CANALS

WORKSHOP, OCTOBER 17, 1996
AGENDA ITEM # I.3

Agenda Item: Presentation by Dr. Gustavo Antonini, Florida Sea Grant Program, regarding "Sustainable Waterway Management: Assessing Levels of Service for Boat Accessibility in Residential Canal Systems"

Presenter: Town Manager and Staff
Dr. Gustavo Antonini, University of Florida

Summary: The Florida Sea Grant and West Coast Inland Navigation District has recently completed a pilot study and GIS mapping of Sarasota Bay and Longboat Key's coastal shoreline resources. The study offers an integrated, place-based approach to boat traffic management, and a method for planning and managing coastal waterways for both regional and local applications.

The workshop presentation before the Town Commission is intended to provide the results of the pilot study for information purposes only. In addition, and if deemed appropriate by Town Commission, a Town Resolution of support for this on-going project has been prepared for consideration.

Attachments:
1. Resolution 96-27
2. Summary of Workshop Report, by Dr. Antonini
3. Executive Summary: "A Regional Waterway Systems Management Strategy for Southwest Florida"/ September 1996 by Dr. Antonini

Recommended Action: Review and discussion.

DG/dmc
10/09/96

DG 10/9/96
final draft

RESOLUTION 96-27

A RESOLUTION OF THE TOWN OF LONGBOAT KEY, FLORIDA IN SUPPORT OF *"A REGIONAL WATERWAY SYSTEMS MANAGEMENT STRATEGY FOR SOUTHWEST FLORIDA"*; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Florida Sea Grant and West Coast Inland Navigation District has embarked upon a "Regional Waterway Systems Management Strategy for Southwest Florida"; and

WHEREAS, in early 1991, a pilot study and GIS mapping of Sarasota Bay and Longboat Key was initiated by Florida Sea Grant and the West Coast Inland Navigation District; and

WHEREAS, the pilot application of the methodology carried out in Sarasota Bay and Longboat Key provides an example of how boat traffic can be managed in ways that reduce stress on surrounding natural habitats and waterfront communities; and

WHEREAS, the methodology is consistent with prevailing state and federal coastal policy initiatives and offers an integrated, place-based approach to boat traffic management; and

WHEREAS, the project results in a method for planning and managing coastal waterways for both regional and local applications; and

WHEREAS, a community-wide traffic shed application in Longboat Key illustrates how project results can be transformed into action projects at the local level.

NOW, THEREFORE, BE IT RESOLVED BY THE TOWN COMMISSION OF THE TOWN OF LONGBOAT KEY THAT:

Section 1. The Town of Longboat Key fully supports the "Regional Waterway Systems Management Strategy for Southwest Florida", as a method for planning and managing coastal waterways.

Section 2. The Town Clerk is authorized to furnish copies of this Resolution to the Florida Sea Grant College Program and the West Coast Inland Navigation District.

Section 3. This Resolution shall become effective immediately upon adoption.

ADOPTED at a meeting of the Town Commission of the Town of Longboat Key held this _____ day of _____, 1996.

_____
MAYOR

ATTEST:

_____
TOWN CLERK

Sustainable Waterway Management: Assessing Levels of Service for Boat Accessibility in Residential Canal Systems

Gustavo A. Antonini
Florida Sea Grant

Summary of Workshop to Longboat Key Town Commission
October 17, 1996

This workshop describes a method for planning and managing coastal waterways, and is based on a pilot study of Sarasota Bay, carried out since 1991 by Florida Sea Grant and the West Coast Inland Navigation District with Sarasota County as a local sponsor.

The study offers an integrated, place-based approach to boat traffic managment. The pilot evaluates the 35 sq. mi. Sarasota Bay region (Cortez bridge to Siesta Key bridge) with 83 miles of waterways, 5,000 boats, 2,000+ facilities, 900+ signs, and 51 boat-source areas. A geographic information system (GIS) analysis provides detailed results for regional and local applications. The analysis evaluates the relationship between boat draft and channel depth for each vessel in order to measure boat accessibility and channel restriction. Results provide a strategy for evaluating levels of service and prioritizing maintenance and remediation of channel conditions.

Restricted boats are evaluated under normal (Option A) and below normal (Option B) tide conditions. Most boats have unrestricted access (87% under A, 73% under B). Restricted boats are clustered: 3 areas account for 38%, 8 areas represent another 40%, under Options A and B. Restricted channels also are evaluated under Options A and B. Ten percent of the waterways restrict boat traffic under Option A and 40% under B. Relatively few canals require improvements under Option A, while many more locations do so under B. Maintenance dredging under Options A and B reflect relative amounts of material that must be removed to provide unrestricted access. Under Option A, a 1 ft. cut will satisfy 70% of the dredging requirement; under Option B, a 1 ft. cut satisfies only 23%. There were only 16 daily occurrences of Option B (below normal) tidal conditions during 1995.

Maintainable navigation access is a valuable and high priority objective for canal-front communities. The study offers the following methods to achieve this end: fit channel maintenance to boat draft requirements; minimize impacts on surrounding bay habitats; prioritize and evaluate management alternatives on a regional basis: develop map products for boaters and shore residents to encourage environmental awareness and stewardship; and empower waterway communities to take an active role in managing their waterways. The study also provides rationale for considering regional permit review of multiple local channel maintenance and habitat restoration projects, where rigorous waterway management systems criteria are used.

Sustainable Waterway Management
Assessing Levels of Service for Boat Accessibility in Residential Canal Systems

Gaetano A. Antonini
Florida Sea Grant

Department of Marine/Coastal Geology, Florida Gulf Coast University
Naples, FL 34105

This workshop describes a method for planning and managing coastal waterways, and is based on a pilot study of Sanctuary Lakes, located on Sanibel Island, Florida. Sea Grant and the Wiggins Pass Inland Navigation District worked together to develop a local model.

Waterway navigation is a major issue in boat traffic management. The pilot study evaluates the 30 mi. Sanctuary Lakes region (Cortez bridge to Lee County bridge) with 85 miles of waterways, 5,000 boats, 2,000+ slips, and 61 bridges. Three areas are analyzed: the main channel system (Old Cypress and Cypress Lake), the residential and local canal systems. The analysis evaluates the relationship between boat draft and channel depth for each vessel in order to measure navigation accessibility and channel restriction. Results provide a strategy for evaluating levels of service and prioritizing maintenance and rehabilitation of channel conditions.

Restricted boats are either unable to navigate normal (Option A) and below normal (Option B) tide conditions. Many boats have unrestricted access (Option A under 3). Restricted boats are clustered in areas accounting for 38% (Areas 1 and 2) and 40% (Areas 3 and 4) under Options A and B. Restricted channel sites are evaluated under Options A and B. Ten percent of the waterway network boat traffic under Option A and 47% under B. Relatively few canals require improvements under Option A, yet 5 canals require more intensive intervention under B. Maintenance dredging under Options A and B is not related to canal length or channel length. Under Option A, a 1 ft. cut satisfies only 23%. There were only 15 daily occurrences of Option B (below normal) tidal conditions during 1995.

Maintainable navigation requires a sustainable approach with priority given to canal front communities. The study offers a framework for evaluating methods to achieve and fit channel maintenance to local need, requirements, and resource availability. Monitoring bay habitats, prioritize and evaluate manage canal characteristics on a regional basis, develop map products for boaters and share realistic information on accessibility, navigability, and slowness (ability); and improve waterway communities, and on active role in monitoring their waterways. The study also provides rationale for conducting regional planning of a system of multiple local channel maintenance and habitat restoration projects, where appropriate, with a lower management system and based

September 1996

SGEB-33

A Regional Waterway Systems Management Strategy for Southwest Florida

by

Gustavo A. Antonini
and
Paul Box

EXECUTIVE SUMMARY

Florida Sea Grant College Program

By Gustavo A. Antonini
and
Paul W.Box

Florida Sea Grant and the Department of Geography
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1. Background

Inland coastal waterways of the United States, since 1960, have been transformed along much of their length by recreational boating and fishing, and by accompanying tourist and residential uses. Florida's coastal population has increased 169 percent since 1960, from 4.8 to 12.8 million, four times the national rate. Seventy-nine percent of Florida's population lives within this coastal zone. The number of recreational boats in Florida, between 1973 and 1989 grew by 176 percent. Today (1995) there are an estimated 750,000 registered vessels in the state, and tourists pilot or trailer another 300,000 into the state each year. In southwest Florida, the number of boats has increased by three times the national rate. Coastal population pressures and unprecedented boating intensities are stressing these water bodies. The region's near-pristine baywater environment is now ecologically threatened by the continuing wave of development.

A unique element of the coastal development process has been the creation of thousands of miles of dredged canals, basins and access channels. These waterways were dredged to provide waterfront access for residential developments. In many instances, the original dredged depth depended on the amount of borrow material required, and not on the provision of adequate channel depth for navigation. Finger canals were dredged deep, but entrance channels were minimally improved or left in a natural state. Over time, these waterways have either silted in by storm water runoff or shoaled from boat wake and storm fetch. Maintenance dredging has been piecemeal and projects have targeted segments of the waterways. Criteria for improving water depth have been based either on the historic dredged depth or an arbitrary depth. Neither approach has produced satisfactory results.

Waterways include arterials, collectors and residential canals and basins. In barrier island coastal locations, waterway boat traffic is governed by the relationship of boat draft to water depth. Boat access is by ramp, private dock, marina or permanent mooring. Unrestricted access from trip origin to open water is uncommon. Source areas of boats -- trafficsheds -- are connected to bays by access channels, which may pass through ecologically sensitive grass and hard-bottom areas. Boat traffic adjoining these habitats may create management problems. Issues of special concern are channel siltation, boating safety, wildlife protection, and habitat restoration.

There is a need to maintain a viable waterway system in the face of mounting shoreside and boating pressures. Recreational boating and fishing make significant contributions to the Florida economy, but these activities are dependent upon a healthy, high quality environment. This report presents a

geographic information system (GIS)-based method for planning and managing regional waterway systems. A pilot application of the methodology, carried out in Sarasota Bay, provides an example of how boat traffic can be managed in ways that reduce stress on surrounding natural habitats and waterfront communities. The methodology is consistent with prevailing state and federal coastal policy initiatives and offers an integrated, place-based approach to boat traffic management which may be applicable in other coastal areas.

2. Waterway Analysis

The GIS analysis is undertaken at large-scale, small-area and high-resolution in order to provide sufficiently detailed results for regional analysis and local community applications. Section aerials at 1:1,200 scale are used to locate boats, facilities, signs and channel centerline. Two types of habitat information -- seagrass and mangrove -- are incorporated into the GIS analysis. Boat draft and water depth information are collected to the nearest foot resolution.

The USGS 7.5' digital shoreline is updated by photo interpretation methods. Bathymetry includes NOS digital files at 1:10,000, COE centerline field surveys at 1:1,200 - 1:24,000, and centerline boat channel field surveys at 1:1,200 scale. Project maps portray depth in two ways: as arcs showing centerline controlling depths at 1 ft. increments representing waterway boat channels; and as polygons corresponding to bay-wide depth areas. The polygon topology is compiled by two methods: a bay method, which processes the 1:10,000 scale digital NOS depth information from open bay locations where most water depths exceed boat draft requirements, and where channel depth constraints to navigation are minimal; and a trafficshed method, which processes the 1:1,200 scale field survey information for residential canals, basins and access channels, and where minor variations in bathymetry translate into serious navigation problems.

Boat and facility information from an on-the-water census is compiled into GIS coverages. Boat information includes type, length, age and draft; facilities are described by accessibility, type, berthing, and services. All boating-related signs are located by GPS methods and inventoried in a GIS coverage.

The geographical analysis evaluates the relationship between boat draft and channel depth for each vessel in each trafficshed in order to measure boat accessibility and channel restrictions. An examination of the results of this trafficshed analysis provides a strategy for evaluating the functionality of the regional waterway system and for prioritizing maintenance and remediation of system channel components.

Boat accessibility is a five step evaluation: (1) a network of boat traffic paths is created in all the trafficsheds; (2) the water depth of each path segment in the network is entered into the channel data base as an attribute of that segment; (3) a boat path is traced representing the most likely route each boat would travel from its point of origin to the open bay; (4) the water depth of each segment is noted, and the shallowest depth that each boat would traverse is recorded, and becomes an attribute of each individual boat in the data base; (5) the shallowest depth is compared to the draft of the boat. As a result of this boat accessibility evaluation, if the boat draft is less than the shallowest depth, then the boat is considered not restricted. If, however, the shallowest depth is equal to or less than the boat draft, then, the boat is considered restricted according to the systems' design criteria. The accessibility rating for each boat is plotted on maps.

Channel restrictions is a three step evaluation: (1) all boats are linked with each segment in every pathway leading from each boat trip's origin to the open bay exit of the trafficshed; (2) the drafts of all those boats is noted, and the maximum draft of that group is recorded for each channel segment; and (3) the maximum boat draft is compared to the depth of the corresponding channel segment. The difference between the deepest draft boat and the depth of the segment -- referred to as channel restriction -- identifies the depth of dredging required for that segment to accommodate the deepest draft boat that would traverse it. As a result of this channel restrictions analysis, if the draft of the deepest draft boat is less than the depth of the channel segment, then, that segment is classified as not restricting any boats. If, however, the draft of the boat is greater than the segment's depth, then, that segment is deemed as restricting that boat. The rating for each restricted channel segment is plotted on maps.

Alternate scenario methods are used to assess a range of decision options influencing waterway management. One method is an <u>accessibility index</u> which evaluates the ratio of boat draft to channel depth. Each boat's accessibility is classified relative to the shallowest segment of its access channel leading to the open bay. A boat may be: (1) somewhat restricted, if its access channel depth (ACD) = vessel draft (VD); (2) restricted, if its ACD $\geq$ 1 ft. shallower than VD; (3) severely restricted, if its ACD $\geq$ 2 ft. shallower than VD; or (4) blocked, it its ACD $\geq$ 3 ft. shallower than VD. Evaluation of a trafficshed's boat population by accessibility classes uncovers boat-channel relationships that affect the magnitude and geographic extent of channel improvement needs.

A second analysis provides for evaluating boat accessibility under <u>normal or below normal tidal conditions.</u> An additional foot of clearance is added to take into account "below normal" tidal conditions (there were only 16 daily occurrences of this condition in 1995).

Map products are presented in four ways: (1) regional characterization, 1:24,000 scale, showing color-shaded bathymetry (as 15 zones, 1 ft. resolution), seagrass, mangrove, boats, facilities, and signage; (2) detailed inventory, 1:4,800 scale, including color-shaded bathymetry (1 ft. resolution), supplemental 3 ft. contours, centerline controlling depth, boats, facilities, signage, seagrass, and mangrove; (3) neighborhood boat accessibility, 1:4,800 scale, showing levels of boat accessibility to open bay; and (4) neighborhood channel restrictions, 1:4,800 scale, showing the location and extent of channel depth restrictions at 1 ft. intervals.

3. Regional Results

Sarasota Bay is a 35.3 sq.mi. area consisting of 32.5 sq. mi. of open bay and 2.8 sq. mi. of trafficsheds. Twenty-three percent of the open bay is < 3 ft. deep; another 20 percent is 3 to 6 ft. deep. Fifty-seven percent of the open bay is relatively deep water (≥ 6 ft.) which is adequate for all boating activities. There are over 8 sq. mi. of seagrass meadows and about 3 sq. mi. of mangroves. Trafficsheds represent only 8 percent (2.8 sq. mi.) of the bay, but their shoreline locations and close proximity to mangrove and seagrass make these boat source areas of special environmental concern. Much of the boating activity which takes place on the bay comes into direct contact with these sensitive bay habitats, due to the locational geography of the trafficsheds and the origin-destination pathways of the boats. Five percent of the seagrass in the region (0.4 sq. mi.) is situated in these trafficsheds, and 28 percent of the mangroves (0.8 sq. mi.) is located there as well.

There are 5 types of trafficshed systems in the bay: (1) finger canal or basin with one access channel; (2) multiple finger canals and/or basins with one or more access channel(s); (3) shoreline channel with one or more access channel(s); (4) shoreline channel linked to multiple finger canals, basins, streams and/or creeks, with one or more access channel(s); and (5) natural stream or tidal creek with one access channel. Simple shoreline canals have the largest proportion of sensitive habitat areas, followed by complex shoreline canal systems and multiple finger canals. Both natural creeks and single finger canals contain negligible natural habitat areas. Trafficshed channels, on the average, have relatively deep water: 12 percent are ≤ 3 ft., 37 percent are 4 - 5 ft., and 51 percent are ≥ 6 ft. Boat accessibility problems are due to limited channel segments with restricted depths.

Restricted boats are evaluated under normal tide (0 mllw datum,_Option A) and_below normal tide (-1 ft. mllw, Option B) conditions. There were 4,552 boats using Sarasota Bay in 1992. Most boats have unrestricted access (87 percent,

Option A., 73 percent, Option B). There are 532 restricted boats under A, and roughly double the number, 1,213, under B. This doubling of the restricted boats, from A to B, is reflected by the two lower index levels (≤1 ft. difference between draft and depth), but there are four times the number of restricted boats under B at the higher index levels. Restricted boats are clustered spatially: three trafficsheds account for 38 percent; eight others represent 40 percent; and 23 to 26 additional locations include 22 percent, under both Options A and B.

Restricted channels also are evaluated under Options A and B. Ten percent (28,680 ft.) of the waterway system restricts boat traffic under Option A; the length of restricted channels is four times this amount (117,829 ft.) under Option B. There are significant differences in these results. Twenty percent of all trafficsheds under A have no restricted segments; that declines to 5 percent under B. The number of trafficsheds with low and medium (≤9.9) percentages of restricted channels doubles from A to B; conversely, locations with a high (≥10) percentages of restricted channels decline to half from B to A. Relatively few trafficsheds require channel improvements under Option A, while many more locations do so under B.

Maintenance dredging under Options A and B reflect relative amounts of dredged material that must be removed to provide unrestricted access. Under Option A, a 1 ft. cut will satisfy 70 percent of the dredging requirement; 2,3, and 4 ft. dredging depths satisfy 14, 11 and 4 percent of the needs, respectively. Conversely, a 1 ft. cut satisfies only 23 percent of the Option B; deeper dredging is required to satisfy most boat access needs.

4. Community Waterway Management

A community application in Bay Isles, Longboat Key, illustrates how project results can be transformed into action projects at the local level. This 680 acre community includes 1,267 dwelling units, a 27 hole golf course, and a resort marina. A 3.6 mi. boat channel parallels the perimeter of the community and is connected to the marina. There are 437 boat slips and in 1992 there were 252 boats. There is transient boat traffic throughout this waterway, due to the resort marina and restaurant, and the natural attractiveness of the perimeter canal as a nature preserve and prime fishing locale. The outer mangrove buffer which originally protected the perimeter channel has been depleted and this has led to shoaling of the waterway. Other landside pressures have created additional problems that are reflected in water quality and habitat conditions. Boat wake is washing away soil, and contaminants from boats accumulate because of the low tidal exchange within the canal system. The management needs include: habitat

restoration; channel maintenance; traffic management (signage); and public education.

Florida Sea Grant is providing project data and technical support to the community to evaluate present waterway conditions. A local demonstration project is being developed to restore critical areas of the mangrove buffer. The project's channel restrictions analysis provides data on the extent and location of required dredging; this will be initiated once the restoration work stabilizes the vegetative buffer. Sarasota County has designated and posted the waterway as an idle speed, no wake zone. The community intends to remove abandoned signs and pilings. Work is underway to remark the perimeter channel with navigation day beacons. Community leaders acknowledge that education benefits could be achieved by publishing and distributing a map of the Bay Isles waterway based on project information, which would advise boaters of channel depths, seagrass areas, signs, and shore facilities.

5. Management System

A regional waterway management system is proposed, the long-term goal of which is to preserve the ecological and recreational values of southwest Florida waterways in a manner that maintains the widest possible degree of freedom for users. In order to attain this goal, the following supporting objectives are proposed: (1) fit channel maintenance to boat draft requirements; (2) minimize impacts on surrounding bay habitats; (3) prioritize and evaluate management alternatives on a regional basis; (4) develop map and other information products for boaters and shore residents to encourage environmental awareness and stewardship by users of the neighborhood waters and boat access channels; and (5) empower waterway communities and boating organizations to take an active role in managing their waterways. These objectives can be pursued through a combination of management tools, with a focus on: (1) acquiring the necessary information on waterway and user characteristics in order to map and evaluate boat access needs; (2) providing waterway communities with technical support to develop local management implementation strategies; and (3) disseminating map and guide products to waterway residents which foster stewardship and environmentally responsible boating practices.

Development and implementation of these management tools can be a joint effort between the West Coast Inland Navigation District (WCIND), the Florida Sea Grant College Program (FSG), the Florida Department of Environmental Protection (FDEP), and the Florida Cooperative Extension Service (FCES). Local

governments, local waterway communities and boating groups are recognized as critical players and are encouraged to participate.

6. Recommendations

1. Disseminate findings through presentations and workshops to the state regulatory agencies (FDEP, Florida Department of Community Affairs), local governments, and to residential waterfront homeowner associations and boat clubs in the region.

2. Design channel maintenance projects based on boat draft requirements for normal tide conditions (0 ft. mllw datum). This approach provides reasonable access while minimizing impacts on surrounding bay habitats.

3. Address boat access and channel restriction problems in the priority problem trafficsheds: Bowlees Creek, Trailer Estates West, Mt. Vernon/Coral Shores, Tarawitt, and Bay Isles/Longboat Key Moorings. There areas account for 44 percent of the access-problem boats and 65 percent of the restricted channel segments.

4. Incorporate waterway management into the state, region, county and local planning process by designating marine use areas and recognizing maintainable navigation access as a valuable and high priority requirement for water dependent activities.

5. Encourage the State to revise the present permit review process by allowing for the joint and concurrent evaluation of multiple requests for channel maintenance and habitat restoration in a given region, for those permit applications which adhere to rigorous waterway management systems criteria as described in this report.

6. Provide local staff with GIS training and equipment so that they may service local trafficshed planning and management needs.

7. Sponsor changes in the Florida vessel registration data base in order to transform this information into an effective waterway planning and management resource.

8. Publish and distribute information contained in the atlases which accompany this report into maps, photomaps and nature-tourism

brochures, in order to promote stewardship through a better understanding of environmental history and boating geography of the region.

Copies of the complete report, "A Regional Waterway Systems Management Strategy for Southwest Florida," (Technical Paper 83) including data on each trafficshed in the survey, maps, and a wealth of information resulting from the study will be available after October 1, 1996. The report is priced at $15 and may be ordered from Florida Sea Grant, University of Florida, Box 110409, Gainesville, FL 32611-0409. Ask for TP-83 and make check payable to "University of Florida" (please include 6% sales tax).

UNIVERSITY OF FLORIDA

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Sea Grant
Florida

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(352) 392-2801

or check out our home page at:

HTTP://GNV.IFAS.UFL.EDU/~SEAWEB/HOMEPAGE/FSG.HTM

PRESENTATION TO THE
LONGBOAT KEY TOWN COMMISSION

ON

SUSTAINABLE WATERWAY MANAGEMENT: ASSESSING LEVELS OF SERVICE FOR BOAT ACCESSIBILITY IN RESIDENTIAL CANAL SYSTEMS

BY

G. A. ANTONINI AND P. W. BOX

FLORIDA SEA GRANT
AND
WEST COAST INLAND NAVIGATION DISTRICT

LONGBOAT KEY, FL

OCTOBER 17, 1996

FLORIDA'S COASTS IN TRANSITION

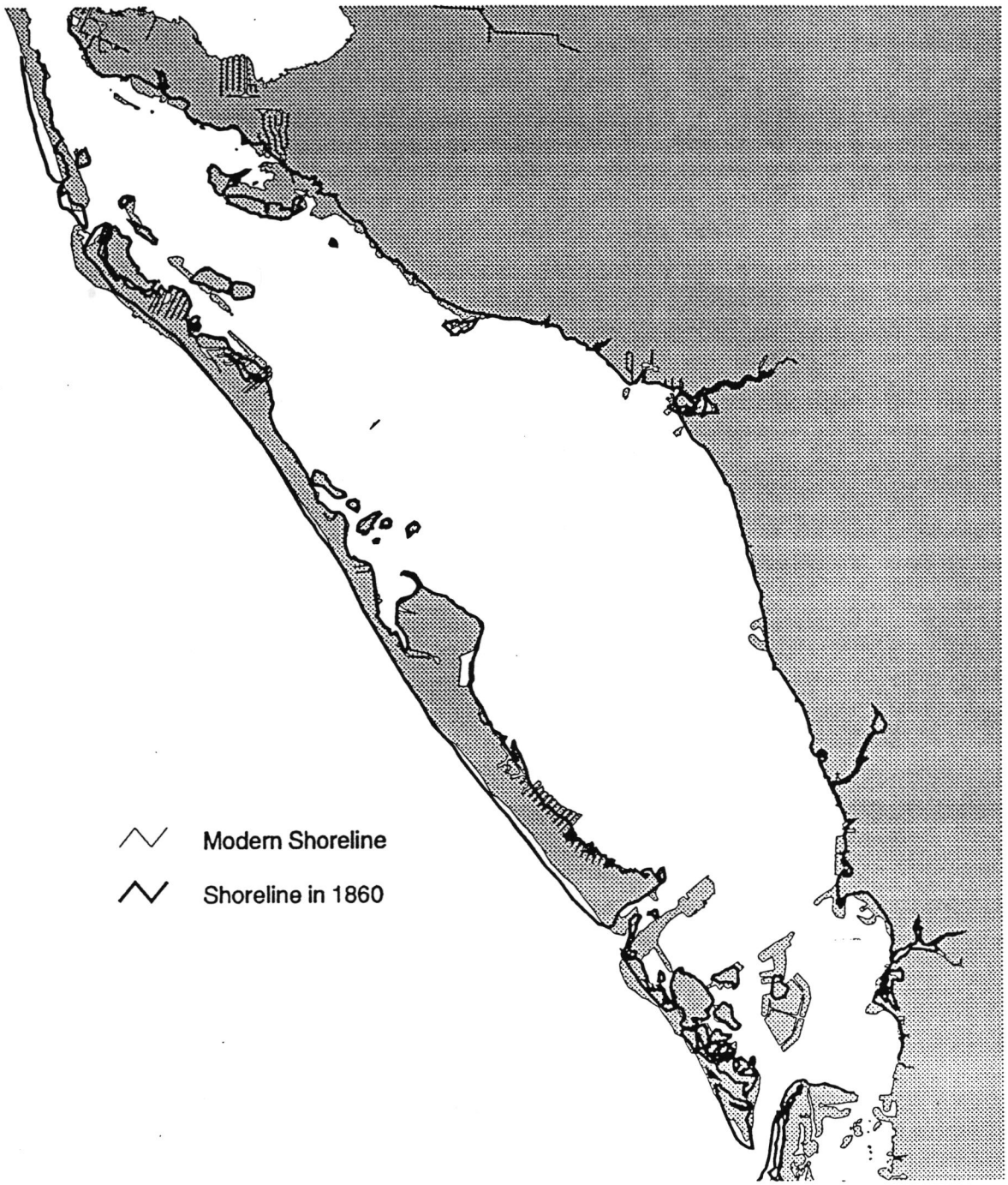
CHANGES IN POPULATION (THOUSANDS)

LOCATION	*1960*	*1991*	*% CHANGE*
US COAST	94,479	135,110	43
GULF	8,386	15,579	86
FLORIDA COASTAL	4,810	12,933	169

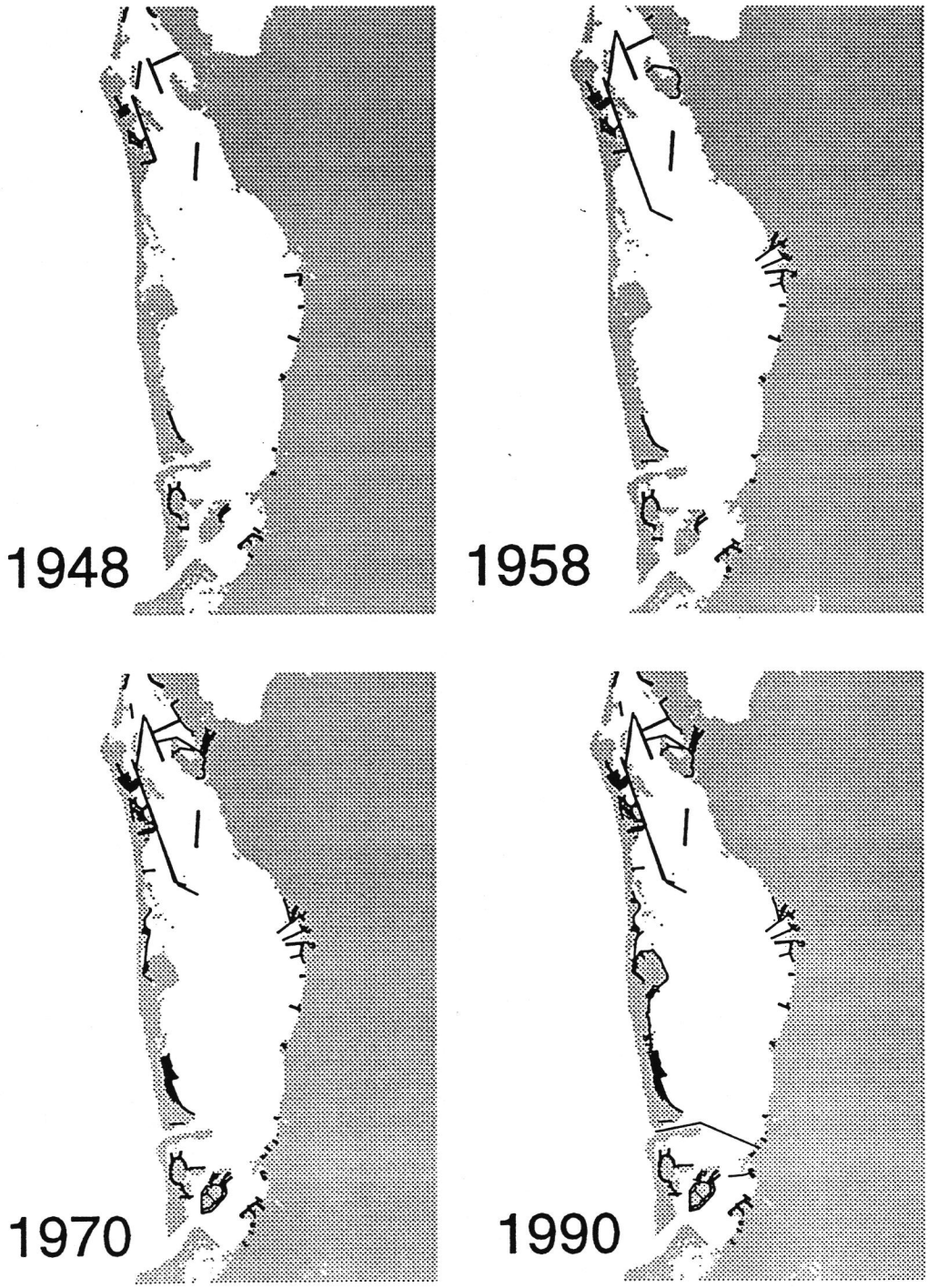
FLORIDA'S COASTS IN TRANSITION

CHANGES IN BOATING (THOUSANDS)

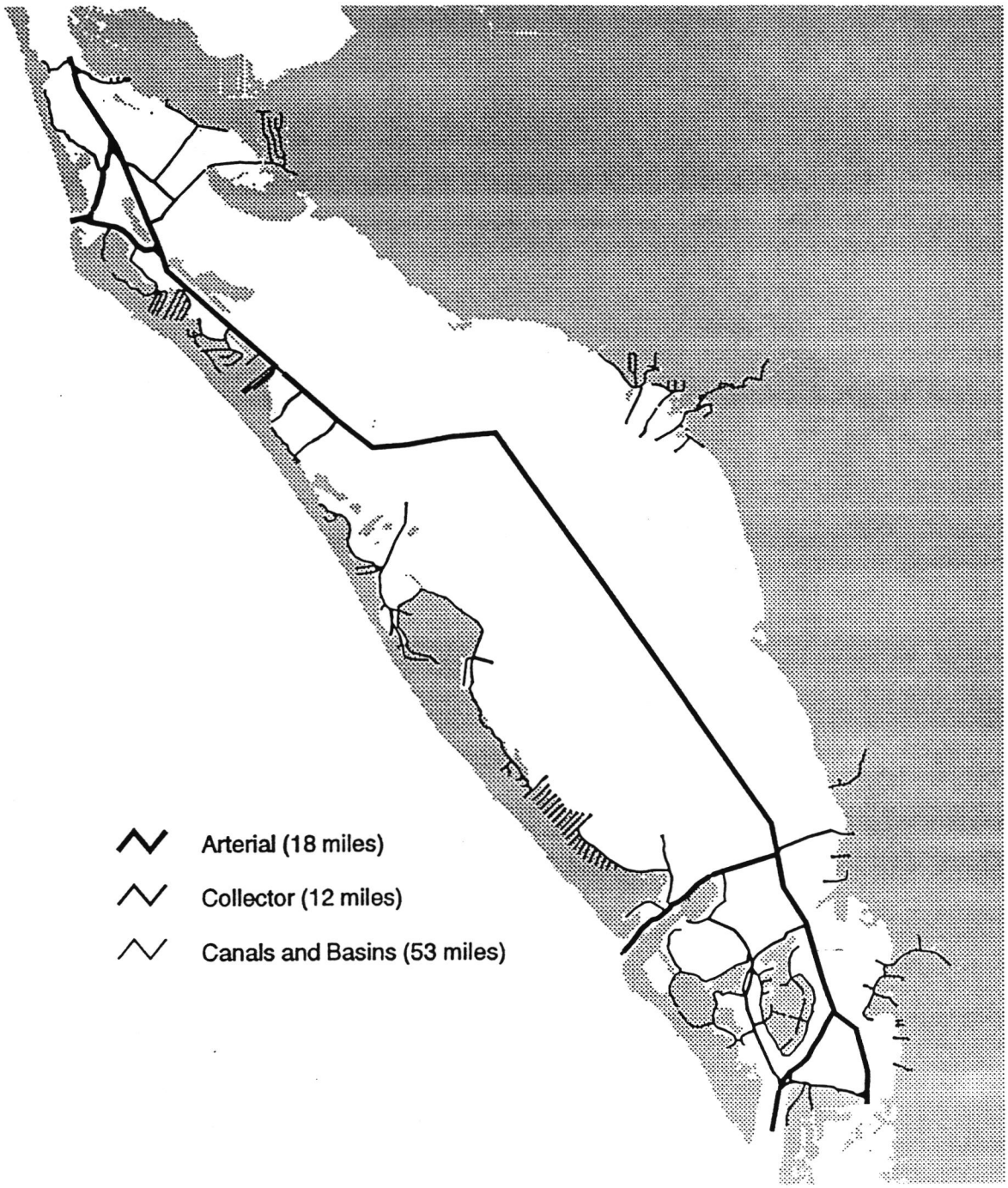
LOCATION	*1973*	*1989*	*% CHANGE*
US TOTAL	9,604	19,195	100
FLORIDA TOTAL	249	687	176
SW FLORIDA	25	75	300



Shoreline change: 1860 - 1996.



Dredging history of Sarasota Bay: 1948, 1958, 1970, 1990. Dark lines indicate dredged channels.



Study region with waterway system of arterials, collectors, canals, and basins

- WATERWAYS AS TRANSPORTATION SYSTEMS

- ARTERIALS: INLETS AND ICW

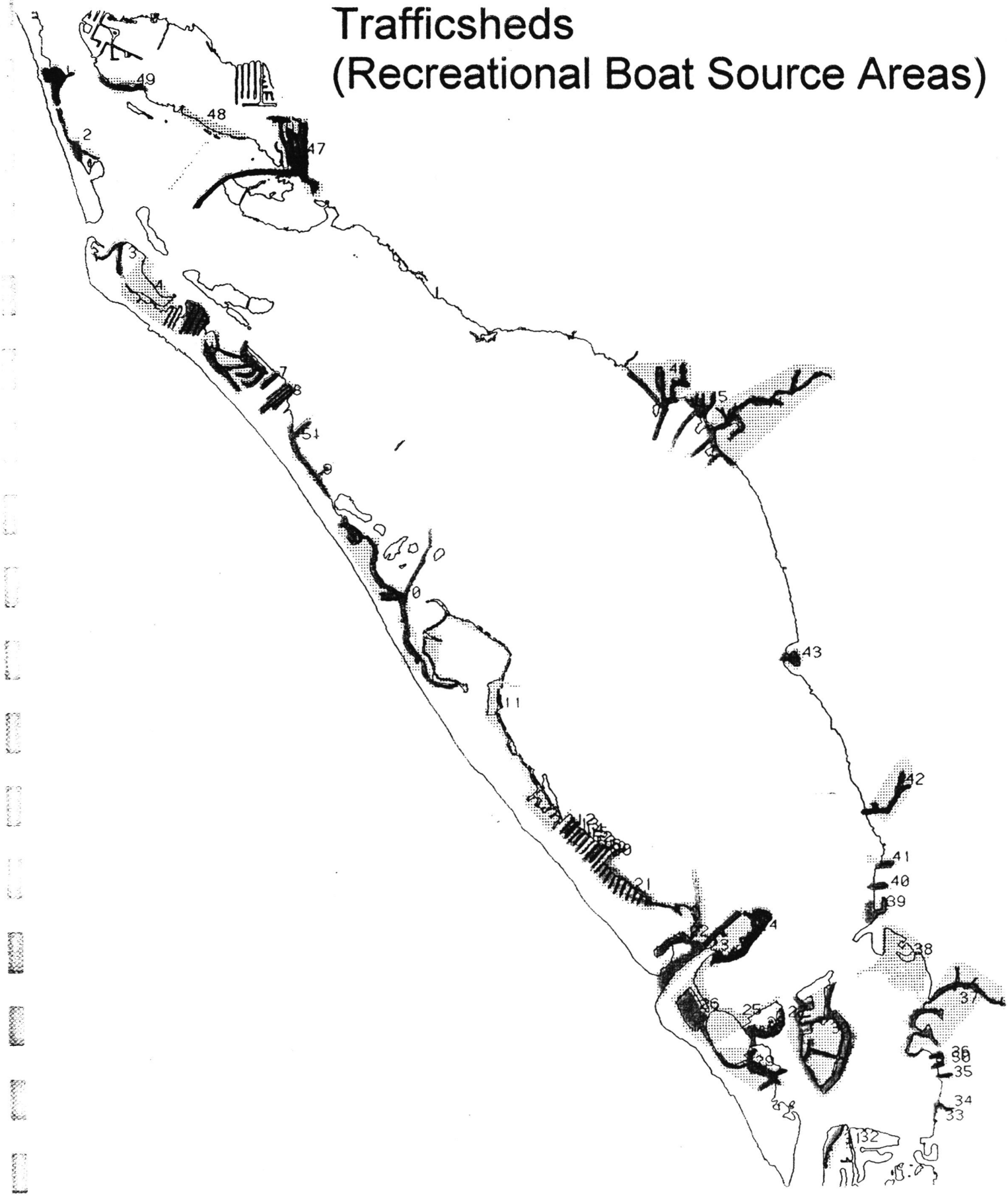
  - DESIGNED FOR COMMERCIAL TRAFFIC
  - MAINTAINED BY COE, NAVIGATION DISTRICTS (PUBLIC FUNDING)

- COLLECTORS: FEW NATURAL, IMPROVED

- LOCALS: MANY IMPROVED CANALS

  - BYPRODUCT OF DREDGE-AND-FILL (SOURCE OF BORROW TO MAKE LAND)
  - DESIGNED TO MAXIMIZE WATERFRONT ACCESS
  - HISTORIC DREDGED DEPTH DEPENDENT UPON AMOUNT OF NEEDED FILL
  - MAINTENANCE FUNDING
    - PUBLIC SOURCES IF GENERAL ACCESS
    - LOCAL COMMUNITY IF PRIVATE ONLY

Trafficsheds
(Recreational Boat Source Areas)



- A SYSTEM IN NEED OF A MANAGEMENT PLAN

- CHANNEL MAINTENANCE
  - ORIGINAL DEPTH PROFILE
  - ONE SIZE FITS ALL APPROACH
  - FIT TO USER DRAFT SPECIFICATIONS

- SIGNAGE
  - CHARTED, UNCHARTED
  - OFFICIAL (PERMITTED)
  - PRIVATE

- TRAFFIC MANAGEMENT
  - PUBLIC, PRIVATE ACCESS

- HABITAT RESTORATION
  - HARD, NATURAL SHORELINES

- PUBLIC EDUCATION
  - BEST MANAGEMENT PRACTICES
  - BOATER MAPS AND GUIDES

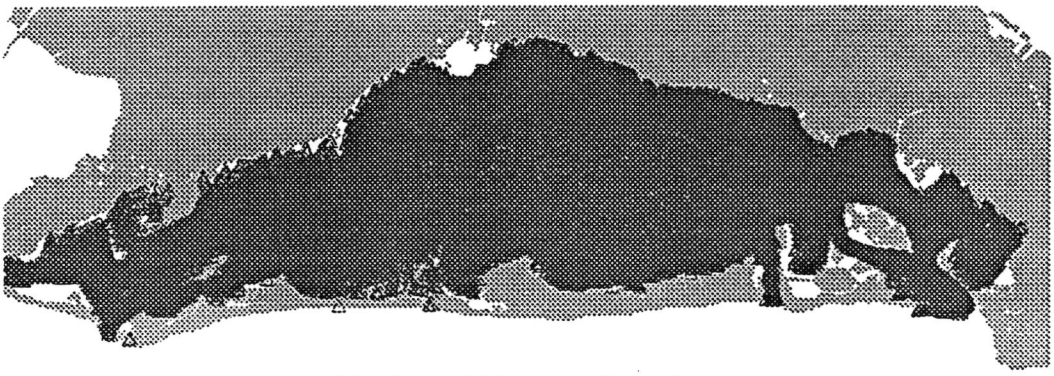
- PERMITS & DEVELOPMENT REGULATIONS
  - ACCOMMODATE WATER-DEPENDENT USES AND MINIMIZE ENVIRONMENTAL IMPACTS

PILOT SARASOTA BAY STUDY FOR

A REGIONAL WATERWAY SYSTEMS MANAGEMENT STRATEGY FOR SOUTHWEST FLORIDA

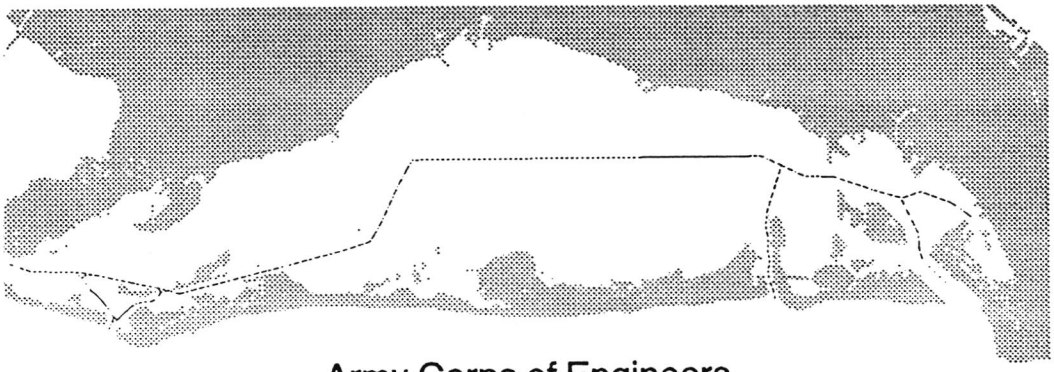
SYSTEM ELEMENTS

- FIT CHANNEL MAINTENANCE TO BOAT DRAFT REQUIREMENTS
- MINIMIZE IMPACTS ON SURROUNDING BAY HABITATS
- PRIORITIZE AND EVALUATE MANAGEMENT ALTERNATIVES ON A REGIONAL BASIS
- DEVELOP MAP PRODUCTS FOR BOATERS TO ENCOURAGE STEWARDSHIP
- EMPOWER SHORE COMMUNITIES TO ACTIVELY MANAGE THEIR WATERWAYS



National Ocean Service

University of Florida



Army Corps of Engineers

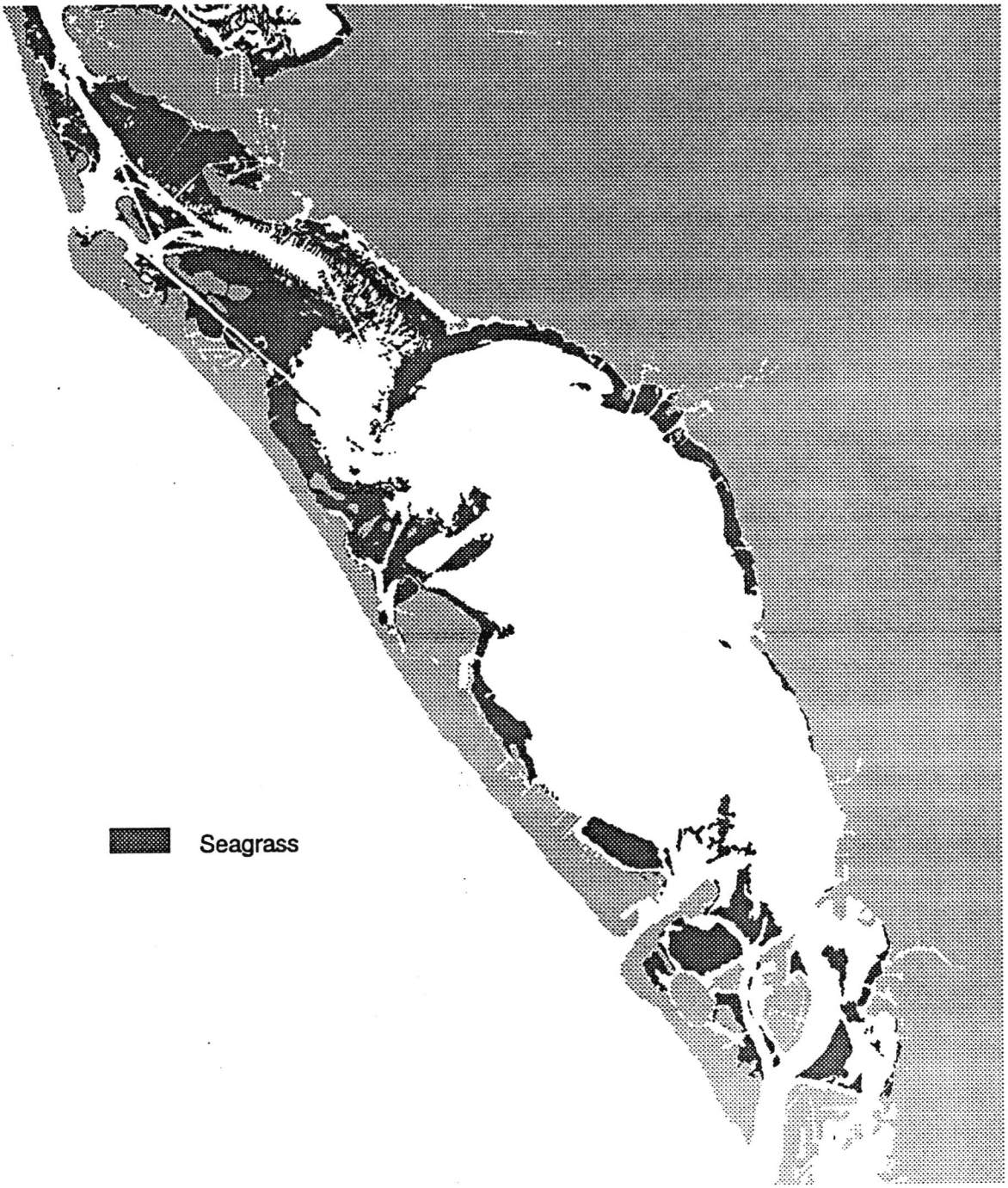
Sources of bathymetric data

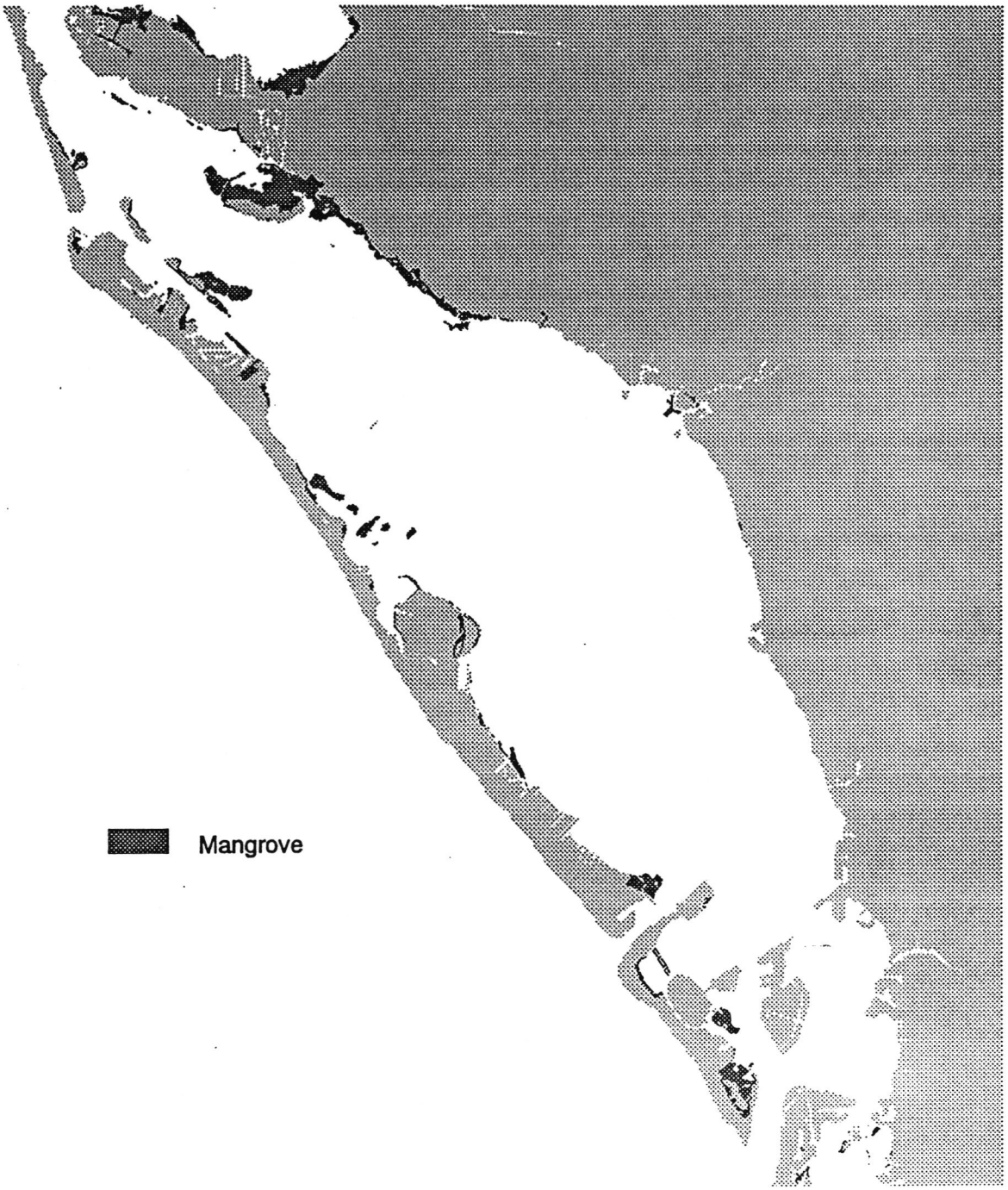
Water Depth < 3 ft.

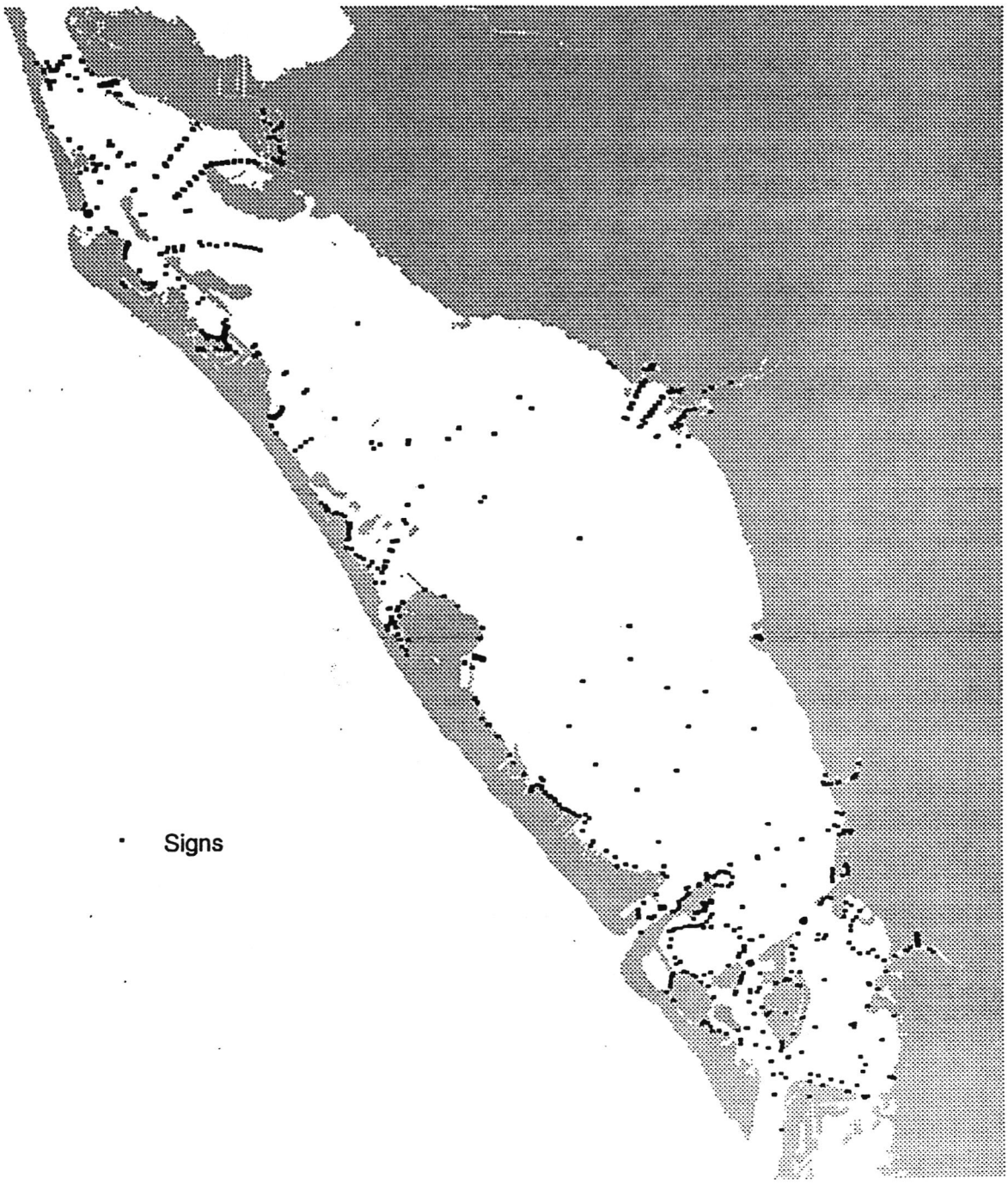
Water Depth >= 3 and < 6 ft

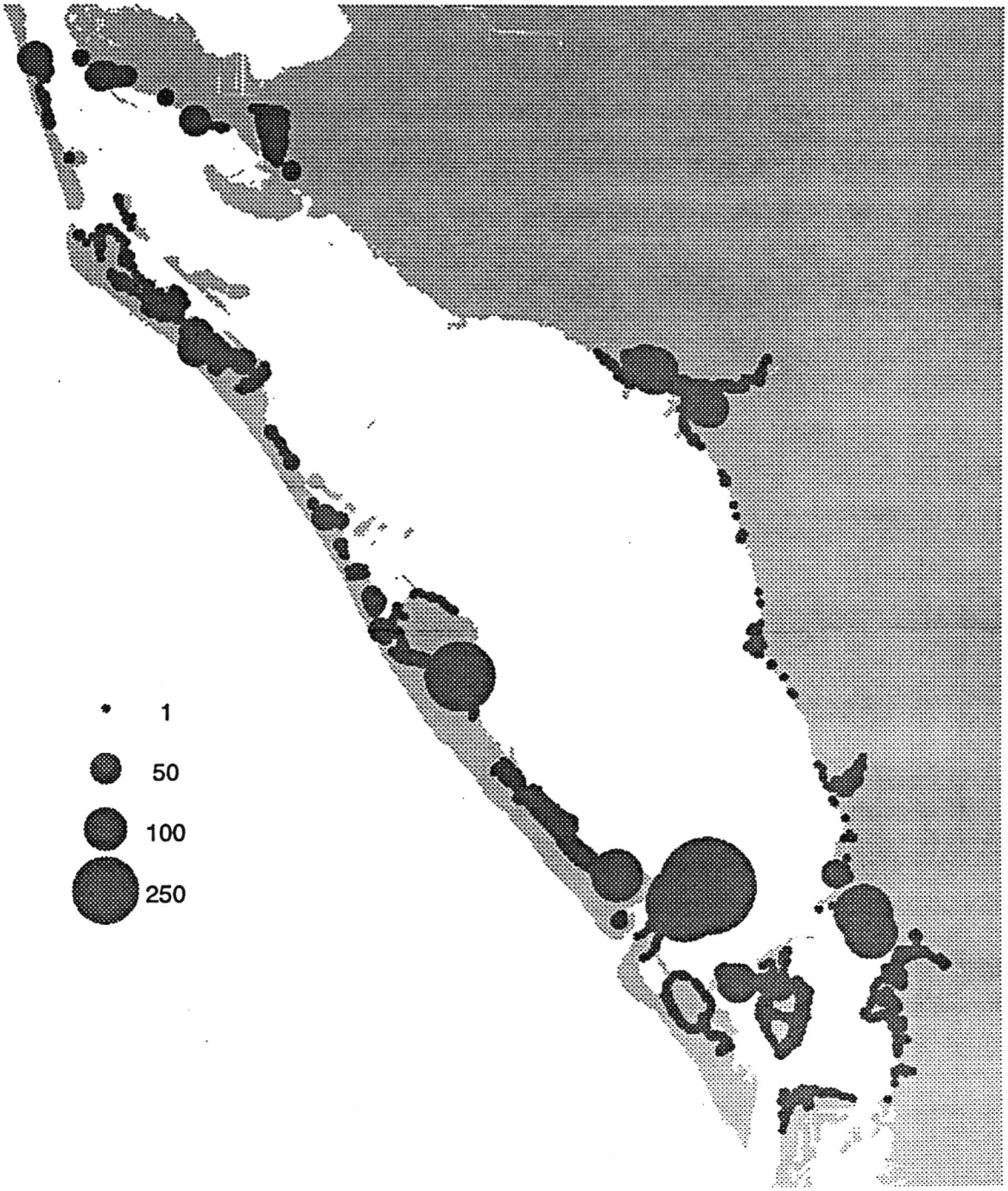
Water Depth >= 6 ft.

Bathymetry

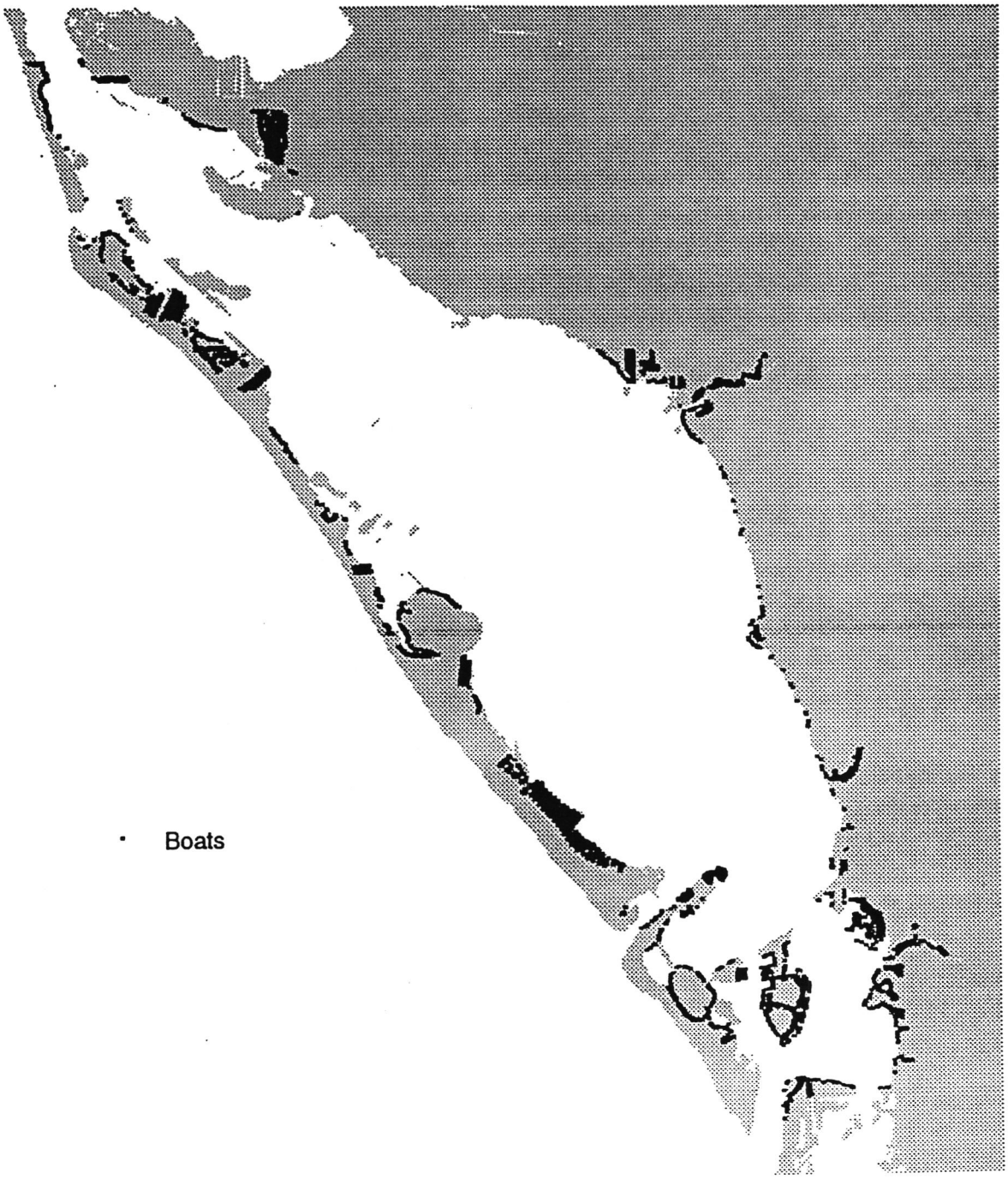

Seagrass


Mangrove


Signs



Facilities


Boats

GEOGRAPHIC INFORMATION SYSTEMS
GIS APPLICATIONS

- DATA CAPTURE
  - BATHYMETRY
  - SIGNAGE
  - SEAGRASS AND MANGROVE
  - BOATS AND FACILITIES

- TRAFFICSHED DEFINITION
  - BOAT POPULATION
  - INFRASTRUCTURE
  - WATERWAY SYSTEM

- BOAT ACCESSIBILITY ANALYSIS
  - INDEX BOAT DRAFT TO WATER DEPTH ALONG CHANNEL TO BAY

    BOAT ACCESS CODE: DIFFERENCE OF DRAFT TO SHALLOWEST CHANNEL SEGMENT

- CHANNEL RESTRICTION ANALYSIS
  - INDEX CHANNEL DEPTH TO BOAT DRAFT REQUIREMENTS UPCHANNEL

    CHANNEL ACCESS CODE: DIFFERENCE OF DEPTH TO BOAT DRAFT UPCHANNEL

Boat (excluding dinghies), Tarawitt Trafficshed

Type	Number	Percent	Draft (feet)			
			Average	Max.	Min.	Std.Dev.
Row	4	8.2	1.00	1	1	0.00
Sail	7	14.3	2.57	5	1	1.40
Speed	14	28.6	1.93	3	1	0.47
Power	4	8.2	2.25	3	2	0.50
Rec.Fish	20	40.8	1.45	3	1	0.69
Com.Fish						
Other						
Total	49	100.0	1.75	5	1	0.84

Infrastructure, Tarawitt Trafficshed

Moorings	Number
Wet Slip	44
Hoist/Drystack	21
Seawall	15
Beached/Blocked	
Trailer	
Ramp	1
Total	81

Signage	Number
Commercial	
Manatee	
Navigation	
Piling	
Recreational	
Seagrass	
Other	
Total	

Facilities	Number
Residential	63
Marina/Yard/Club	
Motel/Restaurant/Shop	
Anchorage	
Other	
Unclassified	
Total	63

Waterway System, Tarawitt Trafficshed

Water Area		Seagrass Area		Canal Depth	
Feet	Percent	Feet	Percent	Feet	Percent
0	25.73	0	0.00	0	25
1	17.54	1	0.00	1	39
2	12.80	2	0.00	2	15
3	10.04	3	31.29	3	6
4	10.61	4	40.86	4	1
5	9.36	5	11.56	5	1
6	7.63	6≥	16.30	6	1
7	5.18			7	3
8	1.12			8	1
9≥	0.00			9≥	7

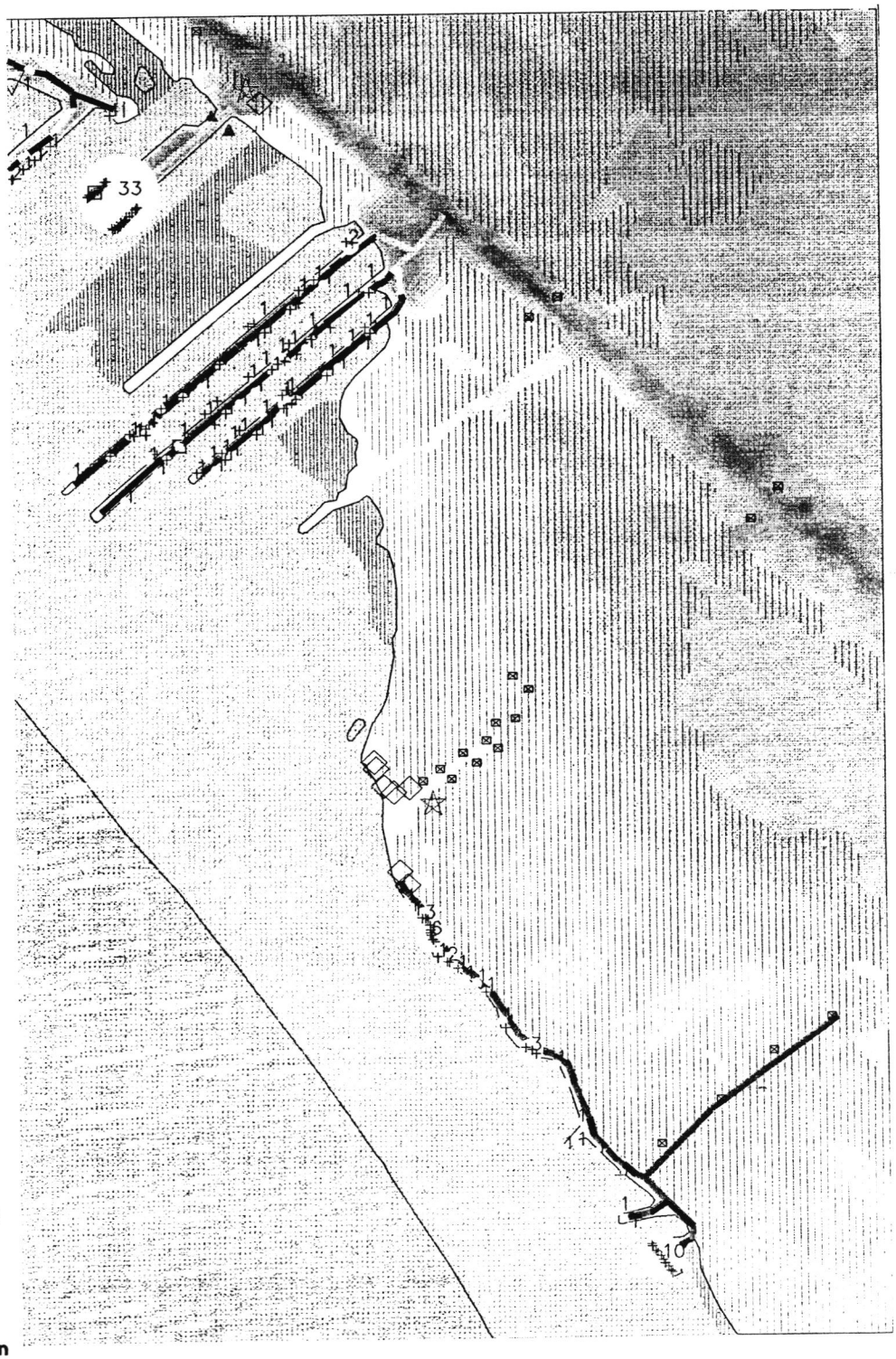
Area	Square Feet
Water	492,964
Seagrass	25,424
Mangrove	10.443
Tidal	126,817

Length	Feet
Channel	6,502
Shoreline	12,040

Depth	Feet
Channel Average	2.8
Entrance Channel	1.0

LONGBOAT KEY

DETAILED INVENTORY MAP



Number of Slips per Facility
(wet and dry berths)

1 5 10 50 100 250

Boat Drafts

- 1 foot
- 2 feet
- 3 feet
- 4 feet
- 5 feet
- 6 feet
- 7 feet

SIGNAGE

- Channel marker
- Bridge
- Cable
- Danger
- Artificial Reef
- Seagrass
- Manatee - Slow
- Manatee - No Entry
- Manatee Fact Sheet
- Slow, No Wake
- Water Sports
- Business
- Crime Watch
- Pollution Prevention
- Piling

Bathymetry

- 1 foot
- 2 feet
- 3 feet
- 4 feet
- 5 feet
- 6 feet
- 7 feet
- 8 feet
- 9 feet
- 10 feet
- 11 feet
- 12 feet
- 13 feet
- 14 feet
- 15+ feet

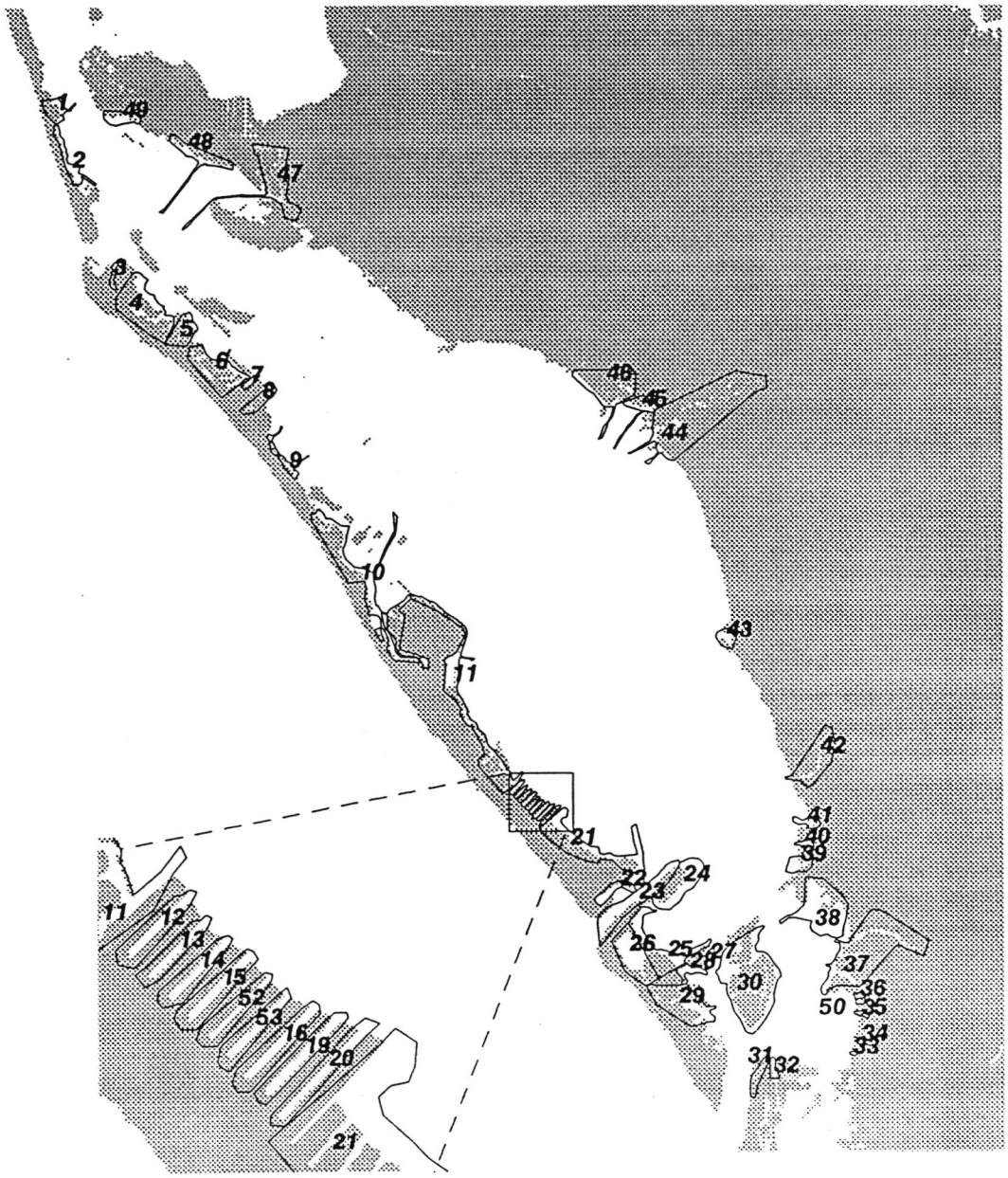
Water Depth

- 1 foot
- 2
- 3
- 4
- 5 feet
- 6
- 7
- 8
- 9 feet
- 10
- 11
- 12
- 13
- 14
- 15+ feet

- Seagrass
- Mangrove
- Land

BOAT POPULATIONS

LOCATIONS	BOATS	TOTAL (%)
TRAFFICSHED	4,416	96.69
OPEN BAY	150	3.31
TOTAL (excluding dinghies)	4,566	100.00



BOAT ACCESS TO SARASOTA BAY

Restriction Levels	Option A (0 MLLW Datum)		Option B (-1 MLLW Datum)	
	Boats	Subtotal (%)	Boats	Subtotal (%)
All Trafficshed Boats (excludes dinghies)	4416	100.00	4416	100.00
Unrestricted	3884	87.95	3202	72.51
Restricted	532	12.05	1214	27.49
Somewhat Restricted = Vessel Draft	350	7.93	685	15.51
Restricted >= 1 ft Shallower than draft	141	3.19	352	7.97
Severely Restricted >= 2 ft Shallower than draft	30	0.68	136	3.08
Blocked >= 3 ft Shallower than draft	11	0.25	41	0.93

- PLANNING SCENARIOS

  1 FIT ACCESS TO *"NORMAL"* CONDITIONS
  (0 MEAN LOWER LOW DATUM)

  2 FIT ACCESS TO *"BELOW NORMAL"* CONDITIONS
  (-1 FT. MEAN LOWER LOW DATUM)

- BASIS FOR SELECTING OPTION 1 OR 2
  (NUMBER OF DAILY OCCURRENCES WHERE TIDAL CONDITIONS ARE ≥ .5 FT. BELOW MLLW)

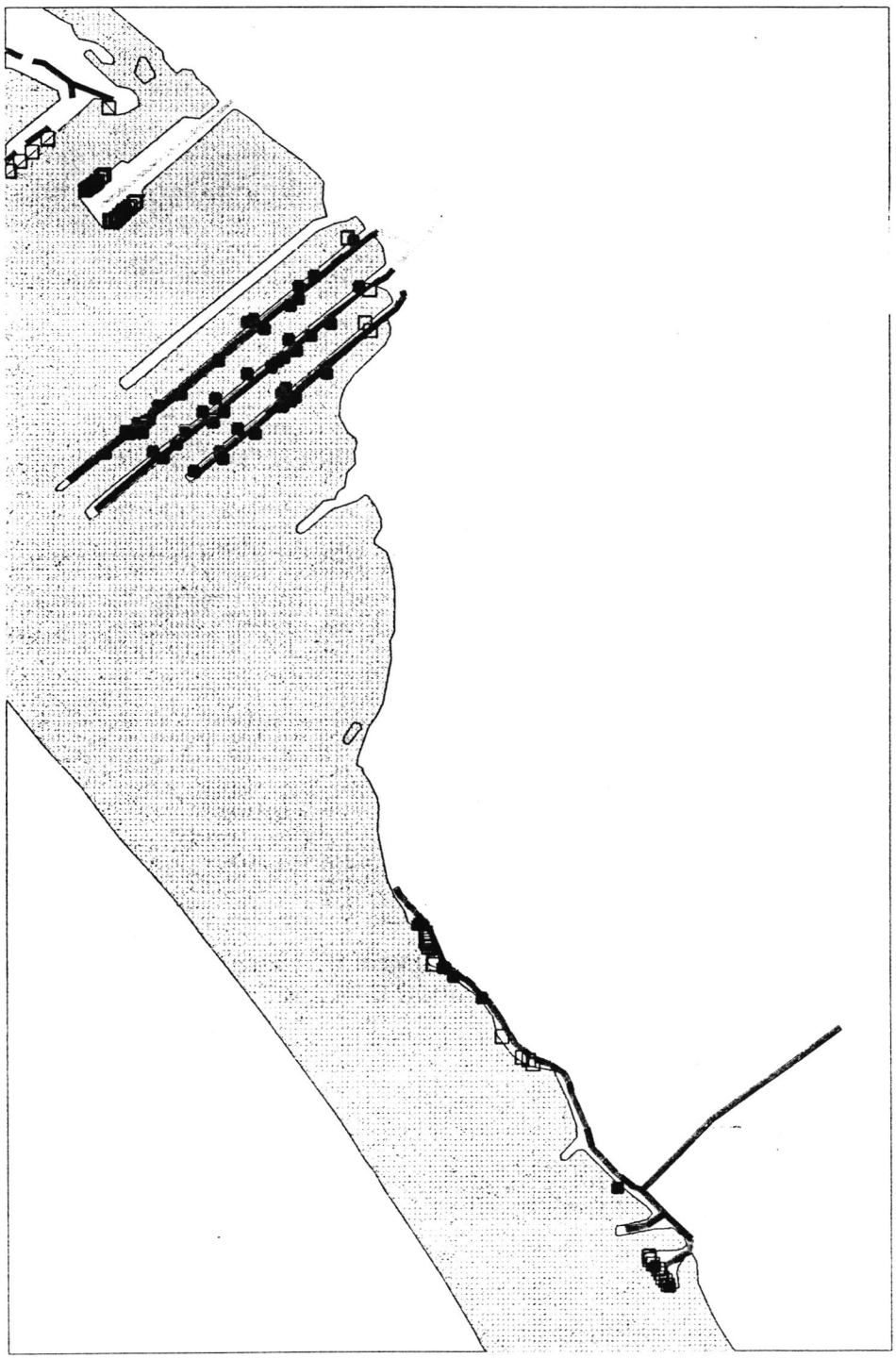
1994			1995				
OCT	NOV	DEC	JAN	FEB	MAR	APR	TOTAL
0	1	1	5	7	2	0	16

OPTION 2 CONDITIONS IN YEAR - 4%

OPTION 2 CONDITIONS IN WINTER - 8%

LONGBOAT KEY

BOAT ACCESSIBILITY MAP



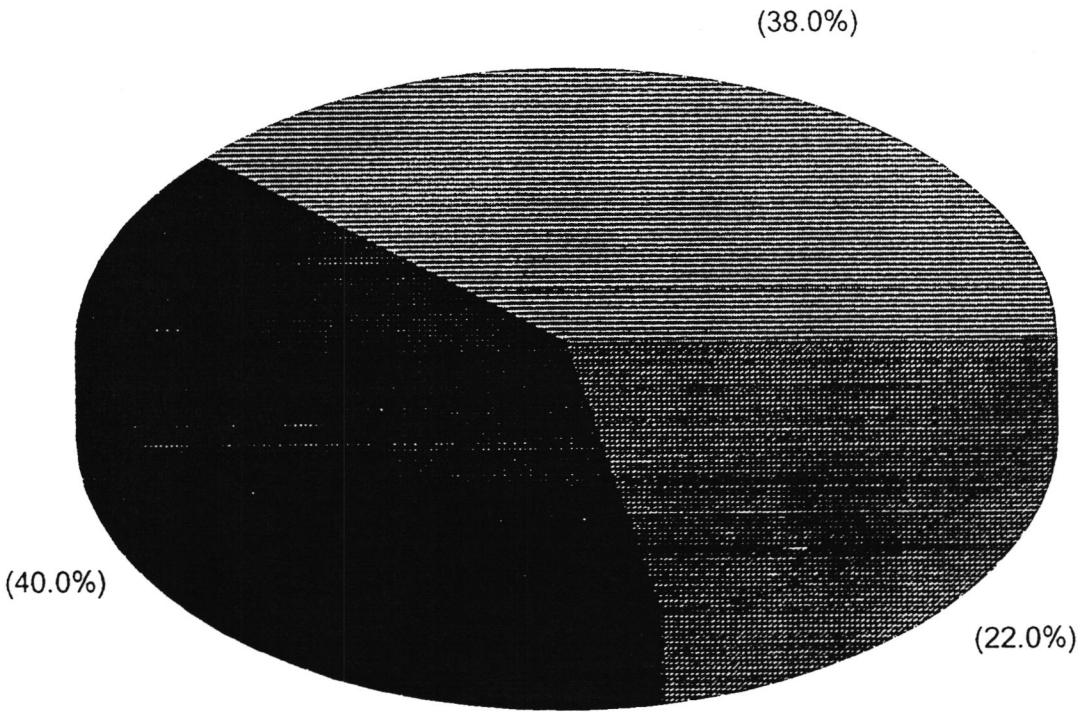
Boat Access Codes

- Not Restricted
- Somewhat Restricted
- Restricted
- Severely Restricted
- Blocked

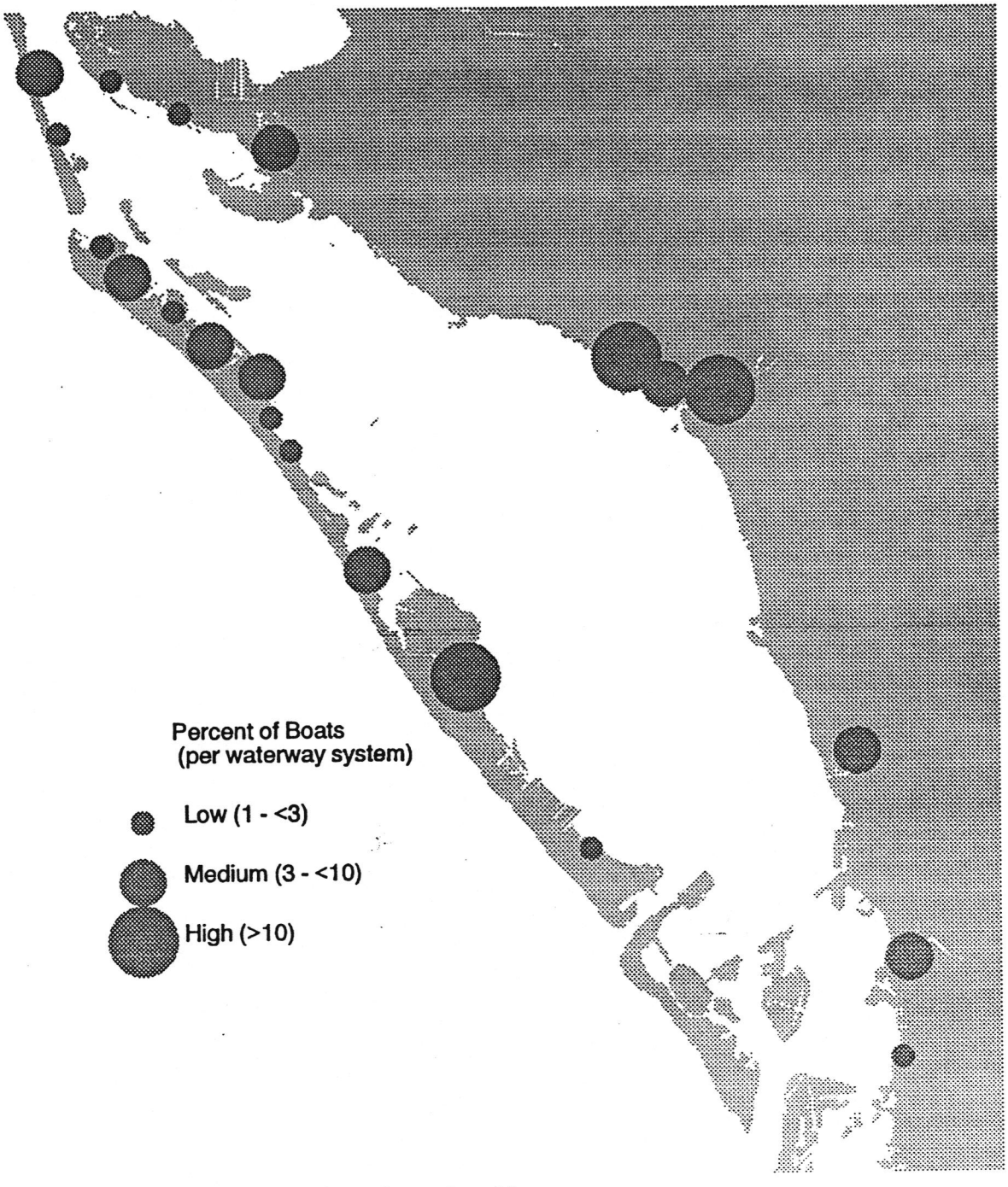
Water Depth

- 1 foot
- 2
- 3
- 4
- 5 feet
- 6
- 7
- 8
- 9 feet
- 10
- 11
- 12
- 13
- 14
- 15+ feet

General Distribution of Restricted Boats



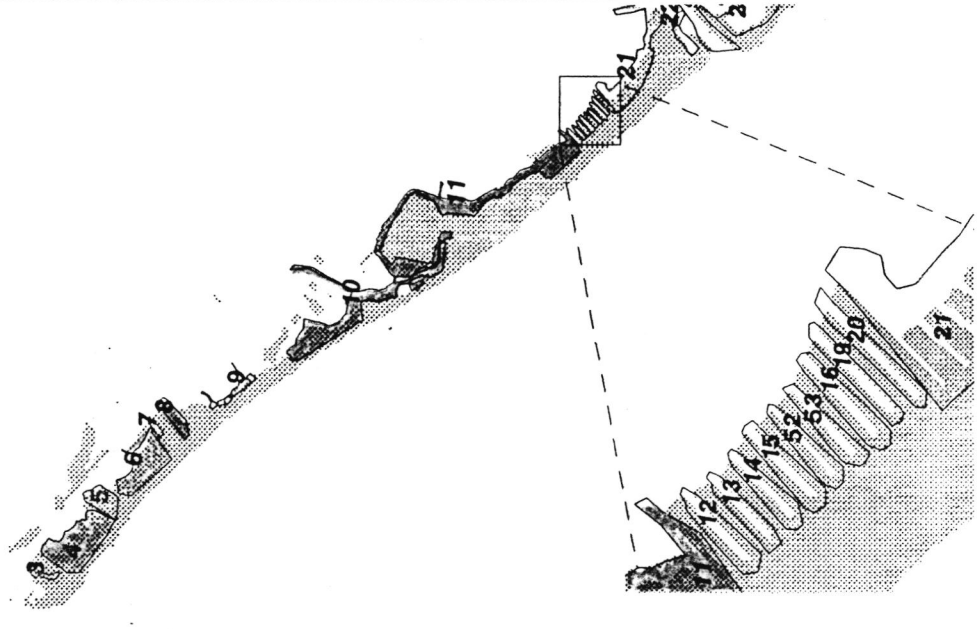
38% - 3 locations
40% - 8 locations
22% - 23/26 locations



General distribution of restricted boats.

BOAT ACCESSIBILITY FOR LONGBOAT KEY TRAFFICSHEDS

Trafficshed	Somewhat Restricted	Restricted	Severely Restricted	Blocked	Total
3 Whitney Beach North	8		1		9
4 Whitney Beach South	17	2			19
5 General Harris	8				8
6 Emerald Harbour	15		1	1	17
7 Gulf Bay Basin					0
8 Gulfarawit	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
9 No Name	9	2			11
10 Buttonwood Harbor	15	2	3	11	31
11 Bayisles/Bk Moorings	46	22	[illegible]	[illegible]	68
12 Golf Links		1			1
13 Chipping		1			1
14 Wedge	1	1			2
15 Birdie	1				1
16 Bowsprit	2				2
19 Ranger	1				1
20 Halyard	1	1			2
21 Boat Name Lanes	7				7
22 New Pass Lagoon					0
51 No-Name North					0
52 Putting Green	2	1			3
53 Yardam		2	1		3
Trafficshed Total	151	66	10	4	231

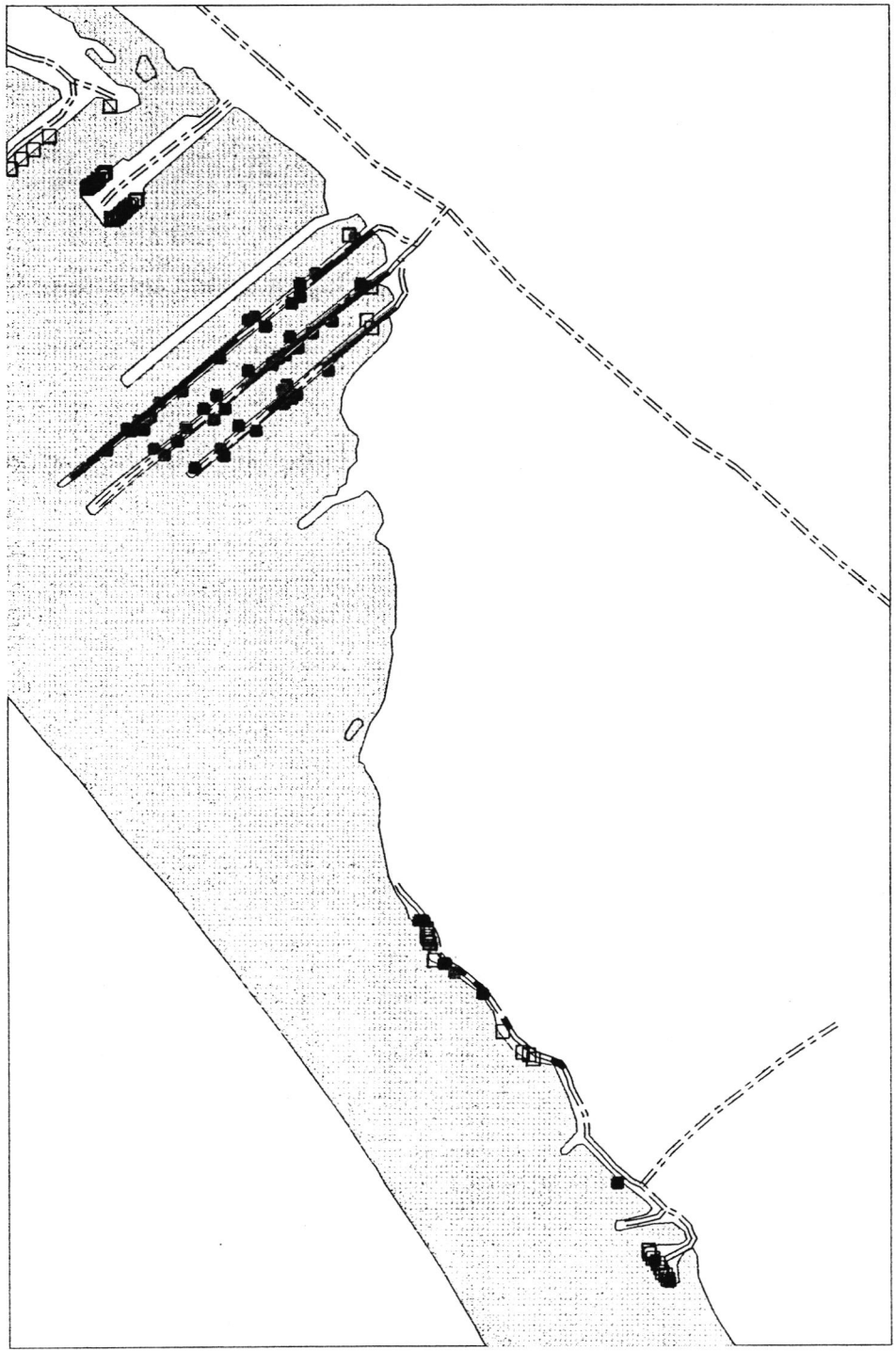


CHANNEL ACCESS TO SARASOTA BAY

Characteristics	Option A (0 MLLW Datum)		Option B (-1 MLLW Datum)	
	Length (ft)	Total (%)	Length (ft)	Total (%)
Unrestricted	251,242	89.75	162,093	57.91
Restricted	28,680	10.25	117,829	42.09
Total	279,922	100.00	279,922	100.00

LONGBOAT KEY

CHANNEL RESTRICTIONS MAP

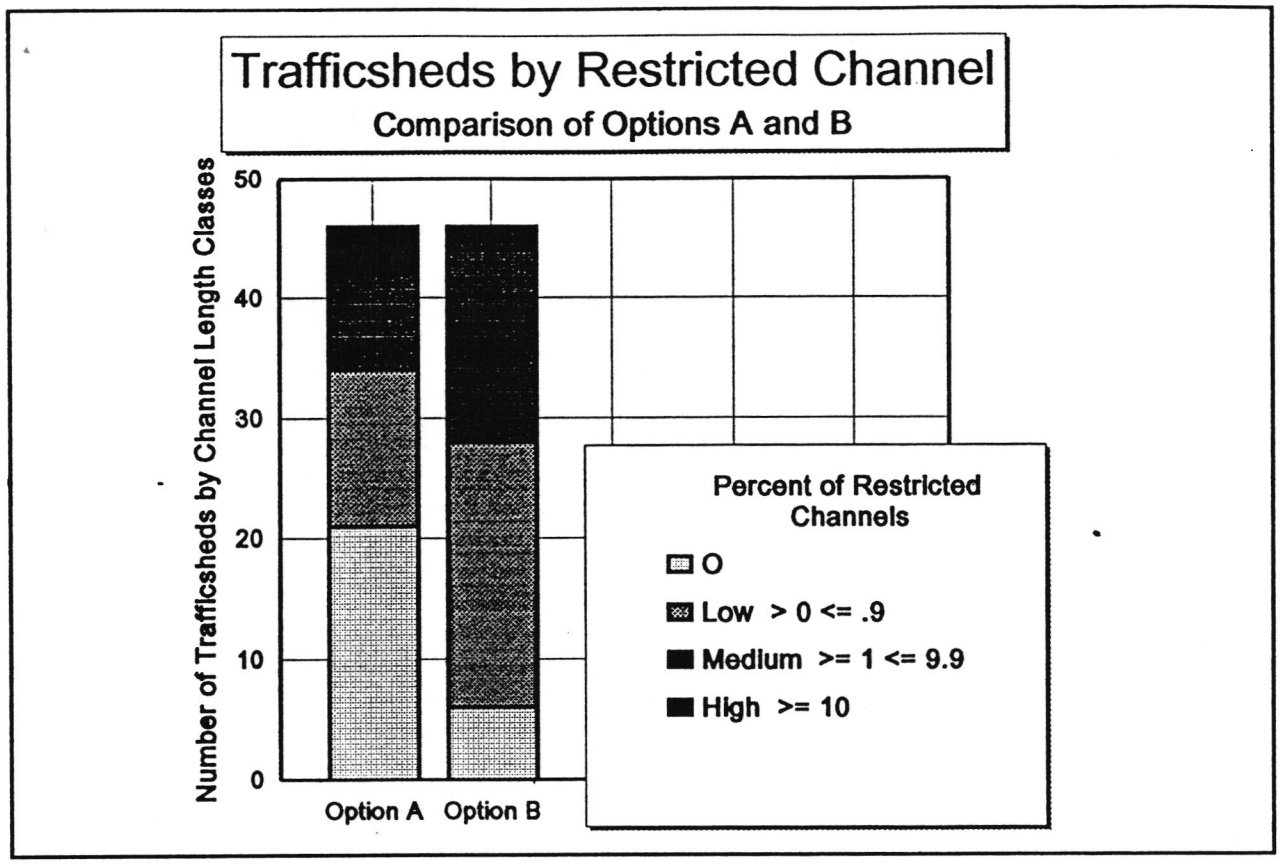


Canal Required Dredge

- Not Restricted
- 1 foot dredge
- 2 foot dredge
- 3 foot dredge
- 4 foot dredge

Boat Access Codes

- Not Restricted
- Somewhat Restricted
- Restricted
- Severely Restricted
- Blocked


Trafficsheds by Restricted Channel
Comparison of Options A and B
Number of Trafficsheds by Channel Length Classes
50
40
30
20
10
0
Option A
Option B
Percent of Restricted Channels
O
Low > 0 <= .9
Medium >= 1 <= 9.9
High >= 10

CHANNEL DEPTH RESTRICTED SEGMENTS ON LONGBOAT KEY BY TRAFFICSHED (OPTION A)

Trafficshed	Channel Restricted Lengths (depth, ft.)				Total
	1 ft.	2 ft.	3 ft.	4 ft.	Length (ft.)
3 Whitney Beach North	176	66	--	--	242
4 Whitney Beach South	390	--	--	--	390
6 Emerald Harbor	424	99	--	--	523
8 Tarawitt	1,519	203	146	--	1,868
9 No Name	313	--	--	--	313
10 Buttonwood Harbor	385	34	28	--	447
11 Bay Isles/LBK Moorings	632	131	--	--	763
12 Golf Links	178	--	--	--	178
13 Chipping	148	--	--	--	148
14 Wedge	191	--	--	--	191
20 Halyard	70	--	--	--	70
52 Putting Green	55	--	--	--	55
53 Yardam	146	35	--	--	181
Trafficshed Totals	5,627	568	1,177	374	7,746

CONCLUSIONS

- RECREATIONAL BOAT TRAFFIC GROWING
- WATERWAY MANAGEMENT NEEDS TO BE ADDRESSED
- MANAGEMENT TOOLS AVAILABLE FOR REGIONAL AND LOCAL ANALYSES
- PURSUE STRATEGIES TO MEET BOATER NEEDS AND RESOURCE MGT. CONCERNS
- DREDGING POLICY: DESIGN CHANNEL MAINTENANCE BASED ON BOAT DRAFT NEEDS FOR NORMAL CONDITIONS
- PERMITING POLICY: ENCOURAGE STATE TO ADOPT *REGIONAL* REVIEW CRITERIA
- EMPOWER WATERFRONT RESIDENTS TO MAKE WISE MGT. DECISIONS (PROVIDE INFORMATION AND TECHNICAL SUPPORT)

PROJECT RESULTS

- MAP ATLASES (80 MAPS)
  - REGIONAL @ 1" = 2,000'
  - DETAILED INVENTORY @ 1" = 400'
  - BOAT ACCESSIBILITY @ 1" = 400'
  - CHANNEL RESTRICTIONS @ 1" = 400'
- PLANNING TOOLS AND DATA FOR MANAGING WATERWAYS
- INFORMATION FOR BOATER EDUCATION TO PROMOTE NATURE-TOURISM AND STEWARDSHIP

PROJECT RESULTS

- MAINTENANCE DREDGING ANALYSIS
  - TO PROVIDE UNLIMITED ACCESS TO 532 PROBLEM BOATS, UNDER NORMAL *(OPTION A)* CONDITIONS, AND 20' CHANNEL WIDTH,REQUIRES REMOVING 25,805 CU. YDS. SPOIL
  - LONGBOAT KEY HAS 35% OF THE DREDGING NEEDS OF THE REGION (8,937 CU. YDS.)

LONGBOAT KEY ESTIMATED MAINTENANCE DREDGING
OPTION A (MLLW = 0)

REQUIRED DREDGE (FT)	RELATIVE AMOUNT (%)
1	72.64
2	7.33
3	15.19
4	4.83

PROJECT RESULTS

• MAINTENANCE DREDGING (CONTINUED)

LONGBOAT KEY
ESTIMATED MAINTENANCE DREDGING
OPTION A (MLLW = 0)

Trafficshed	Relative Amount (%)
3 Whitney Beach North	2.61
4 Whitney Beach South	3.31
6 Emerald Harbour	13.71
8 Tarawitt	58.28
9 No Name	2.65
10 Buttonwood Harbor	4.56
11 Bay Isles/LBK Moorings	7.59
12 Gold Links	1.51
13 Chipping	1.25
14 Wedge	1.62
20 Halyard	0.59
52 Putting Green	0.47
53 Yardam	1.83

PROJECT RESULTS

- BOAT ACCESSIBILITY ANALYSIS
  - 97% (4416) SARASOTA BAY BOATS MUST USE CHANNELS TO ACCESS THE BAY
  - 12% (532) HAVE RESTRICTED ACCESS
  - LONGBOAT KEY HAS 43% (231) OF THE RESTRICTED BOATS
  - FEW WATERWAYS CONTAIN LARGE NUMBERS OF RESTRICTED BOATS (64% AT 7 LOCATIONS)

    62% OF LBK RESTRICTED BOATS AT 3 LOCATIONS
  - MANY WATERWAYS CONTAIN SMALL NUMBERS OF RESTRICTED BOATS

PROJECT RESULTS

- CHANNEL RESTRICTION ANALYSIS

  - 10% (28,680 FT) OF ACCESS CHANNELS RESTRICT BOAT TRAFFIC TO SARASOTA BAY

  - LONGBOAT KEY HAS 27% (7,746 FT) OF THE RESTRICTED CHANNELS

    62% OF LBK RESTRICTED CHANNELS AT 2 LOCATIONS