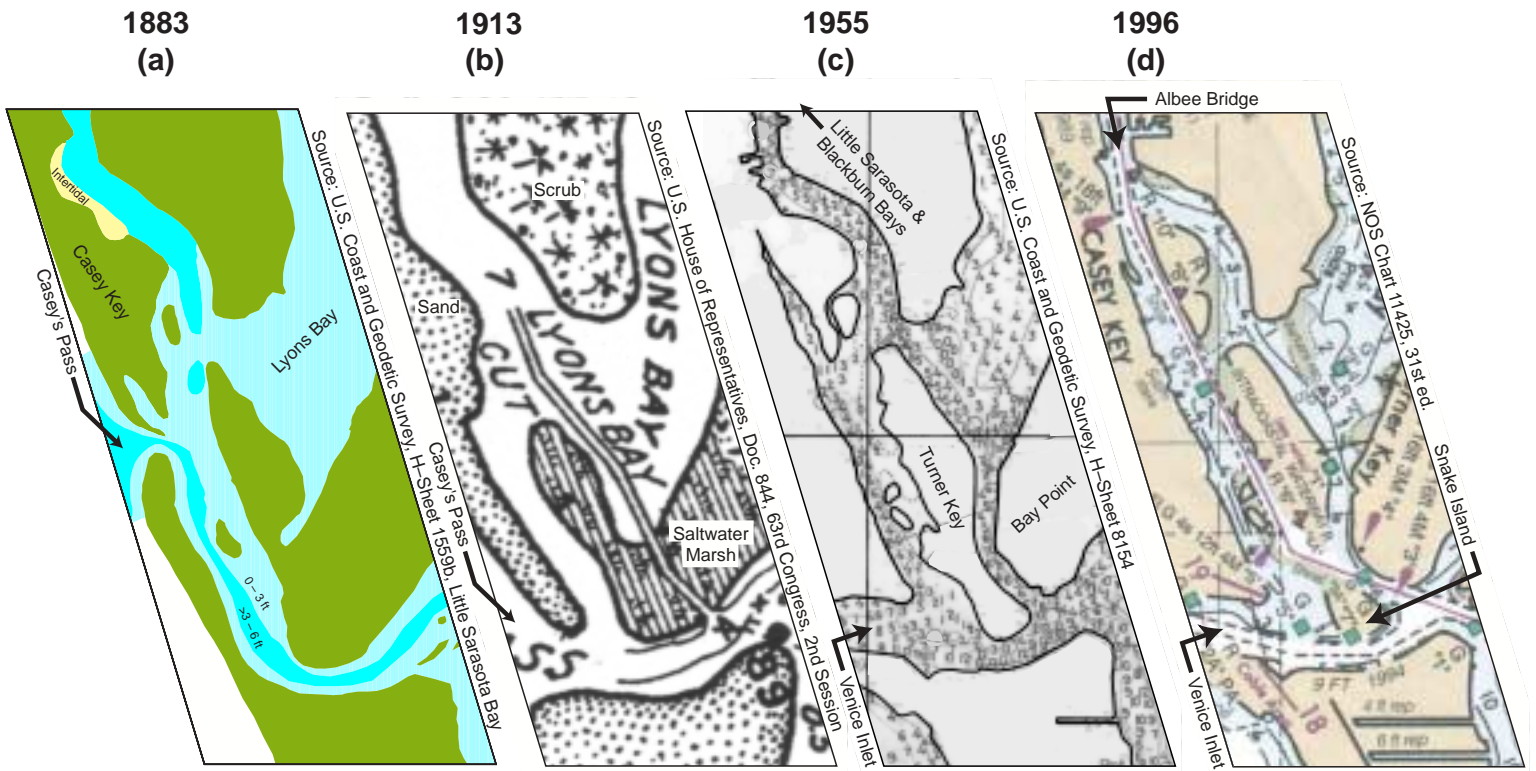
- A. Venice Avenue
- B. Inlet Circle
- C. Pelican Cove
- D. Venice Inlet
- E. Turner Key
- F. Roberts Bay
- G. Dona Bay
- H. Lyons Bay

The area between the Albee Bridge and the Inlet shows some of the most dramatic changes caused by nature and humans in Venice. Map 2 illustrates (a) conditions before coastal development in 1883; (b) the alignment of the original Intracoastal Waterway in 1913; (c) the coastline and water depths before the modern Intracoastal Waterway was dredged in 1955; and (d) waterway conditions in 1996.

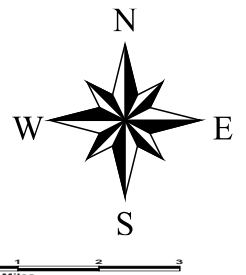
In 1883 (Map 2a), Casey's Pass was located a short distance north of the present inlet and opposite Lyons Bay. Deep-water access from the Pass was limited to the south channel and Roberts Bay (depths shoaled northward to less than 3 feet between the Pass and Little Sarasota Bay). By 1913 (Map 2b), Casey's Pass had migrated south to the location of the present inlet. The Lyons Bay Cut represents the original Intracoastal Waterway alignment prior to 1913, which effectively created an island later known as Turner Key (Photo 4). Saltwater marsh covered this island and the adjoining peninsula (called Bay Point today). Waterway conditions in 1955 (Map 2c) show a 5-foot controlling depth in the original

Intracoastal Waterway south from the Albee Bridge and east of Turner Key to Roberts Bay. That channel was abandoned in 1965 when the route was widened to 75 feet and deepened to 9 feet (Map 2d); the new channel shortened and straightened the alignment, creating one island north of Turner Key and another, Snake Island, south of Bay Point. While the former Intracoastal Waterway east of Turner Key was protected from currents on the gulf side of the Inlet, the present channel is exposed to these currents and chronically shoals where the mouth of Lyons Bay meets the waterway and Venice Inlet (Photo 5).

Landside development pressures began to impact bay habitats in the early decades of the 20th century (Map 3). Bridge foundations and causeways were built across Dona Bay and Roberts Bay, in 1912 for the railroad extension from Fruitville Junction to Venice and in 1921 when the Tamiami Trail (U.S. 41) was extended through Venice. This highway was four-laned in the 1950s, and the causeways were further widened. These structures obstruct natural freshwater discharge from Shakett and Curry Creeks and restrict saltwater inputs from the Gulf of Mexico.



Note: Depths are shown to the nearest foot; bathymetry for the 1883 and 1913 maps is relative to mean low water



Map 2.
Waterway and Waterfront Changes from 1883 to 1996 between the Albee Bridge and Venice Inlet

Photo 4.
Aerial view south
of Venice Inlet,
around 1940,
showing spoil
placement on
Turner Key from
ICW dredging of
original channel

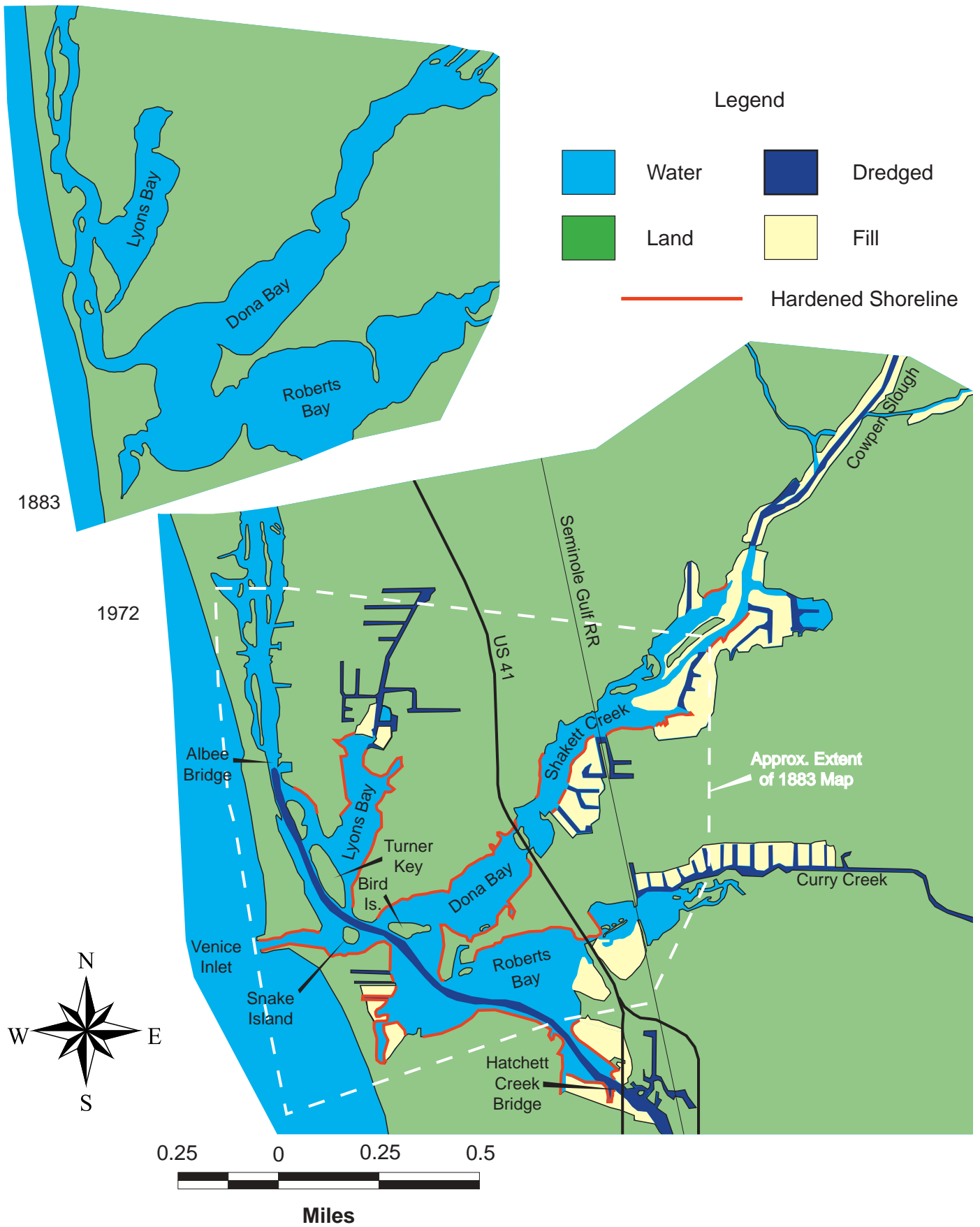
- A. Turner Key
- B. Bay Point
- C. Pelican Cove
- D. Bird Island
- E. Original ICW
Channel
- F. Venice Inlet
- G. Venice



Photo 5.
Aerial view south
of Venice Inlet,
around 1990,
showing new and
original (relict)
ICW channel

- A. Turner Key
- B. Bay Point
- C. Pelican Cove
- D. Bird Island
- E. Original ICW
Channel
- F. Venice Inlet
- G. Venice
- H. Present ICW
Channel
- I. Snake Island





Map 3.
 Shoreline Changes from 1883 to 1972 between the Albee Bridge
 and Hatchett Creek Bridge, Venice



Photo 6.
Black-and-white aerial photo mosaic of Venice showing
1948 land use



Photo 7.
Color infrared aerial orthophotographs of Venice showing
1995 land use

The shoreline in 1948 was almost pristine, with only a few homes or farms found along the waterfront (Photo 6). Significant land-use changes occurred along the bays and creeks in the 1950s and 1960s. Mangroves and other filtering, biologically active waterfront fringe plants were replaced by seawalls and other manmade structures; residential canals and waterfront homesites replaced marshes, while shallow estuarine areas were dredged to provide landfill for waterfront parcels. By the early 1960s almost the entire shoreline of the estuary had been seawalled between the Albee Bridge and Hatchett Creek Bridge (Map 3). Most waterfront homes in the area were built by 1970. During the 1960s the Venice population doubled from 3,444 to 6,648; since then, the city has grown to 18,500 and the uplands have undergone intense urbanization (Photo 7).

Epilogue

Venice represents the extreme case of altering land and water for coastal development within the 55-mile reach of the Sarasota Bay system. More than 80 percent of the bay water area has changed in the area between the Albee and Hatchett Creek bridges — either by shoaling or deepening by nature or humans — within the past century (see *Historical Development of the Gulf Intracoastal Waterway*).

These changes were caused by the desire to reclaim uplands and control drainage during the wet season as well as by a desire to provide navigable waterways for commerce and recreation. The dike-and-ditch policies of private developers and public agencies (local, regional, state and federal) have had an effect on water quality in the estuary. Channelizing Cowpen Slough has doubled the carrying capacity of Shakett Creek and its freshwater discharge into Dona Bay. Had a similar project been carried out on Knight's Slough, with a connection to the Myakka River, comparable effects would be occurring today on Curry Creek and Roberts Bay.

Public-works projects such as road and waterway construction have changed the shape of the shoreline and the boating geography of the region.

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Numerous species of waterfowl are found throughout the Sarasota Bay area. Of note are cormorants, several species of herons and egrets, brown pelicans, ibises, ospreys, several varieties of gulls and terns, the bald eagle, wintering ducks, wood stork, roseate spoonbill, and the endangered scrub jay, to name a few.





LOSS OF SEAGRASSES

To countless marine creatures, seagrass beds are a vital source of food and shelter. Seagrasses also contribute to water quality due to the stabilization of bottom sediments.

Five types of seagrass are found within the Sarasota Bay system: *Thalassia testudinum* (turtle grass), *Syringodium filiforme* (manatee grass), *Halodule wrightii* (shoal grass), *Ruppia maritima* (widgeon grass) and *Halophila engelmannii* (star grass).

Based on bathymetry from the pre-development era as compared to today, (Map 1) it is estimated that seagrass area has been reduced due to destruction from dredge-and-fill activities and deteriorating water quality. Direct destruction takes the form of filling of the bays for coastal development, dredging of canals, creation of the Gulf Intracoastal Waterway or boat propeller scarring. Of the roughly 10 square miles of seagrass found today in the area of Sarasota Bay stretching from Cortez Bridge to Siesta Key Bridge, three square miles have been identified as suffering from light scarring, 0.8 mile from moderate scarring, and .5 mile from severe scarring (Map 2).

Indirect damage to seagrasses comes through poor water quality in the bays, mostly due to increased coastal development. Losses of upland vegetation alter plants' capacity to filter sediments and pollutants from reaching the bay system. Coastal development also increases the amount of nutrients that reach the bays. For example, Sarasota Bay has lost approximately 39 percent of its mangroves between the 1880s and 1990.

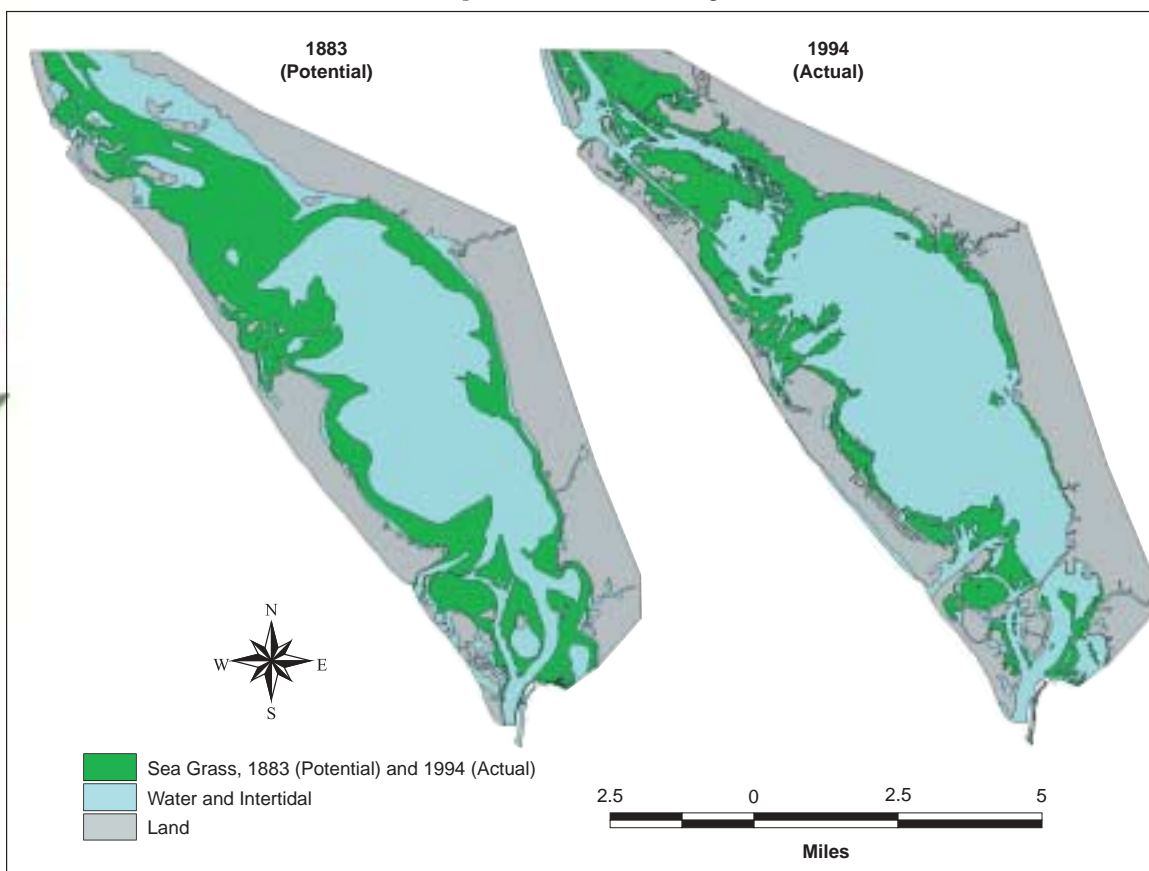
Investigation of potential seagrass areas in the predevelopment era (1893) and non-existing seagrass water areas today indicates a possible net loss of more than 22 percent of seagrass beds (Map 3). Much of the change is in the intermediate water depth areas of Big Sarasota Bay area, such as north of Longbar Point and adjacent to Bird Key (Map 3), where seagrass beds could have thrived due to better water quality.

Studies to determine if better marking of seagrass meadows and increased boater education on the importance of

seagrasses would help protect the resource have produced mixed results. In the Cockroach Bay Aquatic Preserve and Fort DeSoto Park areas, plans to protect seagrass beds — including increased boater education on the importance of the resource, better channel marking, limiting powerboat access to more sensitive marine areas and enhanced enforcement of existing laws — were put into effect. Unfortunately, propeller scarring continued to increase. Clear demarcation of seagrass beds reduced accidental grounding by boaters unfamiliar with the areas, but better marking tended to escalate recreational fishing on the grass beds and increased damage to seagrasses. In Sarasota Bay, improved marking of the ICW and connectors is being used as a waterway management technique to protect seagrasses.

The Sarasota Bay National Estuary Program has determined that nitrogen pollution has been reduced by 30 percent baywide, resulting in a 20-percent increase in habitat coverage. This increase has occurred due to improved wastewater treatment. These kinds of improvements, for example, to the Manatee County regional wastewater treatment plant near Tidy Island, have virtually eliminated runoff into the bays and increased seagrass bed coverage there. In Big Sarasota Bay, improvements to City of Sarasota wastewater treatment practices have decreased nitrogen discharges into the bay by about 95 percent. Improvements in Sarasota mean that more than 46 percent of all wastewater is reclaimed, rather than being dumped in the bay. And, as a result of water quality improvement such as these, the Bay since 1888, has been able to support 310 million more shrimp, 68 million more crabs and 100 million more fish. Other management efforts are also restoring wetland habitats and creating artificial reefs to replace lost habitats from dredge-and-fill activities.

Seagrass recovery in Sarasota Bay: There has been an additional seven percent more shrimp, crab and fin fish in Sarasota Bay; 614 acres of seagrasses have returned since 1988. Ultimately, more seagrasses means a healthier, cleaner bay; a better bay means enhanced fisheries. Estuaries are among the most productive of all the earth's systems: more than 80 percent of all fish and shellfish use estuaries either as a primary habitat or as spawning or nursery grounds.



Map 1.
Sarasota Bay:
Historical
Perspective
on Potential
Seagrass Areas
Versus Existing
Seagrasses

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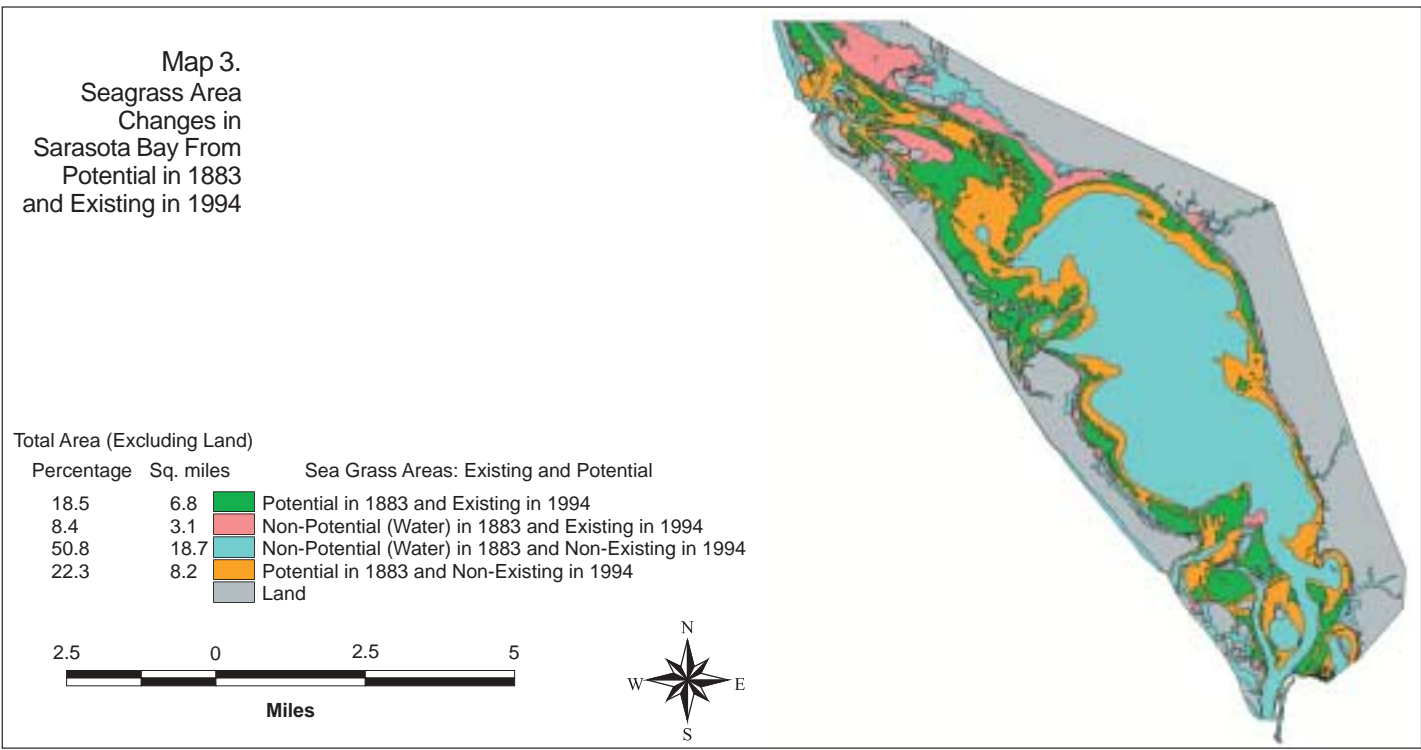
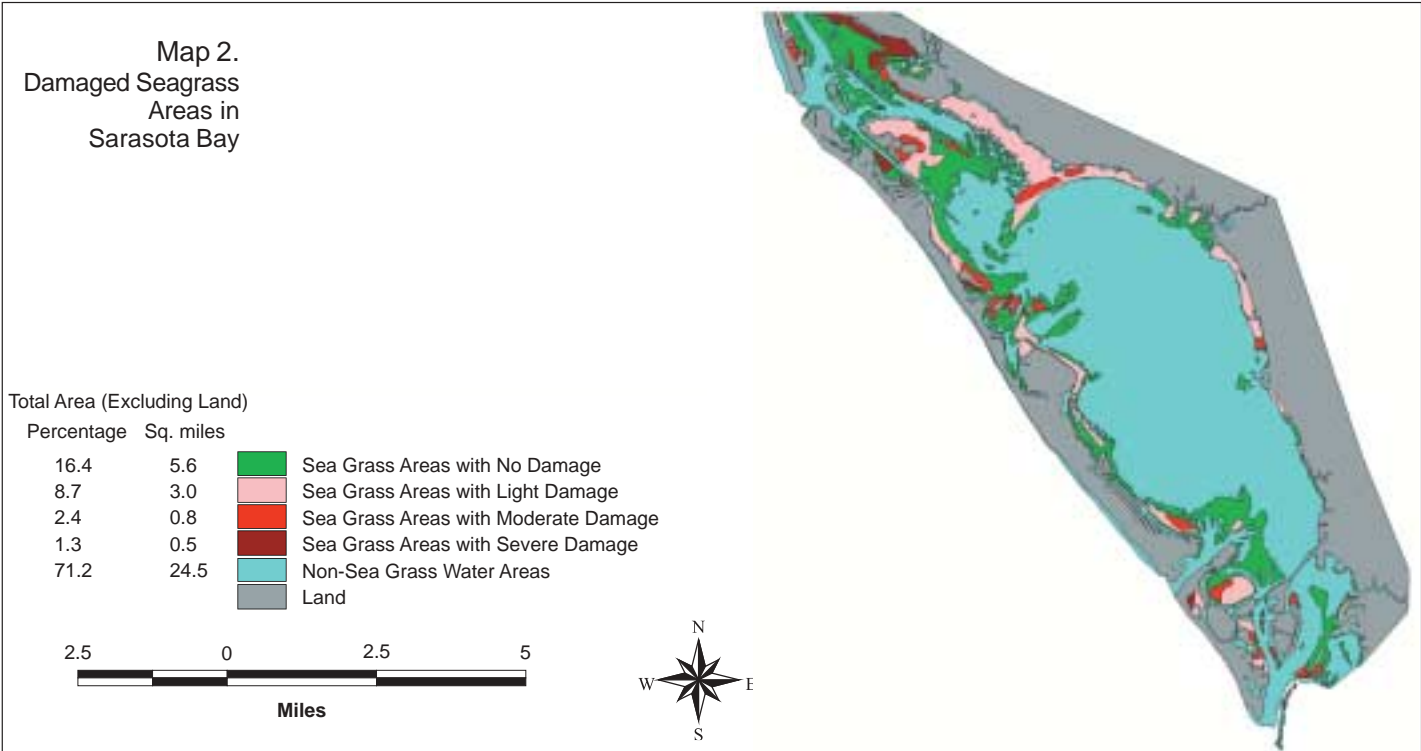
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CORTEZ: A Working Waterfront



Mariners coming upon the village of Cortez can glimpse a historic fishing waterfront in crisis. Once one of the largest fishing villages in Florida, Cortez and its waterfront today are only a shadow of their former selves. Where once scores of net-drying shacks stood on pilings just offshore, today only one still exists (Photos 1 [1940] and 2 [1990s], pages 72 and 73). Where a dozen bustling fish houses once teemed with the fare of the sea, today only a handful still fight to survive. Development pressure increased populations targeting fixed stocks of fish and legislative changes in fishing techniques have created major changes in the working waterfront.

Cortez is a village of more than 500 people located at the north end of Sarasota Bay, seven miles west of Bradenton in Manatee County. It was settled in the 1880s by North Carolina fishers who came south seeking mullet. At that time, the village was comprised of about 16 extended families: Fulfords, Guthries, Taylors, Lewises, Adamses, Garners, Joneses, Culbreths, Bells, McDonalds, Capos, Greens, Coarseys, Moras, Carvers and Drymonds.

In 1879, a U.S. Fish Commission official traveled up and down the west coast of Florida conducting a survey of commercial fishing. Of Cortez, he wrote, "Mullet is the fish most largely taken, and 10,000 pounds were caught at a haul."

The mullet and its roe were kench-cured, or rubbed with salt and dried in the sun, then shipped to Cuba to be sold, until a railroad was constructed between Tampa and Bradenton in 1884. Then, fish were shipped on ice to markets in Atlanta, Jacksonville and points north.

The village was not named until 1896, when the post office was built. Ironically, villagers decided to call their community "DeSoto," after the first Spanish explorer to set foot in this part of the state. However, some nameless postal clerk in Washington, rumored to have discovered two other "DeSotos" in Florida, named the village after "the great conquistador Hernando Cortez," even though Cortez never came near Florida.

At that time, the North Carolina natives found their village to be heaven. As Ben Green writes in his book *Finest Kind*:

"The immigrants had found what they were looking for: Sarasota Bay, sheltered from the Gulf by Anna Maria Island and Longboat Key, provided miles and miles of fishing grounds that were teeming with mullet, redfish, trout, bluefish, snook, sheepshead and flounder. Just beyond Anna Maria and with easy access through Longboat Pass lay the Gulf of Mexico, which had huge schools of mullet running along its beaches during roe season and, in the spring, a wealth of mackerel and kingfish."

Fish houses were built, homes erected and docks constructed, and the little village flourished. In 1912, a brick schoolhouse was built.

Cortez prospered through the early part of the 20th century. Gasoline-powered engines greatly enhanced the range of fishers, and as the state boomed, so too did Cortez. However, a hurricane on October 23, 1921, destroyed the Cortez waterfront with 75-mph winds and 10-foot seas in the bay. Fish houses, netspreads and fish camps were destroyed, but the hardy villagers rode out the storm in the old schoolhouse and no one perished.

The village rebuilt, only to face another catastrophe: the stock market crash in 1929, coupled with a mysterious disappearance of mullet from the waters of Sarasota Bay. As Green quoted Earl Guthrie in *Finest Kind*:

"It was so bad you could leave Cortez on the flood tide, go across Palma Sola Bay and right on across the mouth of the Manatee River, past Terra Ceia and McGill's Bay, past Joe's Island, right on up to Bishop's Harbor, be there on the high water, turn around and come back the same way, go across to Anna Maria and down the Gulf side of Longboat Key and back to Cortez and never see the first mullet jump. Not the first one, day after day after day."

Fishers left the sea to seek other work until the mullet again reappeared in 1938-39. (During the financially wracked years of the Depression, Cortez became noted as the only place in the U.S. that didn't accept financial assistance from the federal government.)

The ways of the water again confounded villagers in 1947, when one of the worst red tide outbreaks in history decimated fishing. The tiny microorganism visited the area again in 1953.

It wasn't only the threat from sea that impacted the fishing village. By 1967, development along the shores had destroyed acres and acres of mangroves, a vital nursery habitat and food source for mullet. That year, legislation was proposed to ban commercial fishing in Manatee County within 1,700 feet of shore — a move that would effectively end fishing in the bays. Cortez fishers banded together with other groups throughout the state and defeated the legislation, but the die was cast, and developers continued to gnaw on the outskirts of Cortez, attempting to transform the village into a huge housing subdivision.



Cortez fishermen pulling in their nets off Anna Maria in Bay Front Park.



...the Cortez fisherman is one of the freest people on earth. Some of nature's most spectacular sights are the normal backdrop for his daily labors: white sand beaches framed by the brilliant blue of the horizon; billowy cumulus clouds rearing up to heaven; and at night, the Milky Way stretching towards distant galaxies, looming ice-cold and crystalline across the sky. There are few people who have seen such wonders and remained untouched by them.

—Finest Kind:
A Celebration of a
Florida Fishing
Village
Ben Green
© 1985

A change in the mullet market took place in the 1970s when Asian interests began to buy mullet roe at what for Cortez were astronomical prices. Some fishers would reap huge profits for fishing only in the weeks between Thanksgiving and Christmas — traditionally prime roe season — and then selling the roe to Taiwan and Japan, where it was considered a high-priced delicacy.

That wave of prosperity ended in 1995, when a Florida Constitutional amendment was placed on the ballot by a petition of Florida citizens. Voters approved a ban on gillnet fishing within state waters; mullet, the village's mainstay, now may only be caught by nets other than entanglement gill nets. This has reduced mullet landings and affected the economic viability of small-scale fishers and fishing villages like Cortez.

More than 100 Cortez homes, businesses and waterfront areas have now been placed on the U.S. Registry of Historic Places, protecting them from destruction. Manatee County and the state, through the Florida Communities Trust, have agreed to purchase the old school house and turn it into a community center.

This will assist in the survival of the village of Cortez as a traditional working waterfront community.

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Albion Inn in Cortez in the 1920s, a popular winter resort. It is now a Coast Guard station.



Cortez fishing village.



Photo 1
Aerial view of Cortez in 1940s



Photo 2
Aerial view of Cortez in 1990s

Charting Sarasota Bay



The tides and waves are the sovereign forces of the seashore, shaping and reshaping the edge of the continent with their ceaseless motion. Year after year they nibble away cliffs and promontories, grind rocks into sands that form beaches and dunes, and carry the flotsam of the world to shore, where prowling beachcombers hunt for treasures. Beautiful shells, striking gemstones, grotesque pieces of driftwood and wondrous glass floats from far-off Japan are part of the water's bounty.

—The SeashoreWorld
David F. Costello
©1980



Astrolabe, a medieval instrument used to determine the altitude of the sun or other celestial bodies. Sailors used an astrolabe on the open sea in charting their travels.

A nautical chart is a printed reproduction of hydrographic data carefully gathered for an area of interest. As the chart primarily serves the needs of the mariner, it shows not only the nature and form of the coast, the depths of the water, character of the bottom and locations of reefs, shoals and other dangers to navigation; but also the rise and fall of the tides, the locations of artificial aids to navigation, the direction and strength of currents and the behavior of the earth's magnetism as it affects the mariner's compass.

The chart includes appropriate land areas that are visible from the water, which may include landmarks of use to navigation. Historically, coastal charts were almost exclusively products of the United States Coast and Geodetic Survey (USC&GS), which based them primarily on its own topographic and hydrographic surveys, supplemented with the best available data from various other sources. The National Oceanic and Atmospheric Administration (NOAA), absorbed the functions of the USC&GS upon its founding in 1970.

Historic Methods of Charting

During the latter half of the 19th century, comprehensive hydrographic surveys by USC&GS produced the first charts of sufficient detail and accuracy to be of everyday use to mariners navigating Florida's coastal waterways. The methodology for nautical chart preparation differed from that of topographic mapping, which was applied to all land areas and features inshore of the high-water line. Topographic mapping was based on the planetable, a device that resulted in an essentially complete map when the field work was done. With the planetable, the topographer constructed a map during the actual survey, delineating the high-water line, sketching contours and locating roads and other cultural features, all with the terrain in full view. However, the planetable was not suited for use in a moving boat, and most of the "terrain" was hidden from the hydrographers, as we call makers of nautical charts.

Hydrographic surveys were undertaken to represent the water area of a portion of the earth's surface by means of soundings (depths) taken at various locations throughout an area, in sufficient numbers to enable the hydrographer to delineate all underwater features of special significance to the navigator, such as channels, reefs, banks, shoals, rocks and other characteristic submarine features. It was — and still is — understood that the resulting chart represented these features at the time of the survey, and that as the dynamic coastal environment changed, revisions would be necessary.

In the 1800s, the work of actually surveying the water area on a given project usually followed establishment of control points on land and completion of the topographic mapping in the vicinity. These operations furnished the latitudes and longitudes of the stations that were to be used in the hydrographic work for locating the boat's positions during the survey.

The hydrographer first prepared a working sheet, or "boat sheet," on which a projection (meridians of longitude and parallels of latitude) was laid down, the control points plotted and the high- and low-water lines transferred from the planetable survey. Occasionally, additional control stations were established by the hydrographic party. Proposed sounding lines were plotted in pencil on the working sheet in accordance with a planned system designed for most effective depiction of known bottom features. The hydrographer attempted to follow these lines as the work progressed.

On the water, the hydrographer recorded information in a "sounding volume," to be later plotted in the office as a "smooth sheet," which became the official record of the survey. A complete smooth sheet is a record of the soundings taken during the field survey, together with other data necessary for a proper interpretation of the survey, such as depth curves, bottom characteristics, names of geographic features, control station designations and locations and tide records used to relate soundings to a reference datum.

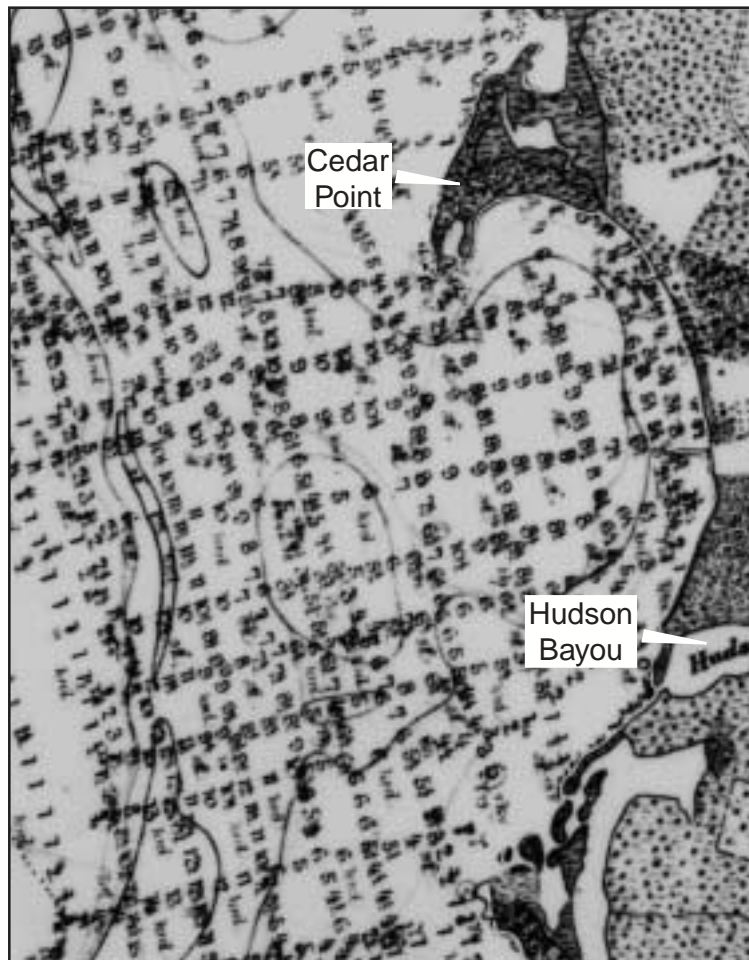
Soundings were generally made from small boats. The early boats may have carried sails, but during actual sounding operations the boat would have been powered solely by crew members manning oars, providing the necessary maneuverability and precise handling at low speeds or while stopped.

A typical field party engaged in inshore hydrography usually included two hydrographers or engineers (one to direct operations and one to operate a sextant for locating the survey boat's position by measuring angles between shore stations), a leadsman to take the soundings, a recorder to transcribe the soundings and the observed angles and the crewmen necessary to operate the boat. In some instances, additional personnel on shore assisted in determining the boat's location.

Two essential operations were performed simultaneously: measurement of depths (soundings) and determination of the geographic positions (latitudes and longitudes) of the soundings so they could be charted in correct relation to each other and to the surrounding topographical features.

Sextant angles taken in the survey boat between pairs of control stations on shore gave an accurate position. When feasible, theodolite angles could be taken at two shore stations upon a flag hoisted in the boat.

For sounding in depths up to 15 feet, the leadsman used a graduated pole with a disk on the lower end to prevent its sinking into a muddy bottom; at greater depths, he would employ a leadline. A skilled leadsman could employ either device with the boat moving forward, but the boat would necessarily be stopped for the sextant readings to determine position. Another method of determining position was by running out ranges from shore and fixing the positions by time. This method, which allowed collection of many more soundings in a work day, became practicable when the oarsmen were replaced by an engine that allowed the boat to move at a constant speed.



Map 1.
Composite of 1883 Hydrographic (H)
and Topographic (T) Sheets
for Sarasota Waterfront



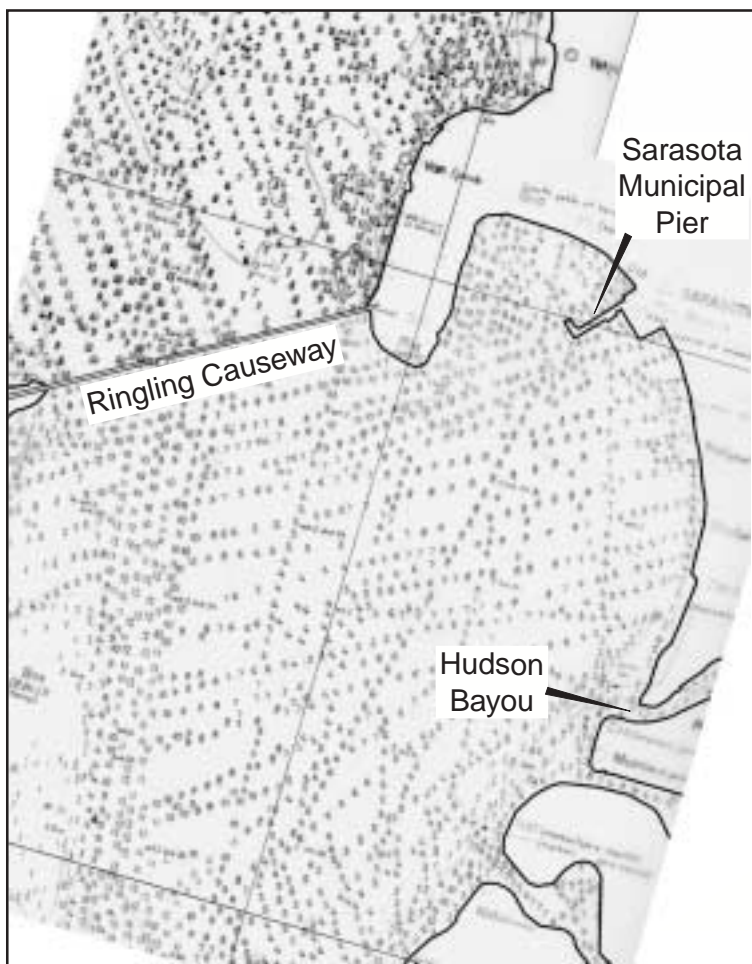
Each recorded sounding needed correction for the height of the tide at the time of measurement, in order to refer the depth to the sounding datum or reference plane, usually mean low water. During the hydrographic work, personnel at a nearby tide station would maintain a log of the tide's rise and fall. The hydrographer would later use this information to adjust each sounding for the state of the tide.

During the survey, the boat crew recorded the nature of the bottom encountered as soundings were made. On the finished chart, this information would be of use to mariners evaluating suitability of the bottom for anchoring. The crew also recorded positions and condition of man-made aids to navigation.

Upon completion of field work, the hydrographer would have collected and assembled all the information necessary to prepare a nautical chart. The smooth sheet, relevant topographic maps and other information would be passed to the cartographers responsible for producing the final chart in a form suitable for printing in large quantities. Map 1 is a composite assembled from portions of hydrographic and topographic sheets of Sarasota Bay near the City of Sarasota, resulting from surveys ending in 1883. It does not represent the finished nautical chart. However, these intermediate products clearly reflect the immense labor involved.

The skill and dedication of the hydrographers, expressed through the artistry of the cartographers, gave charts of immense practical value to the mariners for whom they were created. Today they are admired for their esthetic value and for the realization they instill of the immense labor and care that went into their creation. To chart just one typical bay on Florida's coast, hydrographers spent many weeks or months making and recording thousands of soundings — along with a position and tide correction for each — using techniques that could be accurately described as “paper and pencil” before the word “electronic” had been coined. Yet where the positional accuracy of early nautical charts can be evaluated, it is almost always found to be excellent. And the basic approach created by the early hydrographers, from data collection to production of the finished chart, was sufficiently sound that it is still in use today; only the tools have changed.

Mid-20th Century



Map 2.
1954 Hydrographic Sheet of Sarasota Waterfront



After World War II, hydrographers creating nautical charts benefited from technological advances that made possible small, portable, accurate electronic depth sounders. Even with the increased efficiency afforded by the new devices, however, the old technique for position determination — use of a sextant to measure angles between stations on shore — remained the state of the art. And the leadsman still had a role to play: Coast and Geodetic Survey “Descriptive Report 8034,” dated 1953, reported that “portable depth recorder” (Model 808-J) was used “where the depths and character of the bottom permitted. On the extensive shoal flats, in areas where marine vegetation cut out the fathometer return and in investigating shoal spots, a wooden pole, graduated in feet, was used.”

The 1953 report and others from 1954 provide further insights into the equipment and methods. In the 1953 survey of the waters from Longboat Pass to Tampa Bay, the primary vessel was to be the USC&GS’s vessel “Sosbee,” which was 68 feet in length. She had a wooden hull, a turn radius of 100 meters at 1000 rpm and a speed of seven knots. She had been used only part of one day when she was found to be too unhandy in strong winds. Remaining soundings were done from a 25-foot skiff, powered by two 10-hp outboard motors. The skiff was based at Cortez for most of the survey, then moved to a shipyard near the mouth of the Manatee River for operations in that area.

A portable, automatic tide gauge was maintained at Cortez. Hourly heights were used “without correction” — no allowance was made for distance from the gauge. The tidal datum was mean low water, and “headquarters” determined the gauge elevation.

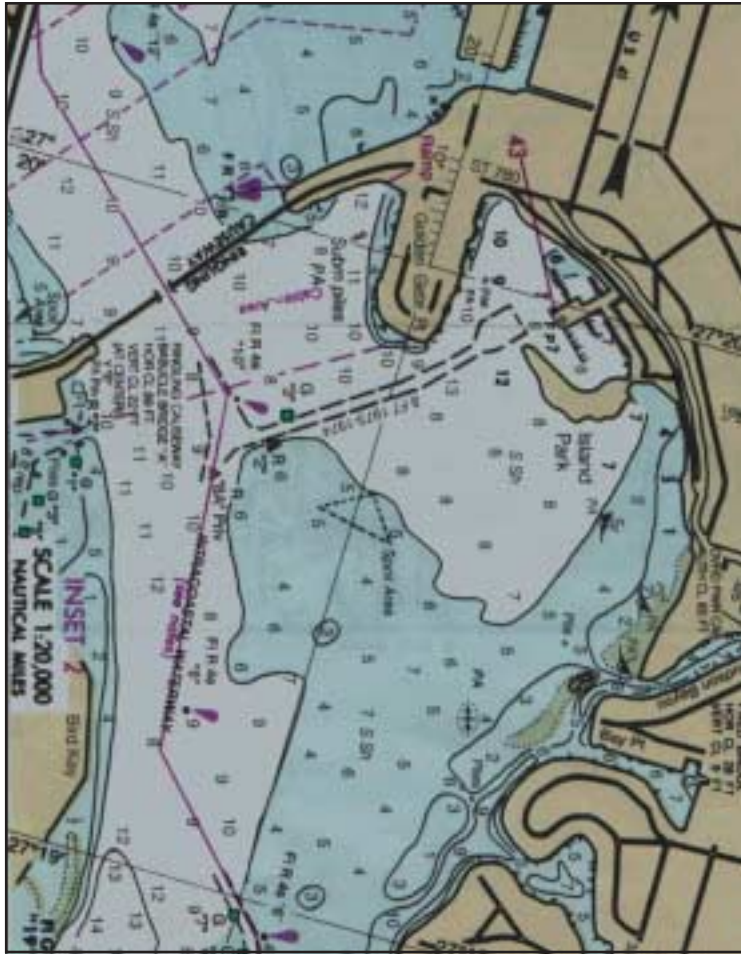
Reflecting another technological advance, control stations were located on aerial photographs, and shorelines and topography were determined from “photogrammetric sheets.” Still, sounding positions were determined by “the usual three-point fix method,” using a sextant where possible but otherwise “estimated from shoreline details.” Bottom samples were taken to allow better definition than “hard” and “soft,” which were the only annotations on earlier charts.

In all, 16.5 square miles were surveyed, with 3,170 positions mapped. Pole soundings totaled 6,849. Transects totaled 486.7 miles, including 24.1 by the “Sosbee.” The hydrographers were confident that one-foot accuracy had been achieved.

In 1954, the USC&GS completed hydrographic surveys of Sarasota and Little Sarasota Bays, with the “Sosbee” and the 25-foot skiff based at the Sarasota Municipal Pier. The “Sosbee” served as survey vessel for deeper parts of Sarasota Bay, the skiff for all other work. Tides were read directly from a “portable automatic tide gauge” at Sarasota Municipal pier.

In the Sarasota Bay survey (January 5-September 16, 1954) the “sounding lead” was used briefly. Navigating by 26 triangulation stations, the crew recorded 3,992 positions and 4,532 pole soundings, with 618.4 statute miles traversed. In Little Sarasota Bay (January 29-March 21, apparently with work done in both areas during part of the time), the numbers were 13 triangulation stations, 2,950 positions, 5,981 pole soundings, and 338.2 statute miles traversed.

Map 2 shows results from the 1954 hydrographic survey of Sarasota Bay, again in the vicinity of Sarasota.



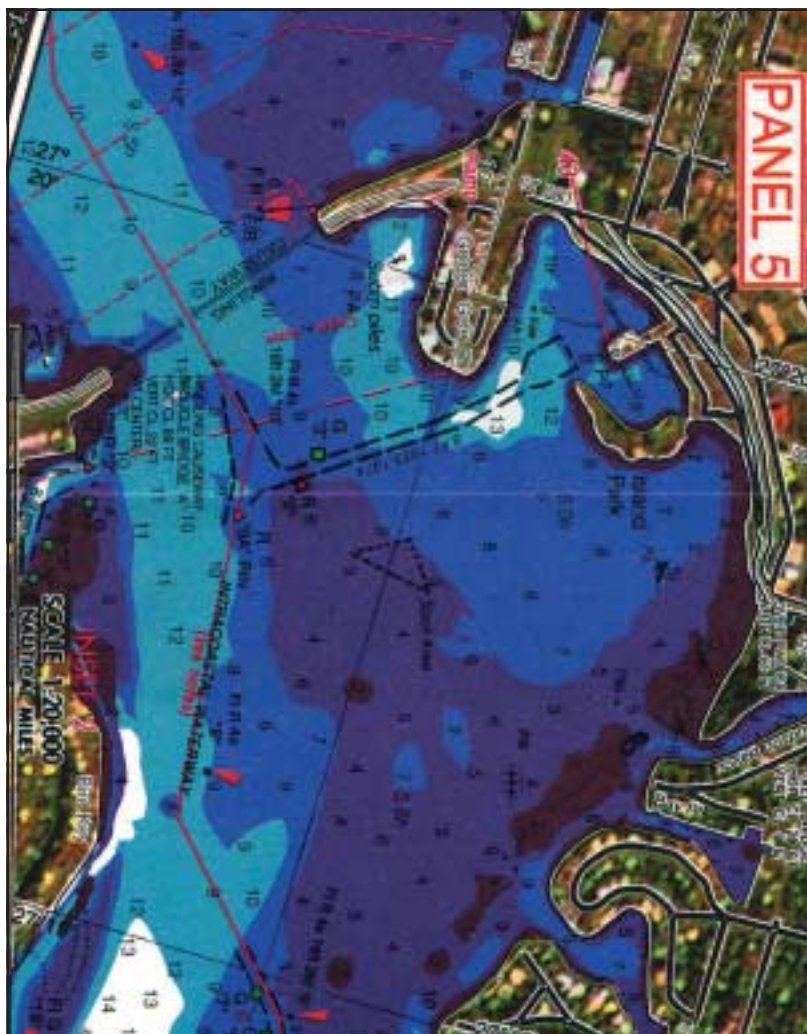
Map 3.
Modern Nautical Chart
1996 Hydrographic Chart of Sarasota Waterfront

Charting in the 1990s

Nautical chart makers in the 1990s benefit from additional technological advances since the 1950s. Most significant is computerization, which allows efficient management and manipulation of the immense quantities of data resulting from measuring depths at many thousands of places in a body of water. The calculations involved to correct the field data for tides and other variables must be performed for each datum, an extremely labor-intensive task when done with pencil on paper but one readily managed by computers. The computer programs called Geographic Information Systems (GIS) are important to today's chart-creation process, as they automate precise placement on the chart of depth data and readily assist such tasks as creation of depth contours. Also, workers using GIS in other fields, such as environmental planning, marine animal migration studies, oil spill cleanup, etc., can share the data.

Specialized mapping programs and graphics applications have almost completely supplanted the traditional methods of cartography; rarely does a draftsman apply ink to vellum to create a nautical chart or map. Instead, the cartographer guides a mouse or uses a pressure-sensitive stylus on a graphics tablet to transform the plethora of high-quality, precise data into an understandable, useful and esthetically pleasing product for the boater. Map 3 is a portion of NOAA Intracoastal Waterway chart 11425 (31st edition, October 1996), showing the same location, at the same scale, as Maps 1, 2 and 4.

Another technology that has transformed cartography in the 1990s is the Global Positioning System (GPS), a satellite-based means of determining positions on the earth's surface. Using the most accurate kind of GPS, known as Differential GPS (DGPS), positions can quickly and easily be measured to one meter (about 1.1 yard) or better. When the workboat arrives at a desired site, the DGPS system records the depth, the time (for use in tide correction) and the location. In ideal situations, the DGPS data collector can be connected directly to the depth sounder, so the only action required by the field personnel is one touch of a button, if that. However, depth sounders are still sufficiently fallible that personnel on the boat will often have to heave a lead line or dip a staff to measure the depth or verify the fathometer's reading. The leadsman lives on. Still, eliminating the need to pause for sextant readings to fix a position for each sounding yields a huge increase in data-collection efficiency. Today a crew of one or two persons can measure several times more depths in a workday than was possible with a larger crew as recently as 10 years ago, with much improved accuracy.



Map 4.
1999 Prototype Photo-chart of Sarasota Bay



The Near Future

Nautical cartography is on the verge of even more dramatic improvements as technology continues to advance. Increasing availability of high resolution, rectified (spatially correct, undistorted) imagery from aircraft or satellites will make it feasible to include realistic views of land features on charts. Mainland and island topography and vegetation, bridges, piers, roads, etc., can be shown in a way recognizable to most boaters. This will not only aid navigation, but also will contribute to enjoyment and understanding of the marine environment and the land adjoining our coastal waters. Map 4 was scanned from a prototype of such a chart.

Data collection methods being developed will allow rapid measurement of depths, and perhaps bottom characteristics, over large areas by remote sensing from air or space; these sensors include water-penetrating laser radar. Use of remote sensing will greatly increase efficiency of data collection, compared with today's methods.

This all-digital approach to data collection and presentation will facilitate widespread use of charts as real-time displays in a boat's instrumentation and on home computers used for trip planning and reminiscing. But for the foreseeable future, the most common form of nautical chart will remain a paper one carried on board for ready reference. The chart of the future will be unfolded by skippers and consulted for plotting the day's course, for finding shelter in storms and for deciding where to drop the hook at day's end.

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Glossary



- accretion** - the build-up of land due to artificial or natural causes.
- bascule** - a style of bridge utilizing counterweights that allows a steel span to raise, permitting high-masted vessels to pass through.
- bathymetry** - the science of measuring water depths to determine coastal or ocean bottom topography.
- bayou** - a small, sluggish secondary stream or lake.
- beach renourishment** - the process of pumping sand onto beaches from channels, inlets, or offshore sources.
- bulkhead** - to partition an area for protection against intrusion by water; a structure that provides such protection.
- bulkhead line** - the farthest offshore area to which a structure may be constructed without interfering with navigation.
- commercial landing** - a quantity of fish or shellfish brought ashore by a commercial fishing operation.
- creek** - a natural stream or channel, normally smaller than and often flowing into a river.
- dredge spoil** - sand and/or mud removed from the bottom of a water course or body of water during dredging.
- dredging** - removing bottom material from a waterway.
- ebb-tidal delta** - sand deposited just outside the seaward margin of an inlet.
- ecosystem** - a natural unit formed by the interaction of a community of organisms with their environment.
- erosion** - the loosening, transporting and wearing away of the land, chiefly by water or wind.
- estuarine habitat** - the natural home or dwelling place of an organism that lives in an estuary.
- estuary** - a semi-enclosed body of water with free connection with the open sea, and within which seawater is measurably diluted by freshwater from land drainage.
- exotic species** - plant or animal species not native to an area.
- fetch** - the distance traversed by waves without obstruction.
- fishery** - place for harvesting fish; a coordinated activity for the capture of fish.
- flood-tidal delta** - sand deposited just inside the seaward margin of an inlet.
- flushing** - the removal or reduction of contaminants in an estuary or harbor through the movement of water and consequent dilution.
- gillnet fishing** - a method of fishing in which specifically sized mesh nets catch fish, often mullet, by the gills. This method of fishing allows smaller or larger fish to escape the net, while fish of a certain size are caught.
- habitat** - the natural or unnatural environment of a plant or animal; the kind of place where a given organism normally lives.
- Halodule wrightii* (shoal grass)** - thin (2 - 3 mm) flat leaves generally 4-10 centimeters in height. This species occupies the lower intertidal area and is the seagrass most commonly observed exposed on tidal flats. It is also common along the deeper fringes of *Thalassia testudinum* beds.
- Halophila englemannii* (star grass)** - a seagrass characterized by a whorl of six to eight smooth, flat green leaves (to 3 centimeters in length) atop a slender stalk. The edges of the blades have fine teeth.
- hardened shoreline/shore hardening** - the artificial alteration of a shoreline, using seawalls, rubble or other means; replacement of vegetative or otherwise natural shoreline with man-made structures.
- hydrography** - the scientific analysis of the physical condition, flow, boundaries and related characteristics of surface waters.
- hydrology** - the science relating to the occurrence, circulation, distribution, and properties of the waters of the earth, and their reaction with the environment.
- inlet** - a short, narrow waterway connecting a bay or lagoon with the sea.
- intertidal** - the area of bay bottom that is alternately covered with water and then exposed due to the rise and fall of tide waters on a regular basis. Areas that are only occasionally exposed or covered due to extremely high or low tides are generally not considered to be *intertidal*.
- jetty** - a barrier built out from shore to protect the land from sand erosion by currents or waves.
- longshore drift** - the parallel movement of suspended sand along the beach, caused by wave and tidal action.
- mangrove** - a salt-tolerant sub-tropical tree or shrub found near the shore, with leaves and bark that are rich in tannin.
- marsh** - a transitional land-water area covered at least part of the time by estuarine or marine waters.
- mean depth** - the average depth of water.
- prop wash** - the turbulent action of water ejected from a boat propeller.
- prop scour** - the resultant condition of sediments subject to chronic prop wash.
- revetment** - a hard structure used to protect an embankment from water or wind.
- rip rap** - a foundation or revetment in water or on soft ground, made of irregularly placed stones or pieces of boulders and used to protect the shore.
- salinity** - any concentration of salt in water, usually measured in parts per thousand.
- salt marsh** - a marine habitat that is usually wet with saltwater and contains shrubby vegetation.
- seagrass bed** - a mass or growth of marine plants, generally found on the sea bottom in relatively shallow water.
- sea level** - the level of the surface of the ocean; especially, the mean level halfway between high and low tide used as a standard in reckoning land elevation or sea depths.
- seawall** - a wall or embankment constructed along a shore to reduce wave erosion and encroachment by the sea.
- sediment** - organic or inorganic material often suspended in liquid that eventually settles to the bottom.
- shellfish** - an aquatic invertebrate, such as a mollusk or crustacean, that has a shell or exoskeleton.
- shell mound/midden** - a refuse pile, in this region generally composed of fossilized bivalve shellfish, produced by aboriginal peoples.
- shoal** - to become more shallow, or an area of shallow water.
- smooth sheet** - a complete record of sounding taken during field surveys plus other data to provide proper interpretation of the survey, such as depth curves, bottom characteristics, names of geologic features, tide records, and other details.
- sound** - a body of water, wider than a strait or channel, usually connecting larger bodies of water.
- spoil** - accumulation of dredged materials.
- storm overwash** - storm-driven waves flowing across a barrier island.
- semi-diurnal** - referring to tides, when a high or low tide occurs twice in a 24-hour period, i.e., half (semi) a day (diurnal) in length of time.
- subtidal** - the area of the bay bottom that remains covered with water under all average tide conditions.
- substratum** - the bottom of the bay, the soils of the bay bottom. Can also refer to any surface that allows for the colonization of marine life.
- swash channel** - a narrow channel in which tides flow, often cut through a bar or shoal near tidal passes.
- Syringodium filiforme* (manatee grass)** - the only seagrass with cylindrical leaves that may exceed 50 centimeters in length. Common in higher-salinity grass-bed fringe areas (deeper water) near gulf passes.
- Thalassia testudinum* (turtle grass)** - the most conspicuous subtidal grass, with thin flat blades four to 12 millimeters wide and up to 1 meter in length, although most Sarasota Bay specimens are considerably shorter. At low tides the upper portions of the blades are often exposed.
- tide** - the periodic rising and falling of the oceans resulting from lunar and solar forces acting upon the rotating earth.
- tributary** - a body of water that supplies a larger body of water, such as a lake or estuary.
- turbidity** - cloudy or hazy appearance in a naturally clear liquid, caused by a suspension of fine solids.
- uplands** - terrestrial areas above the influence of tide waters.
- wetlands** - areas with wet or spongy soil, such as swamps or tidal flats, characterized by plants adapted to living under often-wet conditions.
- wastewater** - water that has been used for industrial or domestic purposes.
- wet-sand area (of beach)** - the area of beach generally seaward of the mean high-tide line.

Scientific, Technical and Boating-Related Information on the Waterways of Southwest Florida

The references listed below result from a decade-long Urban Boating Bay Water Management Research and Extension Program, sponsored by the National Oceanographic and Atmospheric Administration (NOAA), through its National Sea Grant Program, Coastal Services Center and Marine Chart Division, and by the West Coast Inland Navigation District. Designed to help Florida boaters, residents, communities and businesses achieve sustained and self-regulatory uses of coast waters, the program's goal is to eliminate the need for costly regulation of citizens who participate in boating, while preserving and reversing the decline in coastal waters in which many boats are operated. The program focuses on anchorage and waterway management, operating under the aegis of formalized agreements with the Florida Department of Environmental Protection.

Detailed resource inventories, scientific and technical investigations and extension education publications (maps and guide materials) are some of the results of this decade-long effort. Copies of these materials can be examined at or obtained from the agencies referred to by number in () below .

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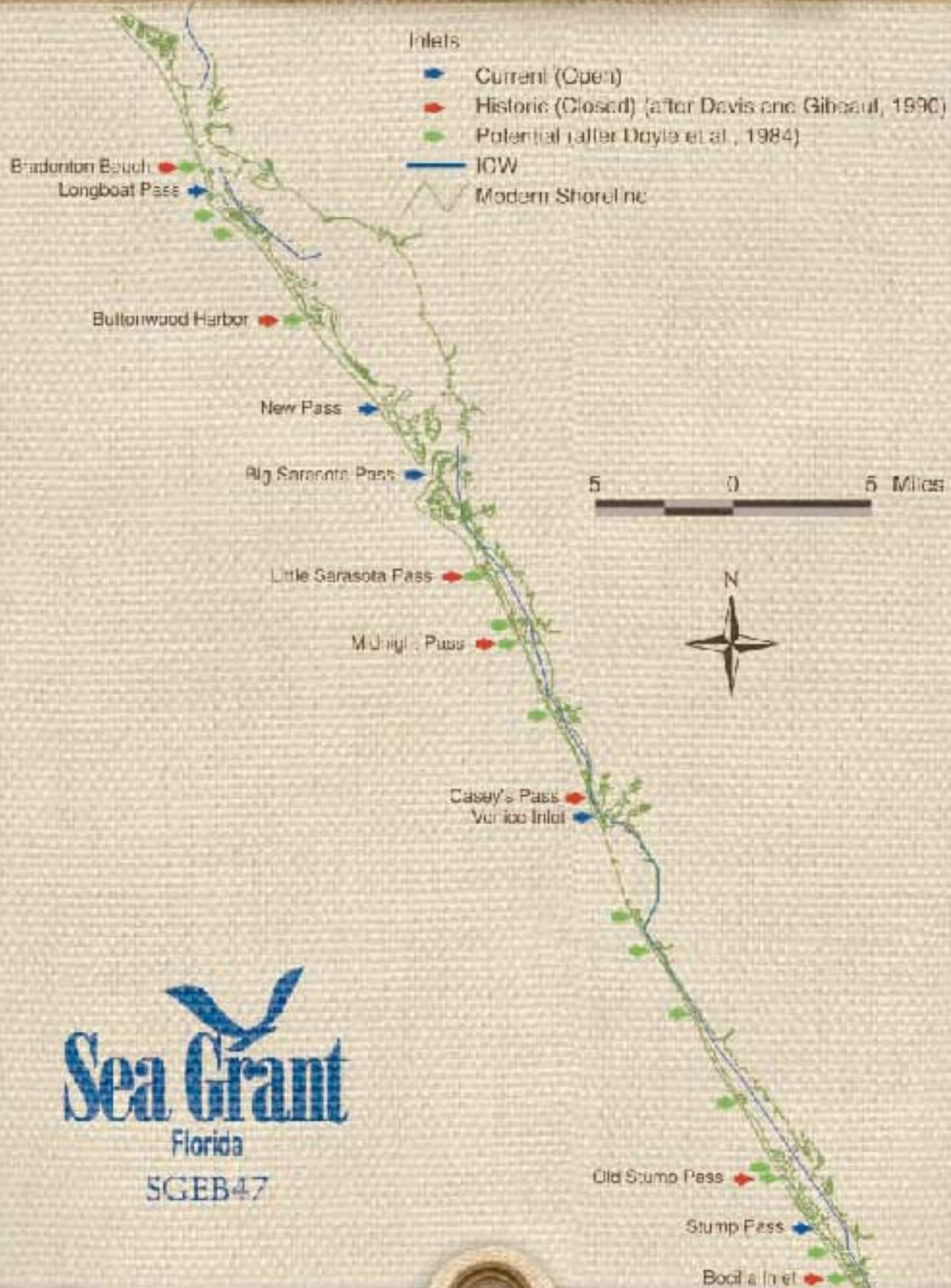
Sources of Publications

- (1) Florida Sea Grant Program
P.O. Box 110400, University of Florida, Gainesville, FL 32611
- (2) West Coast Inland Navigation District
P.O. Box 1845, Venice, FL 34284-1845
- (3) Boaters' Action & Information League
5835 Wildwood Ave., Sarasota, FL 34231
- (4) Sarasota County Natural Resources Dept.
P.O. 8, Sarasota, FL 34230
- (5) Manatee County Environmental Management Dept.
P.O. Box 1000, Bradenton, FL 34206-1000
- (6) Sarasota Bay National Estuary Program
5333 N. Tamiami Trail, Sarasota, FL 34234
- (7) Charlotte County Planning Dept.
18500 Murdock Circle, Pt. Charlotte, FL 33948-1094

Wetlands – areas with wet or spongy soil, such as swamps or tidal flats – are essential to the health and ecological vitality of the bay.









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