



Sarasota Bay
2000

A Decade of Progress



and just...

"Another Day in Paradise"

Produced by the

Sarasota Bay National Estuary Program

Mark Alderson

Executive Director

BY

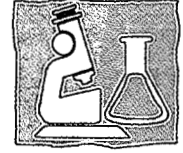
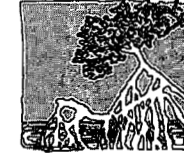
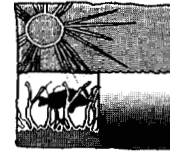
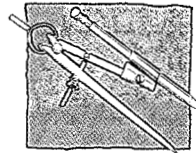
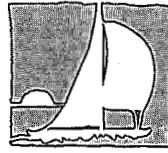


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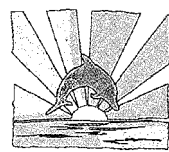
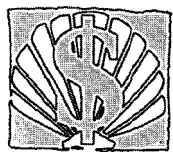
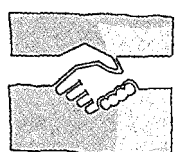
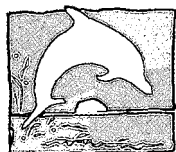
21 Projects and 50 Grants

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DO YOUR PART

Broaden your horizons! Explore natural and cultural sites along the coast.

You will gain a greater sense of pride, respect and ownership in

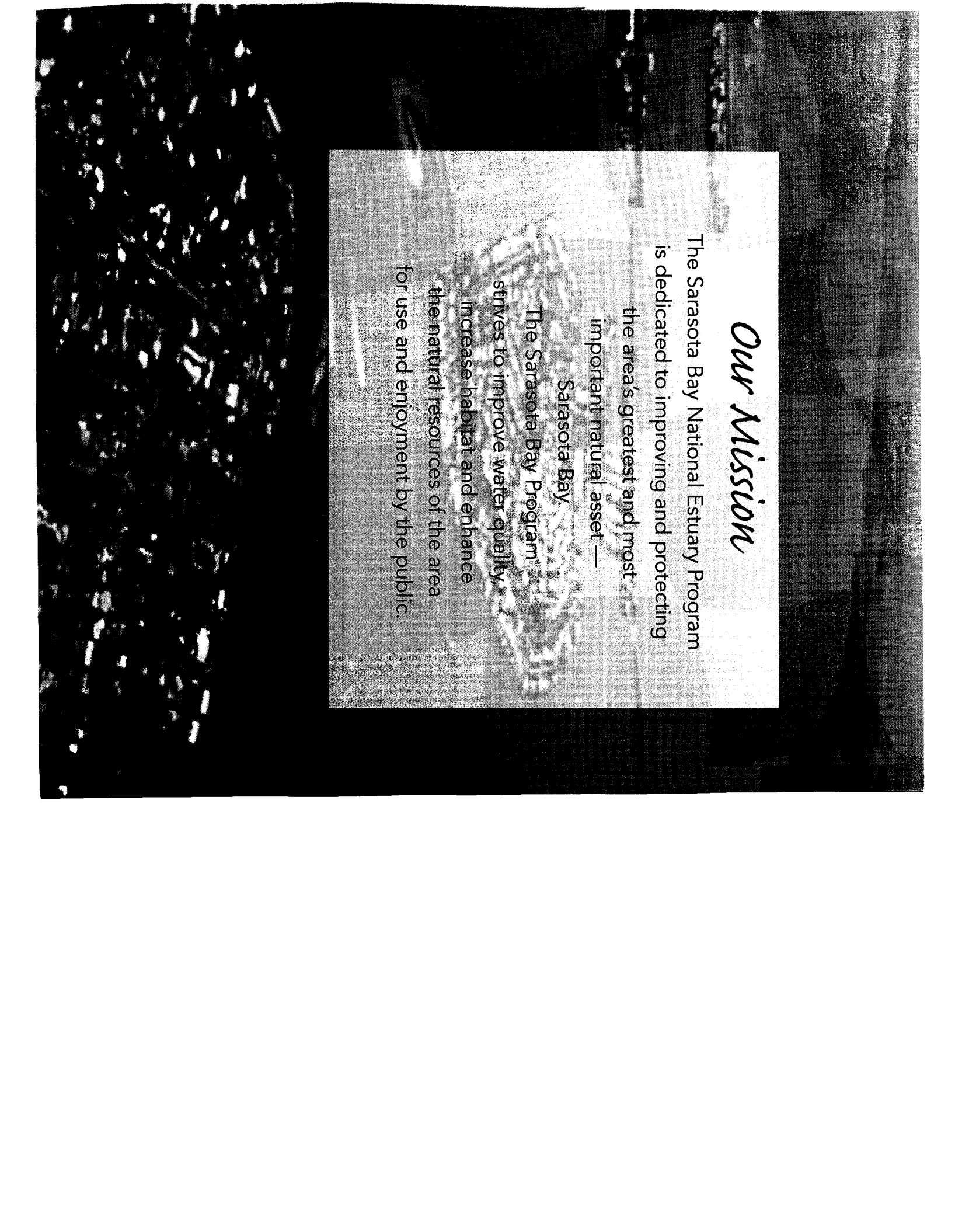
Sarasota Bay's community treasures.



A Special Thanks

The Sarasota Bay National Estuary Program would like to take this opportunity to thank the many citizens, technical advisors, elected officials and government agency staff who have been involved in the process of protecting and revitalizing Sarasota Bay. Sarasota Bay Program staff (5) could not have undertaken such a task without the thousands of area residents and other agency staff who continue to give of their time and energy in developing and implementing Bay projects.

The Sarasota Bay Program has engaged in a number of partnerships over the years to accomplish Bay restoration goals. Agency and organizational co-operative efforts will continue to help achieve Sarasota Bay National Estuary Program goals. The work of a small staff can realize comprehensive accomplishments when its efforts are combined with partner funds, agency staff and the Sarasota Bay National Estuary Program supporting committee structure through the Management Conference. When the community contributes its time and efforts, even more can be achieved.

An aerial photograph of a coastal area, showing a mix of water, land, and vegetation. The image is in black and white, with a grainy texture. The water is dark, and the land is lighter, with some areas appearing more vegetated than others. The coastline is irregular, with various inlets and peninsulas.

Our Mission

The Sarasota Bay National Estuary Program
is dedicated to improving and protecting
the area's greatest and most
important natural asset —

Sarasota Bay

The Sarasota Bay Program
strives to improve water quality,
increase habitat and enhance
the natural resources of the area
for use and enjoyment by the public.

Accomplishments

Community Accomplishments Since 1989		Sarasota Bay National Estuary Program Involvement
1.	Nitrogen pollution to the Bay has been reduced by 47% since 1990 (nitrogen pollution from wastewater treatment plants has been reduced by 80%).	<ul style="list-style-type: none"> Secured funding and contracted to develop a pollutant loading model Evaluated nitrogen reduction strategies Assessed the condition of the Bay in relation to modeled loads Evaluated the impact of nitrogen reductions on Bay resources Established the pollutant loading reduction goals
2.	Seagrass habitat has increased 18% (1,751 acres) since 1988.	<ul style="list-style-type: none"> Assessed trends (expansion in relation to water quality) Conducted studies evaluating the condition and quality of existing habitat
3.	Saltwater wetland acreage has been increased by 8%; 21 wetland enhancement projects have been proposed and funded.	<ul style="list-style-type: none"> Secured funding and conducted studies to evaluate the extent and quality Assessed trends and established goals for enhancement Established funding sources and identified lands suitable for restoration
4.	Twenty Bay artificial reef projects have been permitted; seven have been constructed.	<ul style="list-style-type: none"> Developed the artificial reef master plan Tested innovative strategies for reef deployment Provided funding for enhanced reef creation
5.	An estimated 110 million more fish, 71 million more crabs and 330 million more shrimp than in 1988.	<ul style="list-style-type: none"> Conducted studies to provide baseline information on seagrass habitat Studied data as an indicator of the Bay's increased capacity to support life
6.	Significant Bayfront land has been purchased.	<ul style="list-style-type: none"> Drafted proposals, in concert with local staff, to secure these properties
7.	The Gulf Coast Heritage Trail linking the Bay community's cultural, historical and environmental treasures has been launched.	<ul style="list-style-type: none"> Initiated the Trail Obtained support from the National Park Service Developed brochures and educational materials Implemented road and destination sign system and auto route
8.	Several watersheds have been retrofitted for improved stormwater management.	<ul style="list-style-type: none"> Supported the development of Environmental Utilities Sponsored retrofit projects for funding Assessed toxicity and identified sources
9.	The Florida Yards and Neighborhoods Program has been developed, recommending alternative landscapes regionally.	<ul style="list-style-type: none"> Developed the Program and related educational materials Secured grants and funding for implementation Promoted research and statewide implementation Analyzed the bacteria data and alerted appropriate agencies

Community Accomplishments Since 1989		Sarasota Bay National Estuary Program Involvement
10.	Central sewers are planned in north Sarasota County (Phillippi Creek) with options available for implementation.	<ul style="list-style-type: none"> • Conducted studies on bacteria and viruses • Participated on the multi-agency task force • Provided technical support and funds for educational programs
11.	Scallops have been reintroduced to the Bay to reestablish stocks.	<ul style="list-style-type: none"> • Conducted studies on spawning • Deployed and monitored performance
12.	A regional Wastewater Re-use System has been planned, funded and is partially under construction recommending aquifer storage and recovery as a means for preserving water resources.	<ul style="list-style-type: none"> • Established the need for the plan and connections to Bay quality • Promoted the master plan with Basin Board members and SWFWMD • Participated in the regional task force • Evaluated wet-weather storage options
13.	\$3.0 million in technical studies to better understand the Bay have been completed	<ul style="list-style-type: none"> • Secured funding and contracted for 40 technical studies to characterize the Bay and its resources
14.	A sophisticated multi-jurisdictional Bay monitoring program is in place.	<ul style="list-style-type: none"> • Developed protocols and assisted in establishing the regional network
15.	SBNEP staff have been directly involved in leveraging more than \$18.8 million for Bay restoration activities. The community has committed more than \$120 million for implementation with regional infrastructure supporting long-term protection valued at more than \$1 billion.	<ul style="list-style-type: none"> • Drafted proposals and work plans • Established a network of contacts with the funding agencies.
16.	Citizens are engaged in decision making with regard to the Bay.	<ul style="list-style-type: none"> • Maintained the Citizens Advisory Committee and a network in the community • Funded projects promoting education, community outreach and public involvement • Most major issues in the plan have been publicly debated
17.	SBNEP policies have been integrated into the local government comprehensive plans.	<ul style="list-style-type: none"> • Provided contractual and staff support

CHAPTER ONE

A Decade of Progress

Sarasota Bay 2000: A Decade of Progress (and just ... "Another Day in Paradise") is produced by the Sarasota Bay National Estuary Program for the people of Manatee and Sarasota counties.

This document presents information on the current condition of Sarasota Bay and the progress made in implementing the Comprehensive Conservation Management Plan signed by the Governor of Florida and the Administrator of the U.S. Environmental Protection Agency in 1995. The achievements in implementing the plan have been substantial with reductions in pollution and increases in

habitats and recreational opportunities.

Bay area residents should celebrate the dramatic improvements in the Bay and its resources and look forward to further progress in the 21st century.

Additional information is available at the Sarasota Bay Program office, located at 5333 N. Tamiami Trail, Suite 104, Sarasota, FL, 34234; phone (941) 359-5841, or at the following three web addresses associated with our program:

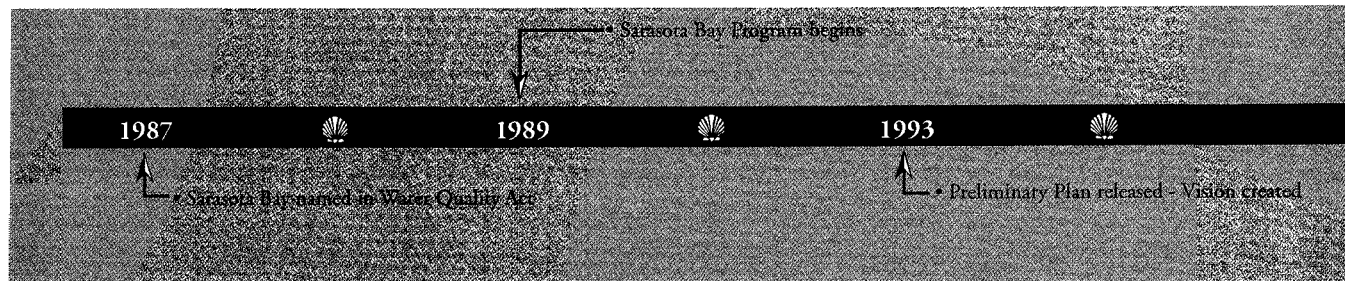
www.sbnep.com

www.ci.sarasota.fl.us/sarabay.nsf/frameset?open

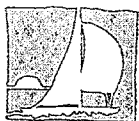
www.epa.gov/owow/estuaries



Central Sarasota Bay.



... Setting the Stage

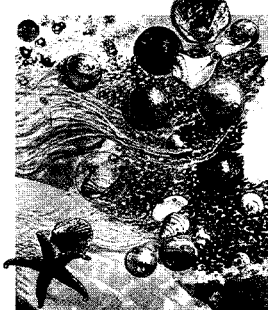


... Setting the Stage

Community leaders and scientists from Mote Marine Laboratory began to compile information documenting the problems and issues facing Sarasota Bay in 1986. With this information, community leaders sought Congressional support to include Sarasota Bay in pending legislation — the Water Quality Act. In 1987, the United States Congress named Sarasota Bay as an estuary of "national significance." Two years later, Sarasota Bay was formally designated as a part of the National Estuary Program by the administrator of the U.S. Environmental Protection Agency, subsequent to nomination by the Governor of Florida.

As specified in the federal legislation, a Management Conference was formed comprising federal, state, regional and local officials who are delegated responsibility through a committee structure to oversee the development and implementation of a Comprehensive Conservation and Management Plan (CCMP) for Sarasota Bay. The Sarasota Bay National Estuary Program Policy Committee establishes the goals, objectives, budgets and workplans for the conference.

SARASOTA BAY



Reclaiming Paradise

Several priority concerns were identified early in the process:

- Declines in water and sediment quality.
- Loss of wetlands and other coastal habitats.
- Loss of seagrasses.
- Declines in finfish and shellfish populations.
- Overuse.

In 1989, the Sarasota Bay Program Management Conference began to develop plans of action to address these concerns through technical studies and citizen action plans, ultimately resulting in the promulgation of the CCMP in 1995.

1995



2000

* CCMP adopted
Governments agree on action

* State of the Bay 2000

About the Region

Geography

Sarasota Bay is a coastal system that extends from Venice Inlet through Anna Maria Sound (see map #1) and encompasses the barrier islands, tributaries and uplands within the Bay watershed. The Bay is comprised of two major embayments — Sarasota Bay and Little Sarasota Bay — and many smaller embayments; it is encompassed by parts of Manatee County to the north and Sarasota County to the south. Seven municipalities bound Sarasota Bay: Bradenton, Anna Maria, Holmes Beach, Bradenton Beach, Longboat Key, Sarasota and Venice.

The Bay area has a mean annual rainfall of 54.6 inches, occurring primarily from mid-June to mid-October. Much of this rainfall enters the Bay as stormwater runoff via a series of creeks and bayous on the mainland. These waterways include Palma Sola Creek, Bowlees Creek, Whitaker Bayou, Hudson Bayou, Phillippi Creek, Clower Creek, Catfish Creek, North Creek and South Creek.

A series of inlets provides for water exchange between Sarasota Bay and the Gulf of Mexico: Tampa Bay at Anna Maria Sound, Longboat Pass, New Pass, Big Pass and Venice Inlet. A former inlet, Midnight Pass, is currently closed.

The Sarasota Bay area is approximately 56 miles long. It includes Anna Maria Sound, Palma Sola Bay, Sarasota Bay, Roberts Bay, Little Sarasota Bay and Blackburn Bay. Within

the Bay, widths from barrier islands to the mainland range from 300 feet (north of Stickney Point Bridge between Siesta Key and the mainland, and near Point Crisp and Mangrove Point south of the Stickney Point Bridge) to 4.5 miles (at an east-west line from Buttonwood Harbor on Longboat Key to the John and Mable Ringling Museum of Art on the mainland). The study area ranges from roughly the Interstate 75 corridor in the east to the Gulf of Mexico to a depth of approximately 30 feet to the west. Activities within this watershed directly impact the overall quality of the Bay. In some cases, activities outside the watershed may indirectly impact Bay water quality, as pollution from atmospheric sources may be generated elsewhere and transported and deposited here.

Most parts of the Bay are relatively shallow, with an average depth of 5 feet. The mean depth in the central part of the Bay is 8 to 10 feet; the Bay's maximum depth, in Longboat Pass, is 27 feet.

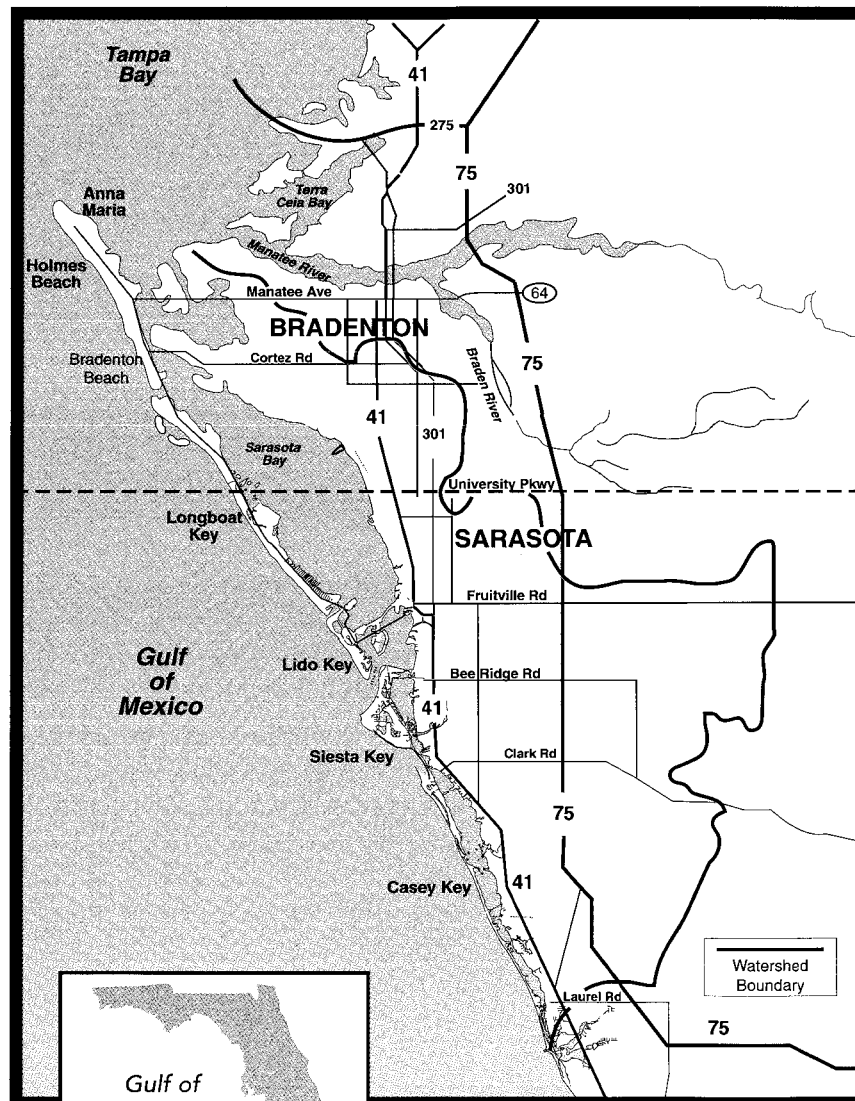
The Sarasota Bay community is home to more than 550,000 people in Manatee and Sarasota counties, which encompass nine incorporated cities or towns. About half of the approximately 400,000 residents of voting age are registered and actually vote. Three-quarters of the total population are over 35, and more than one-third are over 65, according to Florida State University studies in 1991.

... and the Watershed

Seasonal residents represent an estimated 10 to 25 percent of the total population. On the barrier islands, such as Siesta Key and Longboat Key, the percentage is probably much higher, around 70 to 90 percent.

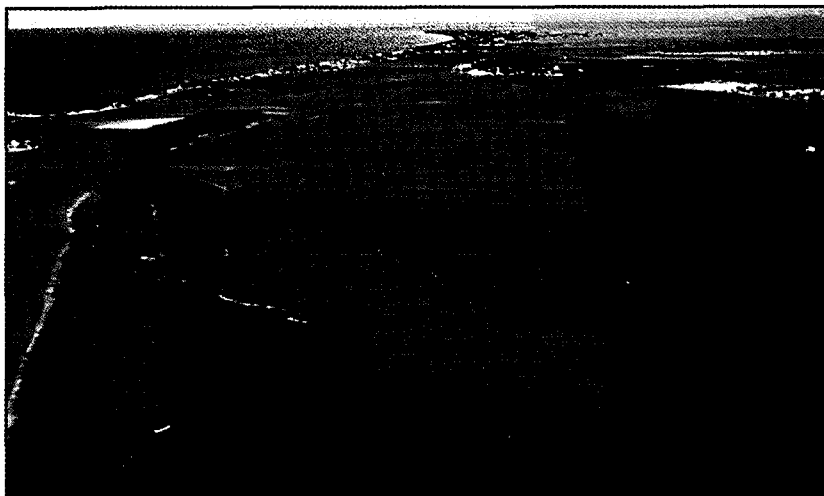
Florida's seasonal community, while promoting the tourism economy, presents a challenge to environmental education and protection efforts. However, a public opinion survey conducted for the Sarasota Bay Program in 1990 revealed a general concern for the Bay's health.

The communities within Manatee and Sarasota counties depend on Sarasota Bay for both recreation and commerce. Boating, fishing, swimming and nature study are a few typical recreational uses that also help support more than 50 water-dependent industries.

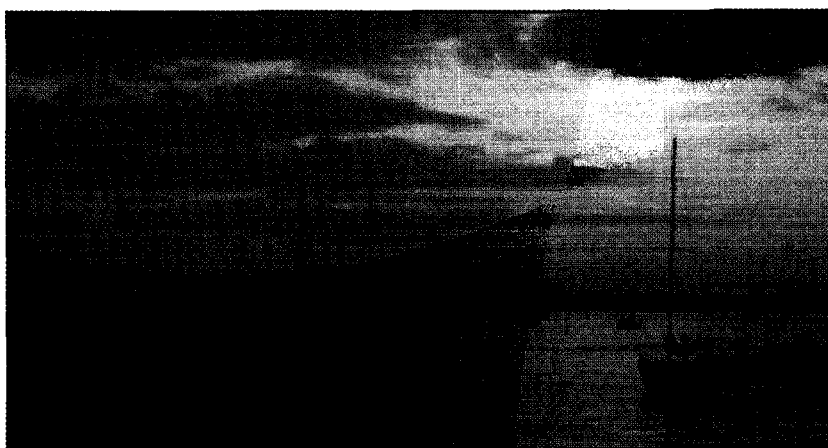


Map 1: Sarasota Bay watershed.

"They will be used as every other place of beauty is, for waterfront homes, country clubs, yacht basins and marinas — but when human beings roost on them their true charm will vanish. No finer use could be found for the upper rivers than to leave them as they are."
— *My Florida*, Ernest Lyons ©1969



North Sarasota Bay.



Downtown bayfront, Sarasota.

The Bay and beaches are also at the center of a multi-million-dollar tourism industry. Tourism is the number-one industry in Sarasota County and number two in Manatee County.

The expanding human population and accompanying development between 1930 and 1990 took its toll on the natural system. Historic seagrass meadows and mangrove wetlands were altered to provide for homes, businesses and commercial waterfront development. With the loss of marine habitat came an accompanying decline in marine life: fish, birds and shellfish. Human-induced pollution, principally nitrogen, also impacted the Bay system. In 1989, the Sarasota Bay National Estuary Program was formed with the mission of protecting and improving the Bay.

Yesterday's Sarasota Bay

Bountiful with Life

Barely 50 years ago, natives of the Sarasota Bay region painted a vibrant portrait of Sarasota Bay. Seagrass meadows were teeming with scallops and oyster harvests were bountiful. Sand flats were thick with clams. The fish population was so abundant that one long-time resident recalls, "You could hardly row across to one of the keys without ending up with a dozen or so fish in your boat."

Sparsely developed, mangrove-lined shores stretched as far as the eye could see, with native plants filtering runoff from the land before pollutants reached the Bay. Clear, clean water provided excellent habitat for fish and other marine life. Small, intimate communities bounded the Bay; everyone knew everyone else, and the sense of place was strong.



Cortez fishing village, 1900.



A family clam-digging



Tarpon were bountiful

Sarasota Bay in 1989

Stressed and Damaged

In 1989, Sarasota Bay was a very different place from what native residents remember.

Seagrass beds had diminished, and remaining seagrass flats were scarred by the tracks of boat propellers. Scallop, oyster and clam harvests were reduced, and anglers' catches were generally reduced as well.

Miles of natural shoreline habitats had been replaced by seawalls, and once-abundant mangrove wetlands depleted. Intense residential and commercial development throughout the Bay area created an accompanying increase in stormwater runoff, wastewater pollution and sediment and chemical contaminants in the Bay. The human-social environment had changed as well, with people often unfamiliar with their neighbors and generally lacking a sense of place and community.

New Vision — 1993 . . .

Bringing the Bay Back

In 1993, a new vision was developed. It was decided that the future of Sarasota Bay would depend on each of us, as tremendous opportunities exist for improving our damaged Bay. In this brighter future vision, water quality improves throughout the Bay with a resurgence of submerged seagrasses and related marine life. Catches of fish increase for both recreational anglers and commercial fishers. Wetlands, both freshwater and tidal, are restored. Existing wetlands, viewed as vital links between people and the Bay, are protected from harm. Canals in residential communities become dramatically more productive habitats for marine life.

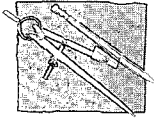
The community aggressively pursues stormwater management and treatment. Residents naturalize their yards by planting native habitats for birds and wildlife, and wildlife returns.



CARS

Maintain your car and repair leaks; recycle or dispose of your auto fluids safely (oil, antifreeze, etc).

Measuring Success in 2000



"How Have We Done?"

Today, Sarasota Bay is much different from what it was a decade ago, and the vision that was created by the citizens in 1993 is being realized. Water quality has improved Baywide, seagrass beds are recovering and the capacity of the Bay to support marine life has increased dramatically. Wetlands and artificial reefs are being created to increase habitats for juvenile fish, and reports by local anglers indicate that recreational fishing is considered to be excellent. The community has upgraded its wastewater treatment plants, pursued the reuse of wastewater on a large scale, restored and protected Bay habitats and constructed stormwater retrofit projects. Citizens are realizing the abundance of natural, historical and cultural treasures that this area has to offer, and are learning the importance of Bay stewardship and the meaning of a "sense of place."



North Sarasota Bay.

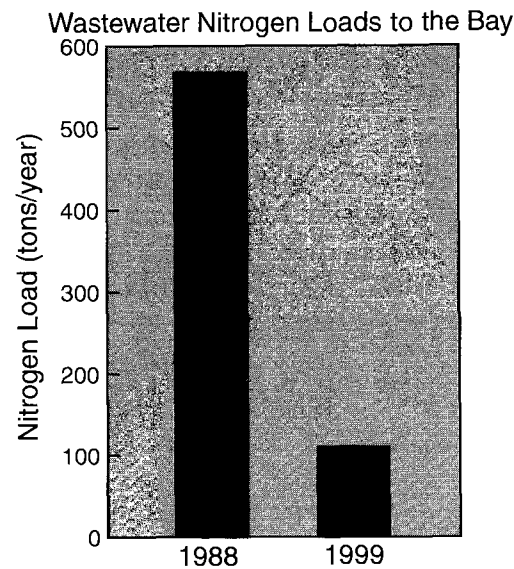


Figure 1. 1988 = 569 tons/year, 1999 = 110 tons/year.

State of the Bay

— Executive Summary

The principle pollutant of concern in Sarasota Bay is nitrogen.

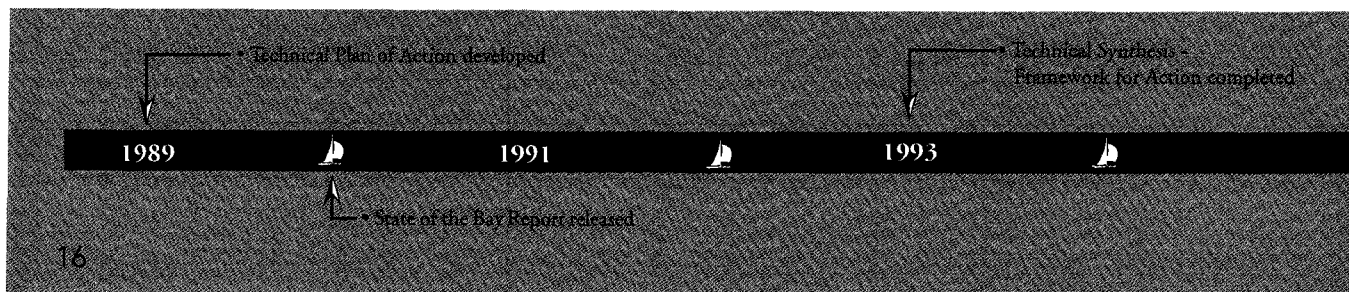
Too much nitrogen in Bay waters causes the growth of small plants called algae that are detrimental to marine life. Algae inhibits light penetration to submerged plants, which is needed for their survival; without a light source, seagrasses will die. Submerged plants may also become coated with algae, causing the same effect. At night, algae consume oxygen rather than producing it. This decaying process depletes oxygen in Bay water, creating low-oxygen or no-oxygen conditions. Since fish, like humans, need oxygen to survive, fish kills occur. Simply stated, the amount of nitrogen entering the Bay is a measure of Bay health.

Principal sources of nitrogen to the Bay are wastewater, stormwater, rainfall and air. People are the big nitrogen generators: human waste, fertilizers, automobiles, lawn mowers, power plants, boats, personal watercraft and other human activities provide excess nitrogen to Sarasota Bay. Computer modeling conducted in 1990 by the Sarasota Bay Program indicated that nitrogen loading levels had increased by 480 percent since the 1800s.

The Sarasota Bay Program has been working with the community to cost-effectively limit and control the amount of nitrogen entering the Bay, and then monitoring Bay responses to selected options. Since 1990, nitrogen loading has been reduced by approximately 47 percent Baywide. This reduction in nitrogen pollution has improved water clarity Baywide (approximately .4 meters or 1.5 feet, to date).

The amount of seagrass, wetlands and other habitats in a marine system generally relates to overall productivity. In this light, the Sarasota Bay community has embarked on a series of projects to enhance habitat related to seagrasses, wetlands and artificial reefs.

Sarasota Bay Program studies completed in 1993 indicated that seagrass had declined by 30 percent since 1950 in Sarasota Bay due to increases in nitrogen pollution and historic dredge-and-fill activities that covered and filled Bay bottom. Seagrasses are extremely important habitats; each square meter of seagrass in Sarasota Bay can support 15 fish, 10 crabs and 46 shrimp. In comparison, barren Bay bottom provides comparatively little habitat for these species.



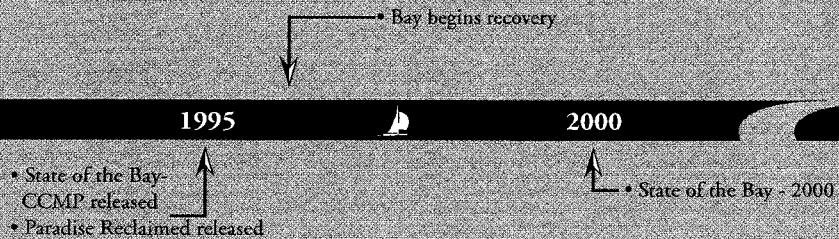
Executive Summary

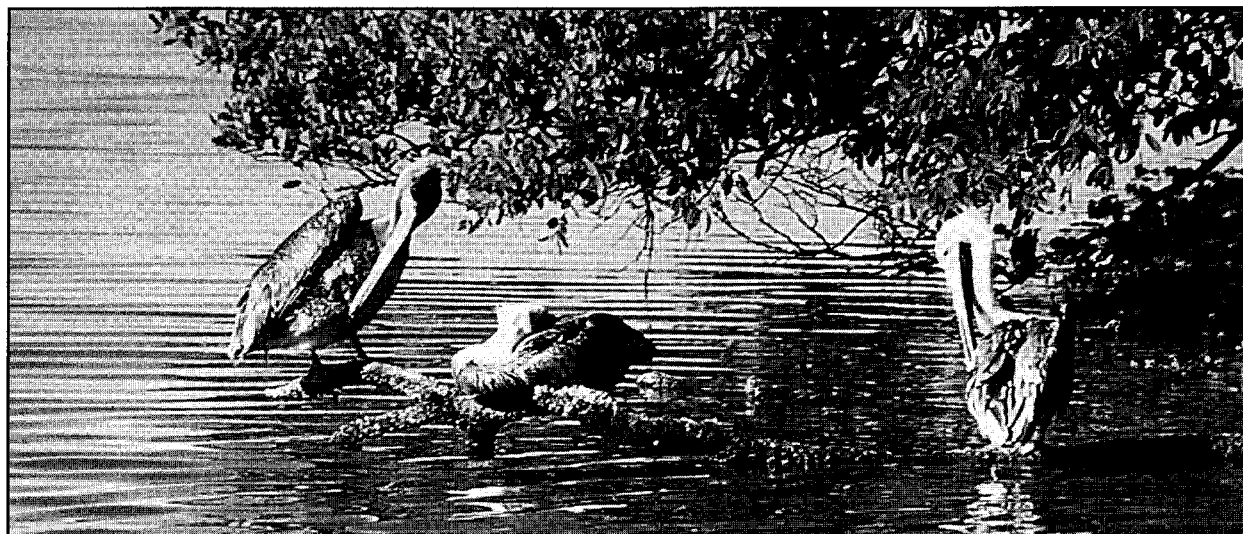


City of Sarasota waterfront.

The Sarasota Bay Program established a goal of reducing nitrogen pollution to the Bay by 41 percent, thus allowing for an increase in seagrass habitat coverage; this goal has been surpassed. Since 1988, seagrass acreage has in-

creased by at least 18 percent, or 1,751 acres, increasing the Bay's capability to support marine life. It is estimated that the Bay now supports 110 million more fish, 71 million more crabs and 330 million more shrimp than in 1988.



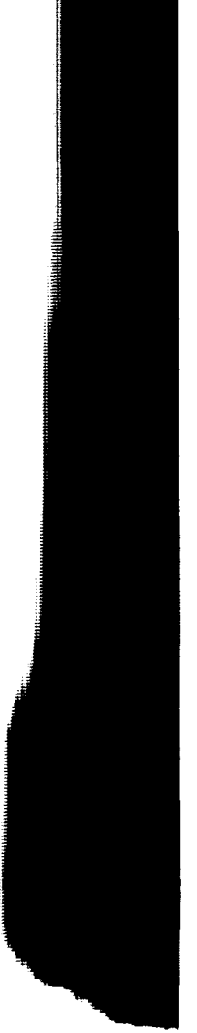


Brown pelicans are a common sight in the Sarasota Bay area.

Wetlands are essential in the food web of Sarasota Bay. The amount of wetlands available for habitat also impacts the Bay's capability to support and sustain life. Studies completed in 1993 by the Sarasota Bay Program documented a 39-percent loss of saltwater wetlands in the Bay. Based on this research, the Sarasota Bay Program has helped initiate substantial wetland-enhancement projects to increase fishery habitats. More than 100 acres of wetlands have been improved or restored since 1990 — an 8-percent increase from wetlands lost since 1950 — with an additional 100 acres planned.

Many areas of the Bay have been dredged to create navigable waterways and new home sites. In fact, more than 50 miles of shoreline were created in the Sarasota Bay area during the 1950s and 1960s. Large areas of Bay bottom were covered, and others are now too deep for seagrasses to grow.

In 1996, an artificial reef master plan to create habitat for juvenile fish was developed; 20 reefs are being constructed accordingly. These reefs will, in part, compensate artificially for habitats lost due to dredge-and-fill operations, which cannot be recovered. The Sarasota Bay Program is currently studying the quality of these habitats being constructed through the master plan.



... Planning for the Future



Designing the Gulf Coast Heritage Trail.

The Comprehensive Conservation and Management Plan (CCMP) also recognized that existing fishery management programs are very extensive in Florida and could not be impacted locally. The State of Florida has extensive regulations restricting the catch of recreationally important species; the state also has instituted an in-shore gill net ban. Due to these extensive regulations, Sarasota Bay Program efforts have not focused on fisheries management, but rather on creating fishery habitats to increase productivity.

Recently, the Program funded work to reintroduce scallops to the Bay, as it was believed that water and seagrass habitats had improved enough to again support a scallop population. Ten thousand scallops were introduced to the system in June 1999, in cages to protect them from predators. Heavy mortality was documented in the cages, and a much larger project funded.

The CCMP recognized the investment the community had already made in protecting the Bay, as well as the public investment that has led to the improvements now being realized. In this regard, the community has developed

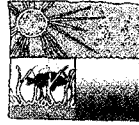
the Gulf Coast Heritage Trail linking the area's cultural, environmental and historical treasures. The Sarasota Bay Program Citizen Advisory Committee has embarked on a Citizen Action Plan to use the Trail and other educational and outreach mechanisms to enhance stewardship of the Bay, its resources and treasures.



SHARE THE BAY

*Enjoy and share
the recreational
opportunities of
the Bay responsibly.*

Restoring the Bay



Bay Pollution Reduced by 47 Percent

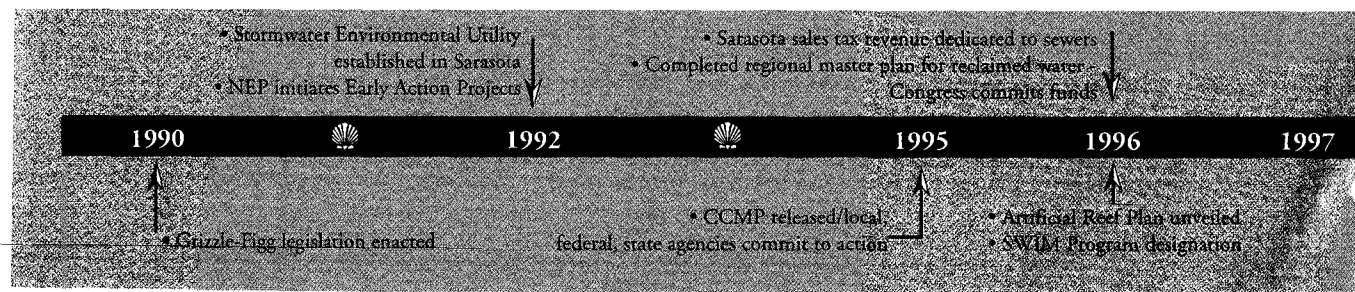
Over the past decade, water quality throughout most of Sarasota Bay has been steadily improved by comprehensively addressing the sources of nitrogen pollution to the Bay: wastewater, stormwater runoff, groundwater and atmospheric deposition (rainfall and dry deposition of gases and particulates).

State-of-the-Art Treatment of Wastewater

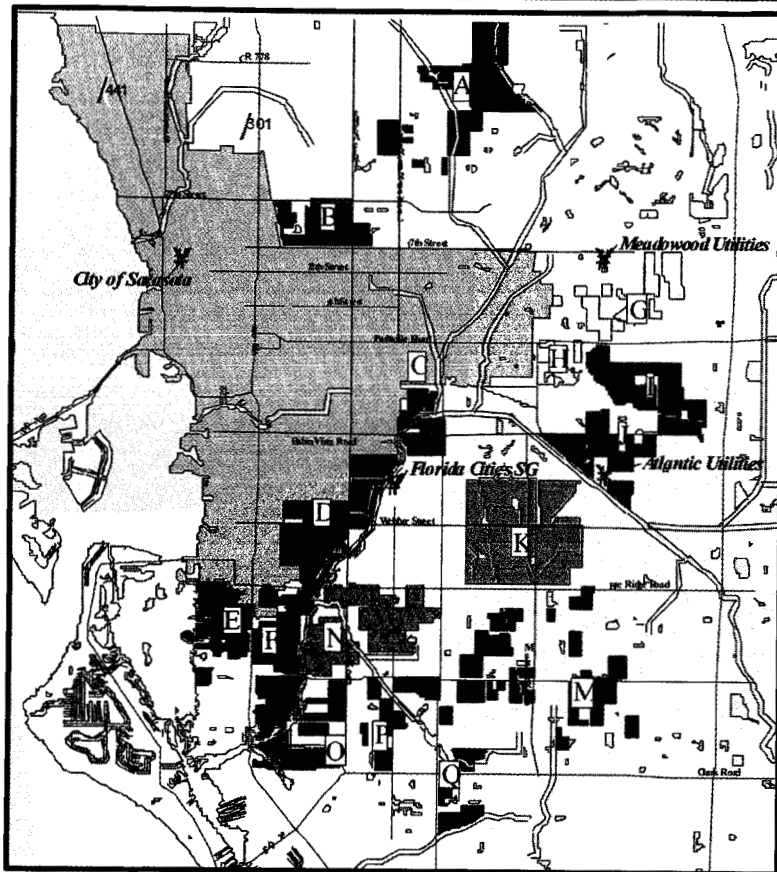
Significant improvements have occurred in wastewater treatment and disposal practices in the Sarasota Bay region in response to legislation enacted in 1990 that required all wastewater treatment plants to meet advanced wastewater treatment (AWT) standards for direct discharge to surface waters. Secondary treatment levels are at 20 mg/L (milligrams per liter), whereas AWT levels are at 3 mg/L for nitrogen removal. These higher standards for wastewater treatment in combination with water conservation policies have reduced nitrogen loadings to the Bay from wastewater by 80 percent because most of the Sarasota Bay area is sewered.

Achieving AWT standards at the City of Sarasota's plant in 1991 reduced the plant's nitrogen loading to the Bay by 80 to 90 percent, a 14-percent decline in nitrogen loadings Baywide. At the same time, Manatee County changed its wastewater disposal plant and installed a deep-well injection system, essentially removing Manatee County's discharge into the Bay. This action, combined with the city's upgrades, resulted in approximately a 50-percent decrease in nitrogen pollution in the central Bay. During this period many of Sarasota County's wastewater treatment plants were also upgrading to AWT or installing deep well injection systems, leading to significant pollution reductions in southern Sarasota Bay.

While not prominent Baywide, septic systems play a significant role in nitrogen loading in some Bay areas whose watersheds have concentrations of septic tanks, especially Roberts Bay, Blackburn Bay and Little Sarasota Bay. While properly functioning septic systems do not pose health problems, their primary function is that of minimizing health risks through reducing bacterial contamination rather than removal of nitrogen and phosphorus in effluent.



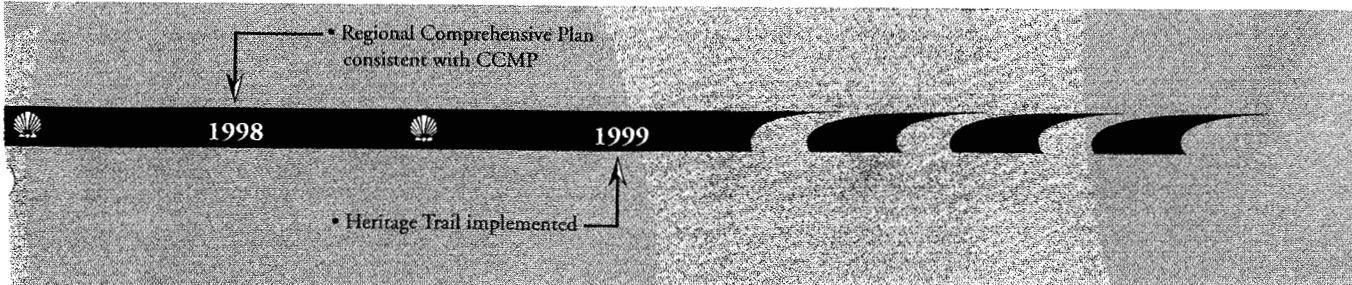
... Reducing Pollution by 47 Percent



Phase 1	2000 - 2002
E	
F	
Phase 2	2001 - 2003
A	
B	
Phase 3	2002 - 2004
C	
D	
Phase 4	2003 - 2005
N	
Phase 5	2004 - 2006
O	
P	
Q	
Phase 6	2005 - 2007
K	
Phase 7	2006 - 2009
I	
J	
M	
Phase 8	2007 - 2010
G	
H	
City of Sarasota	

In many areas of Sarasota County (see Map 2) septic systems cannot effectively treat wastewater, primarily because lot sizes are too small and water tables too high. Many areas were subdivided and developed prior to the promulgation of state rules governing septic tanks that require larger lot sizes, larger tanks and drain fields, and separation from the groundwater table.

Map 2.
Proposed implementation schedule by phase
for the Phillippi Creek Septic System Replacement Program.



...Replacing Septic Tanks

The Sarasota Bay Program was involved in documenting the widespread pollution in Phillippi Creek. These studies led the Sarasota County Health Department to post the creek as unsafe for swimming and human contact. The Sarasota County Commission has formally recognized the problems in the Phillippi Creek area and is pursuing central sewers for this area in response to these concerns. Based on analyses of water quality, soil type, lot size, water table separation and other factors, consultants selected by Sarasota County citizens have prioritized 10,000 to 12,000 septic systems to be replaced in north Sarasota County.

In November 1998, Sarasota County voters passed a one-cent sales tax extension that allocated \$28 million for the expected \$103 million septic replacement program; Congress appropriated \$1.5 million and the state \$500,000 for the same purpose in 2000. Sarasota County is currently pursuing addi-

tional state and federal funding to offset the costs to affected homeowners and has committed \$12 million in utility funds. The City of Sarasota is proposing annexation for the affected area primarily north of Phillippi Creek, and would offer sewer service among other amenities. The city's annexation plan would take advantage of excess capacity available at its wastewater treatment plant.

Reclaiming Wastewater on a Large Scale

Additional improvements in Bay water quality have been realized in response to water-conservation policies instituted regionally. Studies conducted by the Southwest Florida Water Management District (SWFWMD) indicate that potable water demands in the region exceed the safe yield by 50 million gallons per day (MGD), and that water levels in the Floridan aquifer have decreased by approximately 50 feet since the 1930s, primarily in central Manatee County due to overpumpage. This area of significant groundwater impact has been designated as the Southern Water Use Caution Area (SWUCA) and includes, among other counties, all of Sarasota and Manatee. The current goal of the SWUCA plan is to reduce permitted withdrawal.

The Sarasota Bay Plan recognized that efforts to reduce wastewater pollution must be integrated with water-supply needs to most

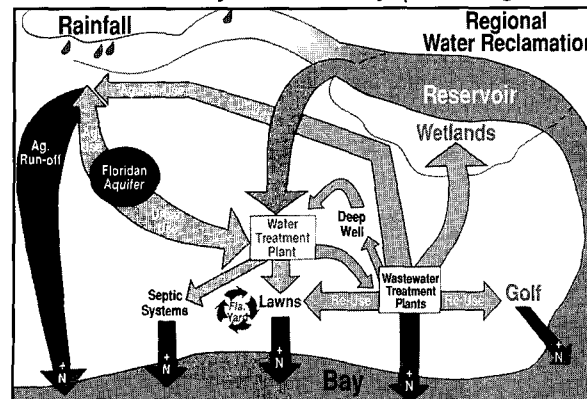


Figure 2. Regional water recovery options.

... Reclaiming Wastewater

efficiently use public funds and improve natural resources. The overall concept was to substantially reduce or eliminate discharge of wastewater throughout the region and to use this wastewater to offset withdrawals from the Floridan aquifer and reduce nitrogen pollution. The Sarasota Bay Program recommended the development of a regional wastewater reclamation system for Manatee and Sarasota counties.

In 1995, the SWFWMD Manasota Basin Board requested that a master water reuse plan be developed. A task force comprised of staff from Manatee County, Bradenton, Palmetto, the City of Sarasota, Sarasota County, Venice, the Sarasota Bay Program and SWFWMD evaluated options for a regional reuse system.

Studies funded by local governments, SWFWMD and the Sarasota Bay Program evaluated multiple storage scenarios and the regionalization of a reclaimed water system.

Currently, Sarasota County and the City of Sarasota have agreed to interconnect their reclaimed water reuse networks to provide for an extensive reuse system in northern Sarasota County. In conjunction with that regionalization, the Sarasota Bay Program has assisted the city and the county in completing reclaimed water aquifer storage and recovery feasibility studies associated with each system.

Manatee County has developed the Manatee Agricultural Reuse Supply (MARS). The overall goal of MARS is to develop a reliable re-

claimed water supply system to serve agricultural needs, thereby preserving a portion of high-quality water resources to meet demands for drinking water within Manatee County. The MARS system is expected to cost \$28 million, with half the funds to be provided by SWFWMD and the federal government.

Through extensive water resource and hydraulic analyses, it was determined that a reuse water interconnection between Sarasota and Manatee counties was not economically feasible at the present time. A separate, but regional, approach was selected, focusing on reuse systems around Bradenton-Palmetto, Sarasota and Venice and using aquifer storage and technology as a means of increasing reclaimed water capability.

SWFWMD has estimated that the Sarasota Bay region now reclaims 46 percent of its wastewater from treatment plants for reuse. This percentage will certainly increase in the future as the demand for water increases. In addition to the substantial environmental benefits achieved by removing this nitrogen source to the Bay, wastewater reuse may defer the construction of wellfields, reduce capital investment in potable water treatment and storage facilities, and reduce long-term groundwater impacts in the SWUCA. In essence, the region is working toward solving both water supply and nitrogen pollution problems simultaneously.

...Monitoring and Evaluating Air Quality

Through Scientific Modeling

In 1993, Sarasota Bay Program modeling efforts indicated that rainfall provided 26.5 percent of the total nitrogen load to Sarasota Bay. Given the magnitude of the loading and the fact that estimates were based upon data collected in Tampa, the Sarasota Bay Program recognized atmospheric deposition as a priority issue for further research and monitoring.

The impact of atmospheric deposition on the health of the Bay is being assessed through a multilayered approach: monitoring, algal response studies and airshed modeling.

The Sarasota Bay Program established an intensive atmospheric monitoring site on Lido Key on September 15, 1998, in accordance with the National Atmospheric Deposition Program and National Oceanic and Atmospheric Administration (NOAA) AIRMoN program. The site was monitored daily for rainfall samples on an event basis, and dry deposition (gas and particulate) samples were collected for a 24-hour period every six days. Results from the monitoring site indicate that atmospheric deposition is not as significant a nitrogen-loading source as originally estimated; revised estimates indicate that atmospheric deposition may provide approximately 14 percent of the total nitrogen input to Sarasota Bay.

The Sarasota Bay Program contracted with the University of South Florida to produce an atmospheric transport and deposition model

to better characterize the airshed of Sarasota Bay and determine potential sources and source areas. Results of the atmospheric model indicate that Sarasota Bay shares the same airshed as Tampa, and that utility emissions in Tampa are likely contributing to the nitrogen loading to the Bay. Nevertheless, the model also predicted that local mobile emissions are expected to be the major source, contributing 80 percent of the total atmospheric nitrogen load to Sarasota Bay. In Sarasota Bay, areas with the highest percentage of nitrogen loading from atmospheric sources exhibit the best water quality.

Two projects have been completed to determine the sources of nitrogen responsible for fueling primary productivity (algae) in different areas of the Bay and to determine if atmospheric loadings produce the same biological effects as point source loadings of nitrogen. Results indicate that concentrations found in local rainfall do not stimulate algal growth in Bay waters.

While the magnitude of atmospheric deposition is much smaller than originally estimated, atmospheric deposition remains a significant source of nitrogen. Because contributions have approximately doubled over the last decade, it is important that the significance of this source not be forgotten.

The Tampa Bay area has recently been determined to be in a non-attainment zone (Environmental Protection Agency classification for areas not meeting air quality standards) for

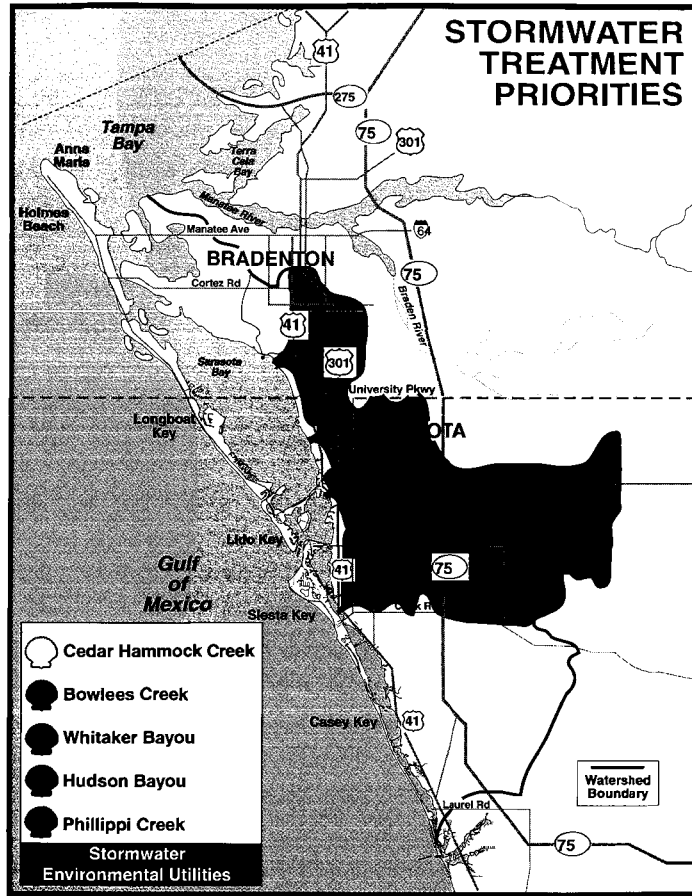
... Setting Stormwater Priorities

ozone; this determination will result in actions to reduce air pollution. The modeling indicates that pollutant-loading reduction achieved in the Tampa Bay area will only marginally impact loadings locally due to the influence of local sources; local mobile sources contribute 80 percent of the atmospheric nitrogen loading.

Reducing the Quantity and Improving the Quality of Stormwater Runoff

Stormwater is the most significant overall source of nitrogen pollution to Sarasota Bay since stringent wastewater standards have been enacted regionally. However, septic tanks along Phillippi Creek remain a major health issue and are potentially a significant source of nitrogen.

Stormwater runoff is now estimated to contribute 56 percent of the total nitrogen loading to Sarasota Bay, with 60 percent of the modeled stormwater nitrogen load originating from residential areas. In addition, while few toxic substances were found in the central Bay, heavy metals such as lead, zinc and copper were found at elevated levels in several creeks and bayous flowing into Sarasota Bay.



Map 3.



BOATS

Empty the holding tank at a designated pump-out station. Fuel carefully to avoid spills.

Retrofitting Watersheds

Implementing Master Plans

The Sarasota Bay Program has supported local efforts to improve stormwater conveyance and treatment system in the region, but the Sarasota Bay Program also recognized that nitrogen reductions from retrofits would be marginal, based on SWFWMD research, indicating that nitrogen-removal efficiencies in stormwater treatment systems are very low, while efficiencies for toxic substance removal are very high. Elevated levels of toxic substances have been found in five Bay tributaries and were given priority for treatment: Phillippi Creek, Hudson Bayou, Whitaker Bayou, Bowlees Creek and Cedar Hammock. Retrofitting those five watersheds will only result in a net nitrogen reduction of seven percent in Sarasota Bay, but should have a more significant impact on toxic loading.

Sarasota County established a Stormwater Environmental Utility in 1993 to develop a master plan for stormwater management in Sarasota County. Sarasota County has 27 separate drainage basins, ranging in size from several hundred acres to more than 50 square miles. Master plans for all basins are scheduled to be completed in 2001. Several stormwater projects have been completed in Sarasota County at Clower Creek and Aqualane Canal, and others are under construction.

A master plan for Phillippi Creek, the largest watershed in the Sarasota Bay area, has been developed and partially constructed.

The Celery Fields Regional Stormwater Facility for Phillippi Creek is nearing completion at an estimated cost of \$30 million. The Celery Fields Facility is expected to reduce flooding significantly, but will only remove less than 1 percent of the nitrogen load to the Bay. In Sarasota County, stormwater and flood control projects are also in progress for Hudson Bayou and Whitaker Bayou.

Unlike Sarasota County, Manatee County has not developed a stormwater utility at this time, and therefore does not have a dedicated funding source to design and construct stormwater treatment systems.

Considering Alternative Landscapes — Florida Yards & Neighborhoods

Stormwater from residential areas is estimated to contribute one-third of the total nitrogen load to the Bay. The Florida Yards & Neighborhood (FYN) Program was developed in 1993 to promote environmentally friendly landscaping with plants suited to the Southwest Florida climate, natural conditions and wildlife. Using these FYN principles, homeowners can reduce water, fertilizer and pesticide use while increasing habitat for wildlife. The Univer

**YOUR MAKE YOUR YARD
A "FLORIDA YARD"**
Create and maintain native
landscapes to enhance and
protect the natural environment.



... Creating Alternative Landscapes

sity of Florida's Institute of Food and Agricultural Sciences (IFAS), is developing the program throughout Florida through the counties' Cooperative Extension Services.

A series of educational materials about the Florida Yard Program and what homeowners can do to implement FYN principles have been developed, among them the Florida Yards & Neighborhoods Program Handbook.

In 1997, a Statewide Implementation Strategy was developed by a joint committee of Cooperative Extension Service agents and staff, IFAS staff and Sarasota Bay Program staff. Funding for a phased integration of the FYN Program throughout the state was approved. The FYN Program is now poised to reach out to the landscape and "green" industries, builders, developers and lending institutions to show the importance and economic benefits of alternative landscapes.

A series of 12 demonstration Florida Yards were constructed in the Sarasota Bay area to provide living models and educational information to residents. The models vary in size and complexity and offer a variety of Florida-friendly landscape designs.

In September 1998 the Sarasota Bay Program, Florida Yard Program, Manatee County and River Forest Residential Development hosted an event to introduce area developers, planners and lenders to FYN Program concepts. The FYN Program is now focusing on changing development practices locally.




*River Forest- Manatee County:
A Florida Yards & Neighborhoods landscape.*

Continuing to Improve Landscape Management Practices through Research

The Sarasota Bay Program has sponsored research from the University of Florida to conduct a project to demonstrate the measurable benefits that may be achieved by adopting Florida Yards & Neighborhood landscape and management principles. The project entails an evaluation of ornamental and traditional turf landscapes; it includes controlled and replicated plot study at the University's Fort Lauderdale Research and Education Center, and a field study at two waterfront homes on Orange Avenue within the City of Sarasota.

Instrumentation was installed in the FYN and turf plots and home lawns to measure nutrient levels in runoff and leachate resulting from irrigation and storms. The project was completed by summer of 2000.

Increasing Habitat

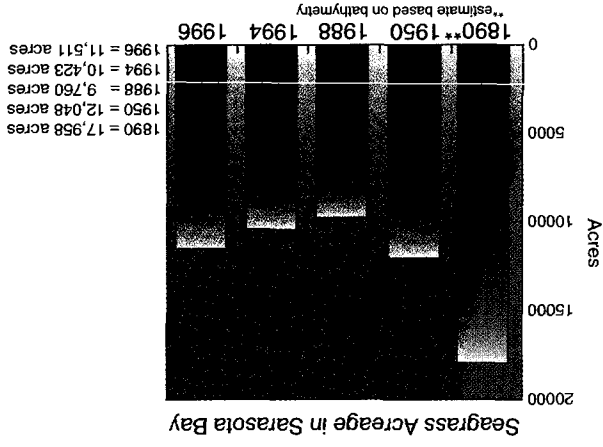
by Almost 2000 Acres*

The Sarasota Bay Program has focused on creating habitat to increase overall Bay productivity. These habitats include expansion of seagrass beds, creation of new wetlands and construction of artificial reefs.

Seagrass Communities

Seagrasses are among the most important habitats in Florida's estuarine environments, indispensable for the role they play in nutrient cycling, primary production, sediment stabilization and habitat for juvenile and adult finfish and shellfish.

Five species of seagrasses are common in Southwest Florida: *Halodule wrightii* (shoal grass), *Thalassia testudinum* (turtle grass), *Syringodium filiforme* (manatee grass), *Ruppia maritima* (widgeon grass) and *Halophila engelmannii* (star grass).
 The most-often-cited cause of seagrass decline and disappearance worldwide is human-induced nitrogen enrichment of nearshore waters. In Sarasota Bay, a decrease in seagrasses has been linked to increased nitrogen loads. The most sparse and least productive seagrass beds are found in waters that received the greatest nitrogen input.

Prior to 1988, the Bay had lost more than 30 percent of its seagrass beds due to declines in water quality and loss of productive Bay bottom from dredge-and-fill activities. Since 1988, the community has made significant progress in reducing nitrogen loads to Sarasota Bay, largely due to improvements in wastewater treatment and disposal practices along with the addition of stormwater retrofit projects and improved agricultural practices. SWFWMD has been responsible for mapping and assessing trends in seagrass distribution in Sarasota Bay. Data generated from that ongoing monitoring effort are being used to assess the effectiveness of pollutant load reduction strategies on water quality, and the results of the pollutant load reductions appear encouraging.



*Figure 2. Increases in seagrass since 1989. 1999 data is under review indicating a 10% decline.

... Expanding Seagrass Coverage by 1,751 Acres

Seagrasses have expanded by 1,751 acres, or 18 percent, from 1988 to 1996. Data released at publication indicated a 10 percent decline in overall seagrass coverage from 1996 to 1999; this data is under review due to reported differences in methodology related to photographic interpretation and resolution. Field observation as well as the expansion of continuous seagrass beds shown in the new data suggest that seagrasses have continued their resurgent recovery.

While seagrasses have made a dramatic recovery, portions of the Bay have responded uniquely. The largest increase in seagrass acreage has occurred in the Manatee County portion of Sarasota Bay, where seagrass beds have steadily expanded by 810 acres (14.8 percent) from 1988 to 1996. Seagrass beds in the Sarasota County portion of Sarasota Bay have also experienced dramatic increases (669 acres), but the recovery there has been even more resurgent (22.7 percent from 1994 to 1996, or 35.1 percent from 1988 to 1996). Most of the increases in Sarasota Bay have occurred along the deep (greater than 1 meter) edges of existing seagrass beds, indicative of improving water quality and clarity.

Little Sarasota Bay also experienced a resurgence of seagrass beds (34.6 percent) from 1988 to 1996. However, extensive unvegetated shallow water bottom still exists in Little Sarasota Bay, which has the potential to support even more seagrass.

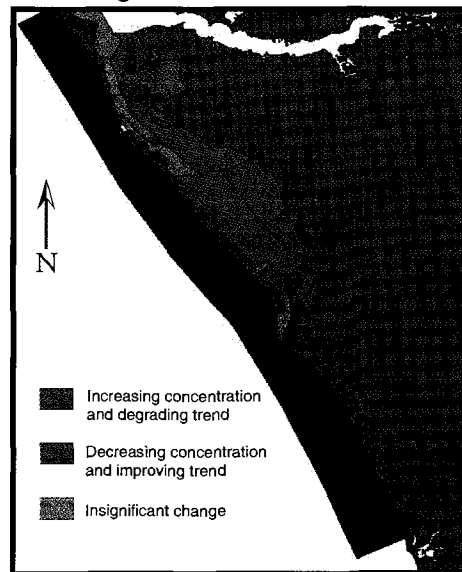
Seagrass monitoring in both Roberts and Blackburn bays has not indicated the dramatic increases observed in other segments of the Sarasota Bay system. From 1988 to 1996, seagrasses in

Blackburn Bay actually declined by nine acres, or 2.1 percent. Seagrass in Roberts Bay increased by 27.8 acres, or 8.4 percent, during the same period. Anna Maria Sound seagrasses have increased by 68.9 acres, or 6.2 percent.

The 1,751-acre, or 18-percent, increase in seagrass beds Baywide represents a recovery of 45 percent of historical losses that had occurred from 1950 to 1988.

Improving Water Quality ...

Sarasota Bay water quality status and trends have been evaluated for the periods 1968-98, 1983-98 and 1989-98, utilizing a Bay segmentation scheme whereby water quality data are grouped into 16 geographic Bay segments and one off-shore segment.



Trends in the concentration of nitrogen in Sarasota Bay waters from 1968-1998.

... Improving Water Quality

Northern Bay segments, along with the southern half of Little Sarasota Bay, have experienced significant declines in inorganic nitrogen concentrations. Instances of elevated inorganic nitrogen (greater than 0.5 mg/L) declined dramatically in the eastern portion of the Bay along the City of Sarasota shore after about 1991, when the city completed its advanced wastewater treatment program and reduced its discharge and total load to Sarasota Bay. Expansion of wastewater reuse and reclamation has also led to significant reductions in discharge to Sarasota Bay.

Increasing trends in dissolved inorganic nitrogen concentrations were noted for the area around Lido Key and in Roberts Bay and northern Little Sarasota Bay. For northern Little Sarasota Bay, maximum values generally increased through 1995; however, no trends coincident with the closure of Midnight Pass were observed.

Total nitrogen concentrations significantly declined in 12 of 16 Bay segments, including Little Sarasota Bay, and were observed to have increased only in the offshore Gulf of Mexico segment. Research is proposed to characterize trends in Gulf of Mexico water quality next year. In Palma Sola Bay, the allocation between organic and inorganic nitrogen changed substantially, with increases in organic nitrogen and decreases in inorganic nitrogen; these

patterns are consistent with algal uptake and an observed increase in Chlorophyll *a* for this segment.

Phosphorus trends typically paralleled trends in total nitrogen, with significant decreases observed in 10 of 16 segments.

Water transparency has improved throughout most of Sarasota Bay. Secchi depth measurements, a technique to measure water clarity, have increased in 10 of 16 bay segments and were generally accompanied by significant declines in either turbidity, suspended solids, color or chlorophyll. In Big Sarasota Bay, Secchi depths have improved from a mean of 1.1 meters to 1.5 meters between 1987 and 1996. More importantly, the percentage of Secchi depth measurements that exceeded 1.5 and 2.0 meter depths increased by approximately 7 and 21 percent, respectively.

Unfortunately, declines in Secchi disk depth (water transparency) were significant in the offshore Gulf segment and in the Bay area east of Longboat Pass. This decline in water quality was most notable between 1990 and 1995 and was accompanied by significant trends in increasing suspended solids and color. Gulf Secchi depths decreased from a mean of 4.7 meters in the 1970s to 3.2 meters in the 1990s and were accompanied by an increase in total suspended solids. Several beach renourishment projects were conducted

... Enhancing Wetlands by 200 Acres



Water-quality monitoring is accomplished by the use of secchi depth measurement technique.

along Anna Maria and Longboat Key in the 1990s, and the new supply of unsorted sediments may have contributed to these observed declines in water quality.

Increasing Wetland Habitat ...

Saltwater wetlands are important in the Bay system as critical nursery habitat. Mangroves are the predominant wetland species in Sarasota Bay, providing essential benefits such as food and shelter for aquatic life, pollutant filtration, freshwater water flow regulation, preferred nesting and habitat sites for native bird populations, and protection from shoreline erosion.

Studies around the world have clearly documented the degree to which various fish and marine life depend on wetlands as nursery areas. These studies have shown that wetland and mangrove shorelines harbor many more juvenile fish and crustaceans than developed shorelines, dredged channels or bare bottom.

Estimates of fish densities in mangrove areas range up to 161 fish per square meter of mangrove root habitat.

Wetlands are the foundation of a complex marine food chain. Leaves and other plant parts from mangroves and other wetland plants drop into tidal waters and are colonized within a few hours by marine fungi and bacteria, which in turn become food for the smallest animals – worms, snails, shrimp, mollusks, barnacles, oysters, clams and even mullet. These animals then become a food source for larger carnivores, including crabs, fish, birds and man. Many species of fish normally found outside the Bay depend upon mangrove and other wetland habitat as juveniles. Data from studies in other areas suggest that wetland and mangrove prop-root habitat may be as important as seagrass for juvenile species. Moreover, diverse assemblages of continuous habitat, such as mangrove roots, shallow seagrass beds and deep seagrass beds, may be utilized by different life stages of a single species, such as snook.

Studies conducted by Mote Marine Laboratory indicate that the Sarasota Bay area has lost about 39 percent of its tidal wetlands since 1950, with the remainder fragmented and altered from mosquito ditching, dredging, filling and excessive pruning. In 1996, the Sarasota Bay Program funded work that identified areas throughout the region suitable for

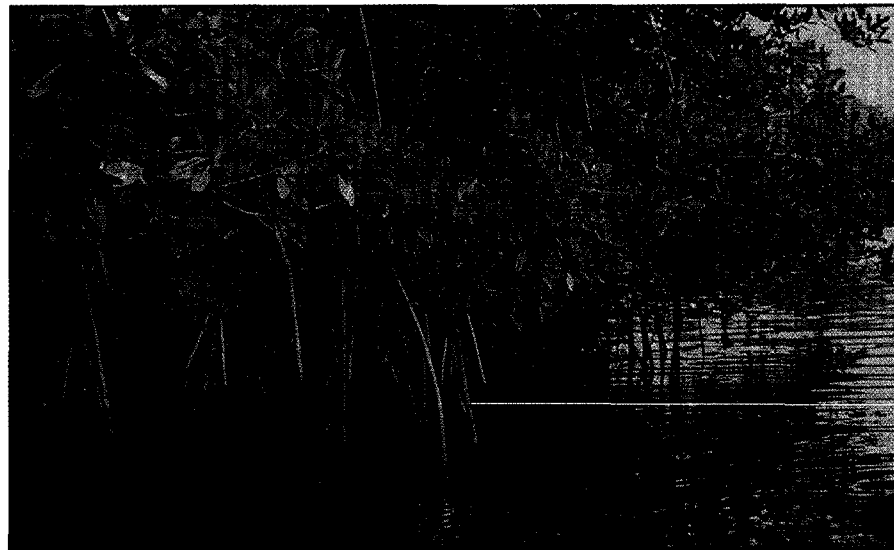
Restoring the Bay ... Identifying Nurseries

restoration and in public ownership. Subsequently, the community has embarked on a number of successful projects to restore those habitats, and many more projects are planned.

The Sarasota Bay Program is in the process of identifying and mapping nursery areas in the Bay that are of critical importance for sustaining fish and shellfish populations and assessing artificial reef and wetland restoration efforts. These projects will provide data to identify critical habitat for protection and restoration and quantify the numbers of various marine life supported by differing habitat components so the benefits of artificial reef and wetland restoration projects may be maximized locally.

The Sarasota Bay Program initiated several Early Action Demonstration Projects in 1991. The purpose of these projects was to test, on a small scale, innovative methods for restoring habitats and determine potential costs associated with larger restoration projects. Many of the techniques used while developing and implementing these model projects have been applied throughout Sarasota Bay and Southwest Florida. Based on the results of these projects and others in the Tampa Bay area, the Sarasota Bay Program recommended large scale enhancement of wetland habitats throughout the Bay. To date, \$8.5 million has been committed by the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, the

Manasota Basin Board of the Southwest Florida Water Management District and the West Coast Inland Navigation District.

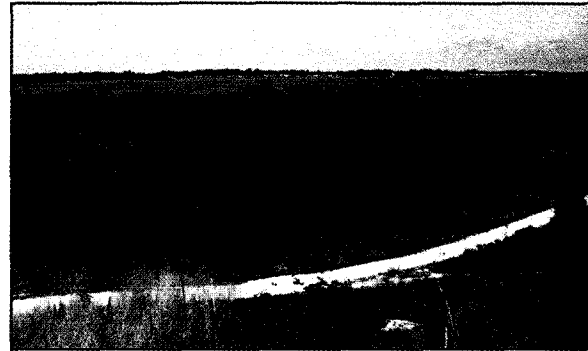


The Red Mangrove is an essential component of the bay system ecology.

... Creating Wetlands



Wetland construction in Manatee County.



Leffis Key.

Enhancing and Creating Wetlands

Habitat restoration in the Sarasota Bay area generally involves removal of exotic vegetation from a designated site, excavation of intertidal lagoons to create juvenile fish nurseries and altering land elevations to support native habitat. With the help of volunteers, the newly created shorelines are planted with native marsh grasses such as cordgrass (*Spartina alterniflora*) and upland vegetation as appropriate. It is estimated that available funds will enhance about 14 percent of lost wetlands in the Bay. More specifically, wetland enhancement projects typically involve:

- Removal of exotic and nuisance vegetation such as Brazilian pepper, Australian pines, cattails, punk tree and carrotwood.
- Excavation of tidal lagoons.
- Creation of tidal wetlands, upland habitats, beach dunes, mangrove lagoons and grassy shoals based on site conditions.
- Reestablishing native plants; as many as 50,000 native plants have been introduced at some sites.
- Creation of productive shorelines.
- Preservation of rare and endangered species of flora and fauna.
- Creation of natural filtration ecosystems to reduce stormwater runoff to the Bay.
- Creation of artificial reef structures.
- Removal of dredge-and-fill spoil where appropriate for a more beneficial use.
- Encouragement of public access and education through construction of board walk and nature trails, walkways, overlooks, interpretive signage and boat ramps.



TRASH THE TRASH

Trash is unsightly
and dangerous to wildlife.
Deposit all litter in a trash
can or recycling bin.

... Wetland Enhancement Projects

Projects Completed or with Funds Awarded

Sarasota BayWalk at City Island (H1)

The Sarasota BayWalk, a six-acre park, is visited by more than 20,000 people each year. Grants awarded: \$200,000.

Coquina BayWalk at Leffis Key (H2)

Leffis Key, a 35-acre park, is featured in the *Florida Wildlife Viewing Guide*. It was also featured in the June 1993 issue of *Good Housekeeping*. In 1993, this project won an Environmental Excellence Award from the Florida Marine Research Institute. Grants awarded: \$315,000.

Bayfront BayWalk at Sixth Street and Sarasota Civic Center Restoration (H3)

This six-acre project was included in the City's master plan to enhance the downtown Bayfront area, and is a part of the downtown BayWalk. Grants awarded: \$130,000.

Quick Point Nature Preserve (H4)

This 34-acre park on the southeastern tip of Longboat Key features a beautiful vista of the Bay. Grants awarded: \$300,000.

Caples Shoreline Naturalization — University of South Florida — (H5)

This one-acre site demonstrated the effectiveness of removing a seawall to create more natural shorelines. Grants awarded: \$10,000.

Selby Shoreline Restoration Project (H6)

This project naturalized the Selby Gardens Bayfront. A new education exhibit to inform visitors about the restoration project is on display at the Learning Center. Grants awarded: \$30,000.

Sister Keys (H9)

These keys are the largest remaining open-water, mostly mangrove islands between Tampa Bay and Charlotte Harbor, and their associated seagrass beds constitute one of the largest communities in the Sarasota Bay area. Future plans call for the removal of exotic vegetation. Grants awarded: \$50,000.

Joan M. Durante Community Park (H10)

This beautiful 35-acre park features reclaimed wetlands, nature trails and a gazebo. Six Grants awarded: \$350,000.

The project will involve habitat enhancement on the park's south side. Grants awarded: \$600,000 (\$350,000 federal/state agencies; \$250,000 Town of Longboat Key).

Leffis Key-North (H11)

This project extends the Bayside lagoon 800 feet northward and connects it with the channel located adjacent to the public boat ramp. Grants awarded: \$125,000 (in cooperation with Manatee County and Mote Marine).

21 Projects and 50 Grants

Hog Creek (H12)

This project will restore approximately four acres of wetland and shallow water habitats in downtown Sarasota. Grants awarded: \$975,000.

Proposed:

Bird Colony Islands (H7)

The Bird Colony Islands, located east of the Intracoastal Waterway (ICW), constitute one of the two largest bird colonies between Tampa Bay and Charlotte Harbor. The islands have suffered substantial erosion, primarily from boat wakes. Future plans include erosion protection and stabilization.

1912 School House and Preserve (H8)

This site contains a saltwater lagoon that has lost its connection to Sarasota Bay. The area has also been invaded by exotic vegetation. Future plans include re-establishing the interconnect between the Bay and tidal pools, exotic removal and planting.

Quick Point Nature Preserve — North (H13)

This project will expand exotic-control efforts over the remaining 22 acres of beach strand, transitional wetlands and mangrove habitat.

Palmer Point Park (H14)

This project would support exotic control efforts near the former Midnight Pass site.

Jim Neville Marine Preserve (H15)

The Jim Neville Marine Preserve is one of the largest publicly owned parcels available for enhancement in Sarasota Bay. Sand from the Island may be placed on Siesta Key to create dunes on the beach front.

Palmer Point Park (H16)

This project would remove dredge spoil (sand) from the area and create a series of sand dunes on Casey Key.

Skiers Island and Bird Colony Islands (H17)

Significant opportunities exist to improve habitat on these islands.

Big Edward's Island (H18)

Big Edward's Island is located in Robert's Bay just south of the Siesta Key bridge. Restoration concepts are proposed to maintain recreation while enhancing habitat.

Little Edward's Island (H19)

This project would enhance habitats on the island.

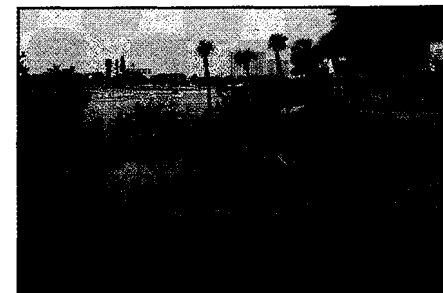
Perico Bayou (H20)

This project proposes to reconnect Palma Sola Bay and Perico Bayou.

"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 intangibles: the gleam on the white sand, the softness of southwest winds, pink and turquoise sunsets, and the abiding simplicity of its people."— The Mangrove Coast, Karl A Bickel © 1989



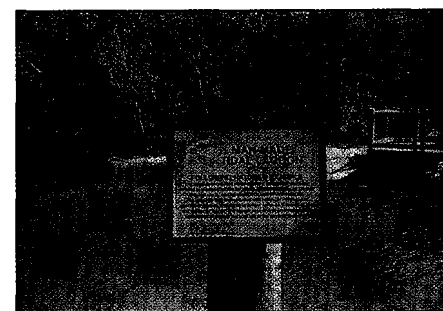
Map 5.



Selby Shoreline Restoration Project



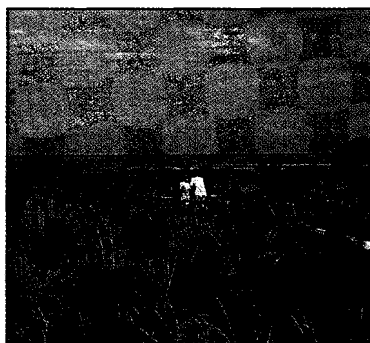
Quick Point Nature Preserve



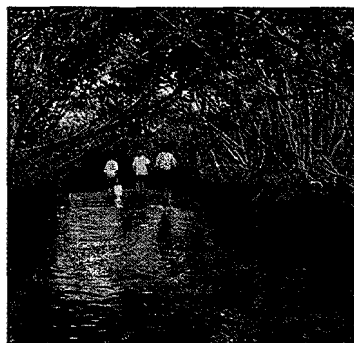
Restoring the Bay



Sister Keys



Leffis Key



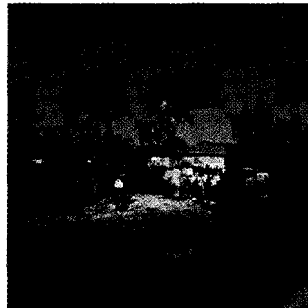
Grassy Point Preserve



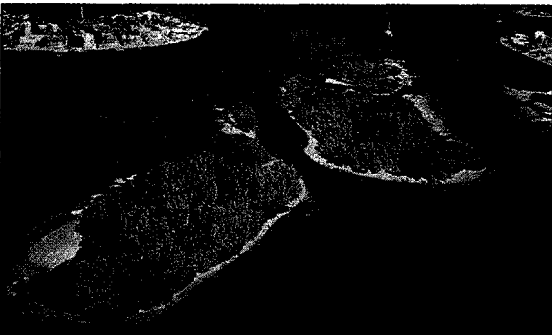
Sarasota BayWalk at City Island



Boardwalk at Sarasota BayWalk



Durante Park



Little Edward's Island



1912 School House Preserve



Cortez Fishing Village

Acquiring Sensitive Lands

To Protect and Preserve...

A second feature of the Bay restoration plan is preservation and protection of wetlands through land acquisition. The Sarasota Bay Program has supported efforts regionally to purchase key parcels of land; once these lands are acquired, funds will be pursued for enhancement.

The 1912 Cortez Schoolhouse and Nature Preserve (Manatee County) (L1)

This land-acquisition project entails preserving, protecting and restoring 2.85 acres of environmentally sensitive wetland area. The site contains a historically significant structure, the 1912 Cortez Schoolhouse, in the Village of Cortez. Grants awarded: \$350,000.

Sister Keys (L3)

Sister Keys consists of four islands located off the northeast tip of Longboat Key. This island complex was purchased by the Town of Longboat Key in 1992 for \$975,000.

Hog Creek (L4)

Two parcels of land were purchased on the west side of U.S. 41 adjacent to Pioneer Park for the purpose of creating habitat. Hog Creek will be enhanced from Coconut Avenue to the Bay. Grants awarded: \$500,000.

Grassy Point (L5)

This project entails preserving and protecting an environmentally sensitive 37-acre wetland area featuring 3,000 feet of vital mangrove habitat shoreline. The project, named Grassy Point Preserve, consists of mangrove swamp, tidal flat, oyster bars, tidal estuarine creek with mangrove canopy and seagrass beds. The acquisition of this parcel will protect wildlife and natural vegetative communities and preserve and protect the last significant undeveloped waterfront parcel remaining on Anna Maria Island. Grants awarded: \$713,350.

Constructing Artificial Reefs

Sarasota Bay Program studies documented the significant amount of Bay bottom habitat that had been dredged and filled (4,800 acres). It was determined that many of these acres could not be restored. To compensate for these losses, artificial reefs specifically designed to support juvenile fish were developed to achieve these goals.

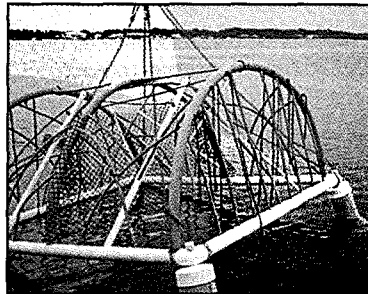
Through a regional task force, the use of reef balls and floating polyvinyl chloride (PVC) reefs emerged to create new habitat (floating reefs can be used when the bottom sediments are too soft to support reef balls and rubble). Preliminary tests on both indicate high success in supporting fish populations and providing habitat (see above).

... Creating Reefs

Sarasota Bay Program studies of Reef Ball™ and PVC reefs indicated colonization of the reef habitats was rapid. All surfaces were well covered in a layer of epifauna within three months. Barnacles began settling immediately; the base layer of barnacles became covered with layers of various organisms such as tunicates, encrusting sponges, hydroid colonies and algae. Micro-crustaceans such as small mud crabs and amphipods were very abundant, and easily observed by disturbing the larger epifauna. Fish of various sizes were observed at all sites, although the larval and juvenile stages were more abundant at the PVC reefs; this preponderance of juvenile species was likely due to the greater complexity of spaces on the PVC reefs. In addition, invertebrates, algae, fish and bottlenose dolphins were observed in the vicinity of the reefs. These reefs have increased productivity and are also having a positive effect on the sediment structure. Additional stud-

ies initiated in 1999 by the Sarasota Bay Program will further document reef performance as habitat providers.

The Sarasota Bay Program has supported the development of reef testing and permitting, and is presently funding reef construction and deployment. Reefs are being constructed to provide habitat and decrease user pressure on natural reefs and protect juvenile fish from predators. Four overall reef categories were described in the master plan: bay reefs, seawall reefs, channel marker reefs and dredge hole reefs.



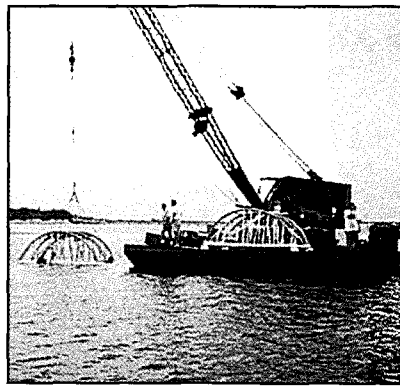
PVC artificial habitat enhancement modules being deployed into Sarasota Bay.



Reef Balls™ awaiting deployment.



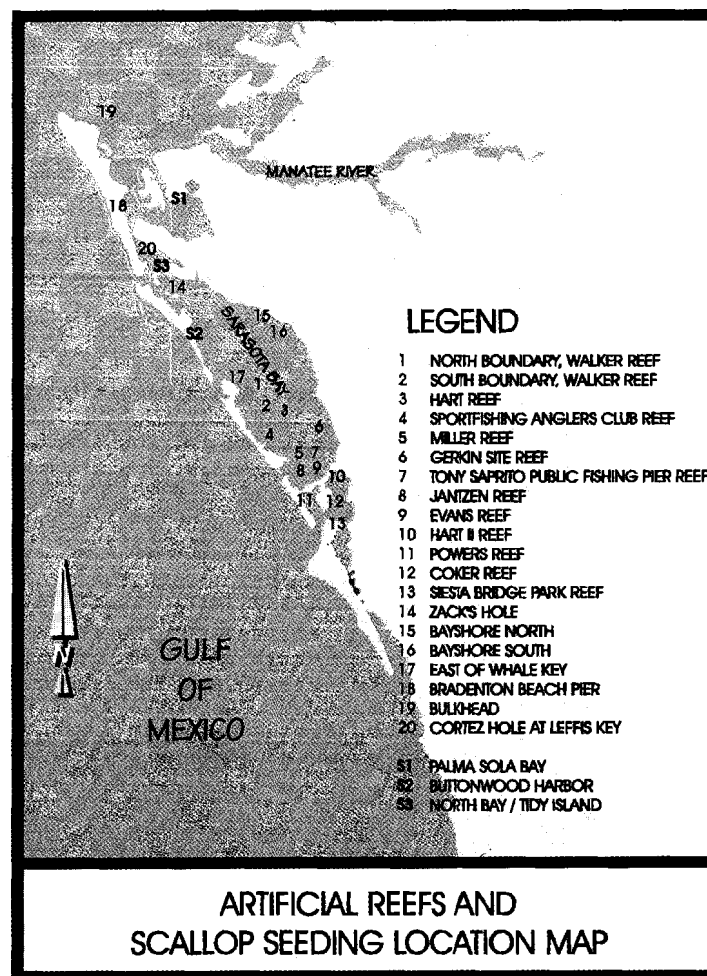
Reef Balls™ being placed in Sarasota Bay.



Bay Reef Project Sites

Master Planning

Twenty Bay reef projects have been identified and are being implemented through an artificial reef master plan. A listing of those reefs is shown below:



- Site 1: North Boundary of Walker Reef (Lat: 27 22.523 Long: 82 35.582)
- Site 2: South Boundary of Walker Reef (Lat: 27 22.00 Long: 82 34.56)
- Site 3: Hart Reef (Lat: 27 22.00 Long: 82 34.56)
- Site 4: Sportfishing Anglers Club Reef (Lat: 27 21.08 Long: 82 35.883)
- Site 5: Miller Reef (Lat: 27 20.11 Long: 82 33.265)
- Site 6: Gerkin Site Reef (Lat: 27 20.208 Long: 82 33.265)
- Site 7: Tony Saprito Fishing Pier Reef (Lat: 27 19.885 Long: 82 33.464)
- Site 8: Jantzen Reef (Lat: 27 19.65 Long: 82 33.92)
- Site 9: Evans Reef (Lat: 27 19.66 Long: 82 33.53)
- Site 10: Hart II Reef (Lat: 27 18.80 Long: 82 33.292)
- Site 11: Powers Reef (Lat: 27 18.80 Long: 82 34.35)
- Site 12: Coker Reef (Lat: 27 18.61 Long: 82 32.61)
- Site 13: Siesta Bridge Park Reef (Lat: 27 19.790 Long: 82 32.921)
- Site 14: Zack's Hole (Lat: 27 25.67 Long: 82 38.42)
- Site 15: Bayshore North (Lat: 27 24.5 Long: 82 36.1)
- Site 16: Bayshore South (Lat: 27 23.9 Long: 82 35.62)
- Site 17: East of Whale Key (Lat: 27 23.5 Long: 82 36.25)
- Site 18: Bradenton Beach City Pier (Lat: 27 27.99 Long: 82 41.65)
- Site 19: Bulkhead (Lat: 27 33.2 Long: 82 42.4)
- Site 20: Cortez Hole at Leffis Key (Lat: 27 27.9 Long: 82 37.00)

Alternative Reefs Seawalls and Reefs

In a demonstration project conducted by Mote Marine Laboratory for the Sarasota Bay Program, small artificial reefs were placed adjacent to seawalls along Longboat Key. The small reefs were successful; more than 100 times the number of juvenile fish were observed in comparison to seawalls without the reefs. As a result of this project's

Map 6.

... *Alternative Reefs*

success, miles of Bay shoreline could become a better home for marine organisms. The Sarasota Bay Program will promote seawall reefs in the year 2001 by working with several Bayfront communities to install the reefs.

Channel Marker Reefs

Sarasota County has an ongoing channel-marking program and a policy which states that, when possible and feasible, BayBalls (reefs) will be deployed at the base of markers when new or replacement markers are installed. Sarasota County has identified and prioritized approximately 300 channel marking sites for Reef Ball™ deployment. Manatee County is in the process of developing a channel-marking program based on the success of Sarasota County's program.

Dredge Hole Reefs

The Sarasota Bay Program's research identified more than 4,800 acres of bottom that have been altered through dredging activity or other associated coastal development activity. Dredge-and-fill operations typically were conducted as a means of creating waterfront property. The dredging often resulted in pockets of water with depths of 12 to 18 feet in otherwise shallow Bay areas. In some cases, subtidal canals were created to serve as boat access; in others, the Bay bottom was dredged only for fill material, with the resultant hole serving no navigational function. Many of these areas were originally productive seagrass beds.

When such holes were created in areas of poor circulation, they in time accumulated fine particulate sediment and organic material, often four or more feet thick. The net result was a bottom habitat very different from the natural Bay bottom, one that can exhibit anoxic sediments and no oxygen, and usually supports very little plant or animal life. These areas also contribute to other Bay quality problems by acting as a long-term source of turbidity during storms or when propeller wash from boats disturbs the bottom.

A number of these holes can be found within Sarasota Bay; one of the largest is south of Cortez Bridge off Anna Maria Island near Leffis Key. Three different types of artificial reef habitats were utilized at this dredge hole: Reef Balls™, a PVC design similar in shape to a Christmas tree and a square floating PVC module designed to rest just above the bottom.

The reefs have increased productivity and are having a positive effect on the sediment structure by slowly creating hard bottom as barnacles and other mollusks are chipped off by other marine life and settle. This unique application of artificial reefs to enhance Bay bottom habitat is now being implemented where other anomalous sites occur within Sarasota Bay, including a site off downtown Sarasota (see Map 6, site 6).

Increasing Fishery Stocks



...by Millions of Fish, Crabs and Shrimp

Studies conducted through the Sarasota Bay Program documented the overall decline in the recreational and commercial fishery in Sarasota Bay. These studies concluded that sea trout landings, the most extensively documented species, were approximately 50 percent of historic levels. It was also determined that the average fisher in the Bay catches one keeper trout for every eight hours of effort.

The Sarasota Bay Program restoration strategy for fisheries focuses on increasing fishery habitat and Bay productivity rather than increased regulation and management given the stringent fishery regulations (catch, bag and size limits) and the in-shore net ban.

Researchers from the Florida Marine Research Institute have documented a three-fold increase in adult female mullet of spawning age since the net ban went into effect in 1995. In addition, catch, bag and size limits have continued to evolve and be modified.

As previously mentioned, seagrasses have expanded by 1,751 acres since 1988. Based upon projections of faunal (marine life) utilization surveys conducted for the Sarasota Bay Program by Mote Marine Laboratory, the 1,751-acre increase in seagrass beds is expected to provide habitat for 330 million more shrimp, 110 million more fish and 71 million more crabs (pri-

marily juveniles) than existed in 1988. Wetland restoration and artificial reef projects also serve to increase and enhance available habitat. Together, almost 2,000 acres of new habitat have been created to support fisheries.

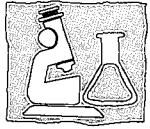
Scallop Seeding and Enhancement

Bay scallops are thought to have largely disappeared from Sarasota Bay in the 1960s as a result of water-quality degradation and habitat declines. An early-action demonstration project conducted by Mote Marine Laboratory for the Sarasota Bay Program in 1993 indicated that scallops could be spawned in certain areas of the Bay.

With the improvement in water quality and resurgence of seagrass beds in Sarasota Bay, the Sarasota Bay Program sponsored efforts to reestablish a natural breeding population of bay scallops in Sarasota Bay in 1999. Seventy scallops were collected from Sarasota Bay and spawned in the laboratory by the University of South Florida. Subsequently, approximately 20,000 juvenile scallops were transferred to Mote Marine Laboratory for deployment, monitoring and maintenance in the field.

The study documented several issues that will need to be addressed prior to establishing a successful scallop stocking program, including high mortality of caged scallops thought to be due to fouling of the scallop shells by organisms such as barnacles and oysters.

... Continuing to Conduct Research



40 Studies Completed

The Sarasota Bay Program has provided funding to conduct a wide variety of research and technical studies to support improved management and restoration of the Bay. A listing of those studies is shown below:

- Establishment of Bay boundaries for data collection and comparison.
- Sarasota Bay water quality monitoring program.
- Water and sediment quality characterization.
- Bivalved shellfish contaminant assessment.
- Three-dimensional water circulation and flushing model for Sarasota Bay.
- Modeling the effect of Manatee River discharge on Sarasota Bay water circulation.
- Modeling nutrient load reductions on Roberts Bay and Little Sarasota Bay.
- Mapping and characterizing fresh and salt water wetlands within the Bay watershed.
- Implications of sea-level rise on the Sarasota Bay region.
- Mapping and assessment of disturbed Bay bottom and seagrass habitat.
- Monitoring and mapping seagrass coverage in Sarasota Bay.
- Assessment of fishery resources (commercial and recreational catch) for Sarasota Bay.
- Fish species identification.
- Sarasota Bay fish species and abundance characterization — trawl and seine survey.
- Recreational fishery survey—catch composition and effort.
- Point- and nonpoint-source pollutant-loading assessment for Sarasota Bay.
- Sarasota Bay recreational access and use assessment.
- Importance of different light attenuators on Bay water clarity, seagrass distribution and health.
- Analysis of trends in water quality parameters for Sarasota Bay, 1968-89.
- Analysis of trends in water quality parameters for Sarasota Bay, 1968-99.
- Assessment of hypoxia (low oxygen) in Bay water on seagrass and fish, crab and shrimp abundance.
- Modeling atmospheric transport and deposition of nitrogen emissions to Sarasota Bay.
- Monitoring nitrogen concentrations in air and rainfall deposited to Sarasota Bay.
- The effects of nitrogen in rainfall on algal growth in Bay and Gulf waters.
- Tracing nitrogen sources that stimulate algal growth in the Bay with stable isotopes.
- Denitrification study of Phillippi Creek as an indicator of nitrogen pollution.
- Identifying sources of metal, hydrocarbon and pesticide pollution in Bay tributaries.
- Demonstrating the measurable benefits achieved by adopting Florida Yards & Neighborhoods Program.
- Assessment of seawall reefs for providing fish habitat.

- Assessment of alternative artificial reefs for disturbed and soft Bay bottom.
- Scallop survival and spawning assessment in Pansy Bayou.
- Large scale scallop spawning, seeding and enhancement project.
- The role of Little Sarasota Bay as nursery area for fish, crabs and shrimp.
- Monitoring Phillippi Creek waters for the presence of human viruses.
- The feasibility of regional wastewater reuse and reclamation system.
- Feasibility of Aquifer Storage and Recovery (ASR) for wet-weather storage of wastewater.
- Report summary of wastewater reclamation and reuse studies conducted for the Sarasota Bay region.
- Surveying the numbers of fish, shrimp and crabs that use seagrass beds as habitat.
- Assessment of seagrass planting and restoration in Sarasota Bay.
- Assessment of seagrass marking for boater avoidance.
- Midnight Pass feasibility study.
- Monitoring Bay water for the pesticide malathion during the Mediterranean fruit fly eradication program.



Developing Environmental Stewardship ...

The Sarasota Bay Program has been involved in environmental education since 1989 with the preparation of reports, educational signage, development of curriculum for schools, public workshops and community activities.

Using the Gulf Coast Heritage Trail to Promote Stewardship

The program began developing a more systematic approach to environmental education in 1996. The Sarasota Bay Program has worked with the National Park Service and community leaders to develop and implement the Gulf Coast Heritage Trail (GCHT) to meet this objective.



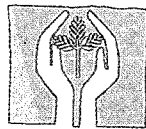
A Gulf Coast Heritage Trail auto tour route.

... Stewardship and Involving Citizens



In 1997, the Sarasota Bay Program's educational programs related to habitat (wetlands, fisheries and boating) were consolidated within the GCHT. A linked system of natural, cultural and historic destinations surrounding the Bay was developed; it includes an auto tour route and illustrated brochure, road and interpretive signage and a blueways guide and chronicle. "Something for everyone" might be the theme for the Gulf Coast Heritage Trail. Along the Trail, sites are designed to be enjoyed by audiences of all ages and interests.

The Sarasota Bay Program is pursuing funding for environmental education at each point of interest surrounding the Bay to enhance stewardship.



Involving Citizens in Bay Restoration

Recognizing that people can be part of solutions, the Sarasota Bay Program's Citizen Advisory Committee developed Actions Plans in 1993 and 1994 and is presently working on one for 2000 to better inform the public. Highlights of this program include:

- Sarasota Bay Program staff presentations to clubs, civic and neighborhood associations and conservation groups.
- Agency partnerships and cooperative matching grant programs targeted to habitat restoration projects.
- Environmental education programs funded for Manatee and Sarasota counties' 55,000 public school students
- Dissemination of information through brochures, newsletters, reports, videos, media coverage including local radio and television stations, speakers' bureau, interpretive signage, public workshops and promotion of public access sites.
- Bay Partners Grants

The Sarasota Bay Program focuses on science-based management criteria to provide the local community with accurate and current information on which to base its decisions and action plans. Studies indicate that whether we live, work or recreate in the region, each indi-

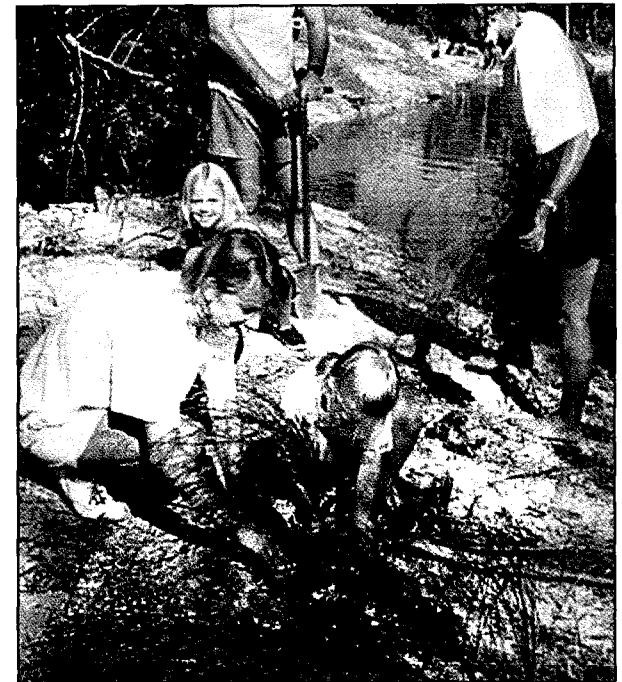
... Bay Partner Grants

vidual contributes to the Bay's problems and can reap the benefits of the Bay's successes. The citizen's role in preserving the Bay's health continues to be threefold: to advocate appropriate government decisions made by elected local, regional and state representatives; to make lifestyle changes necessary to protect the Bay; and, when possible, to participate in Bay education and improvement projects and encourage others to help in restoration and preservation efforts.

Examples of Bay Partners Grants and Public Outreach Activities:

- Habitat restoration site tours
- Exhibits at Mote Marine and the Gulf Coast World of Science and traveling display
- Stormwater coloring books and "Paint the Way to a Better Day"
- Bay Repair Kit
- Newsletter
- Carefree Learner brochure
- Native landscaping at local schools
- Participating at Earth Day and coastal clean-ups
- Preparation of a Bay and Florida Yards video
- Brochures and educational materials for habitat restoration sites
- Preparation of a boating and Heritage Trail guide
- Development and printing of a storm pond maintenance manual
- National Audubon Grant for Census
- Native Plant Society workshop

Solving Sarasota Bay's problems is a long-term process that requires a commitment not only by the Sarasota Bay Program and other environmental agencies but also by a strongly motivated community willing to maintain its commitment to restoring and protecting the Bay.



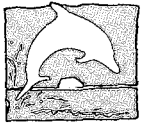
Planting habitat around the Sarasota Bay.



START THEM EARLY

Children are the future caretakers of our natural heritage. Instill in them an appreciation and respect for the environment.

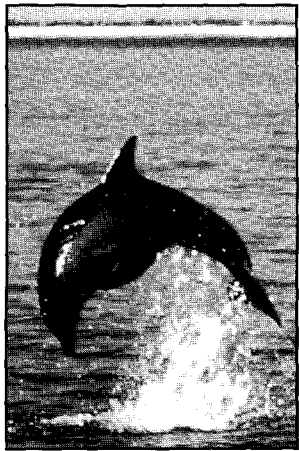
Protecting Marine Mammals



Marine Mammals

Two species of marine mammals inhabit Sarasota Bay on a regular basis: the Atlantic Bottlenose Dolphin and the West Indian Manatee.

The Sarasota Bay Program has not been directly involved in the management and protection of marine mammals. However, high recreational boating use areas recommended for no-wake classification in the Sarasota Bay Plan overlapped with "No Wake Zones" implemented in 1995 to protect marine mammals.



Dolphin

Dolphins reside in population units described as "communities;" several communities have been identified provisionally in the waters of Manatee and Sarasota counties. The bottlenose dolphin of Sarasota Bay are mostly permanent residents, including at least four generations of individuals, and use much of the same home range now as they did 30 years ago, despite the loss of food sources, previous commercial collection pressure, vessel dis-

turbance, entanglement in recreational fishing gear and crab-trap float lines and boat-related injuries. This suggests that the local dolphin community is quite resilient. In general, dolphin density is greater north of Buttonwood Harbor and Long Bar than in southern Sarasota Bay.

Due to the natural laboratory of Sarasota Bay, background data on the dolphin of Sarasota are more detailed and have been collected over a longer term than in any other location in the world.

Manatees

Manatees prefer warm, shallow waters that support their food (seagrasses) or deeper waters in the open areas of Sarasota Bay. Manatee presence and abundance in the Sarasota Bay area appear to be related at least in part to environmental factors such as water temperature and seagrass coverage.

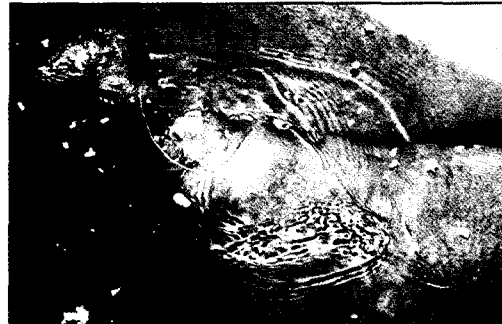
The loss of seagrass habitat is a concern for manatees, as they appear to prefer unaltered habitat. Past declines of seagrass meadows in Sarasota Bay are a concern, but recent improvements in seagrass coverage (1,751 acres) are encouraging. Unlike bottlenose dolphin in



Other Research



Dolphins and Manatees are residents of Sarasota Bay.



the Sarasota area, manatees do not appear to have any natural predators except man. The manatee is a highly endangered species whose most important source of mortality is humans. Manatees were originally depleted through overhunting for meat, oil and leather. The single most frequent cause of death and injury for manatees today, however, is collision with powerboats. Non-fatal collisions are evidenced by parallel scars on the backs of practically all manatees.

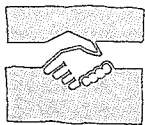
Red Tide

Red tide is a natural phenomenon that occurs throughout the world. Florida red tide is caused by harmful algal blooms of a dinoflagellate (*Gymnodinium breve*) that produce potent neurotoxins. These microscopic marine algae contain toxins that cause extensive fish kills, contaminate shellfish and can create severe respiratory irritation to humans along the shore. Symptoms usually disappear within 24 hours once the exposure is discontinued. Florida red tide blooms typically begin in the Gulf of Mexico 40-80 miles offshore and move slowly southeast with the prevailing ocean currents toward the Tampa Bay area.

Recently, Red Tide has been implicated in the deaths of hundreds of whales, dolphins, and manatees in North American waters. Red tide killed 39 manatees in the Caloosahatchie River area in February and March of 1982 and more than 150 manatees in Charlotte Harbor in 1996.

Interestingly, the red tide organism plays a very important role in the conversion of solar energy to chemical energy (photosynthesis), a process essential to the survival of all animals. Mote Marine Laboratory is involved in research to determine why this menace also produces neurotoxins. Mote Marine conducts weekly monitoring from Sarasota Bay to 30 miles off shore. Current research is looking at the natural and man made factors that influence red tide, as well as the health effects to humans and marine life. (Courtesy of the Mote Marine Laboratory).

Developing Partnerships



Our Roots. . .

Recognizing the Importance of Preserving and Enhancing Coastal Environments

Congress established the National Estuary Program (NEP) through Section 320 of the Clean Water Act Amendments of 1987 in recognition of the importance of preserving and enhancing coastal environments. In 1989, the U.S. Environmental Protection Agency (EPA) designated Sarasota Bay as an estuary of national significance. The Sarasota Bay National Estuary Program Management Conference was jointly convened by the EPA and the Florida Department of Environmental Protection, formerly the Florida Department of Environmental Regulation, in June 1989.

Developing Goals

The mission of the Sarasota Bay Program is to restore and protect Sarasota Bay. A Policy Committee was established to provide oversight to the program; the committee's first directive was to make "action now" a guiding principle of the Program. Seven goals were established:

- Improve water transparency to the maximum allowable by the Gulf and local weather conditions.
- Reduce the quantity and improve the quality of stormwater runoff into the Bay.
- Prevent further losses of seagrass beds and shoreline wetlands, and restore lost habitats.
- Restore and sustain fish populations and other living Bay resources.
- Provide increased managed access to the Bay.
- Coordinate beach/inlet/channel activities to enhance the Bay.
- Establish a coordinated management system between local, regional, state and federal levels of government.



VOLUNTEER

Give something back to the Bay by volunteering. Join a committee, participate in a Coastal Clean-Up or a community planting.

Governance

Establishing Committees

To reach those goals and develop a plan of action, four committees and a staff of five were established.

Policy Committee

The Policy Committee establishes the general policies and goals for the Sarasota Bay Program and sets priorities by reviewing and approving annual budgets and workplans and evaluating progress in meeting the goals set forth by the Management Conference.

The Policy Committee established policy themes for the Sarasota Bay Program: make public awareness a high priority, increase Program visibility at all levels and focus the Program on action, not study, whenever possible.

Management Committee

The Management Committee serves as liaison between the Policy Committee and the Technical and Citizen Advisory Committees. This committee advises the Policy Committee on all matters for which the various committees have direct responsibilities. The Management Committee regularly reviews workplans, funding plans, work products and all other activities of the Program and makes recommendations to the Policy Committee regarding the need for action on specific program needs. The Management Committee selects and approves contractors and approves changes in annual operating budgets.



Cortez Fishing Festival.

... Committees and Staff

Technical Advisory Committee

The Technical Advisory Committee's primary role is to provide technical advice and support to the Program. The TAC also reviews and comments on the technical content of the completed projects, offers suggestions and advice on implementation policies, reviews monitoring data and makes recommendations to the Management Committee on technical issues.

Citizen Advisory Committee

The Citizen Advisory Committee provides a mechanism for structured citizen input to the Sarasota Bay Program and assists in disseminating information relevant to the Program to the public. The CAC also helps establish Sarasota Bay Program goals and objectives, helps set funding levels, assists with public participation activities, communicates Program activities to user groups, provides public input on research priorities, reviews technical findings and helps to further develop and implement the Comprehensive Conservation and Management Plan. The CAC works closely with Program staff to assist in the development of an effective public education and participation program.

Staff and Supporting Legislation

The Comprehensive Conservation and Management Plan for managing Sarasota Bay called for continuing the "Management Conference" (i.e., Technical, Citizen, Management and Policy committees) for an unspecified period of time to oversee implementation and ensure effective participation of public agencies and private citizens in 1995. This element established an environmental quality objective: "To improve Sarasota Bay to the maximum extent possible, given best available technology and economic constraints." This objective has been guiding Sarasota Bay restoration activities locally.

Five staff members have been maintained to coordinate and facilitate program objectives, manage projects and support the committee structure. Key elements of this section of CCMP supported reauthorization of section 320 (NEP) of the Water Quality Act of 1987 and designation of Sarasota Bay as a State Surface Water and Improvement and Management Program (SWIM).

Several bills to reauthorize and increase funding for section 320 of the Water Quality Act of 1987 are pending in Congress. The Southwest Florida Water Management District approved the SWIM designation in 1996, making state funds available for the region.

Comprehensive Planning

Using the Comprehensive Planning Process

Florida is one of the few states in the country that requires local governments to develop and enact laws dealing with growth. These comprehensive plans are organized by eight elements and include Environment, Recreation and Open Space and Intergovernmental Coordination.

The Sarasota Bay Program worked with planning departments in Manatee and Sarasota counties, the City of Sarasota, the Tampa Bay and Southwest Florida Regional Planning Councils and the Town of Longboat Key in 1995 in authoring and reviewing significant portions of their comprehensive plans to include major elements of the Sarasota Bay Program's Comprehensive Conservation and Management Plan. Each jurisdiction included CCMP policies and objectives in chapters of its plan, primarily the Environment or Public Facilities chapters, thus obtaining regional consistency.

The Sarasota Bay Program is in the process of reviewing land-development regulations in the area, comparing them to existing comprehensive plans and Sarasota Bay Program objectives. Ordinances may be developed and adopted to further integrate CCMP policies, goals and objectives into local and regional government growth-management plans through this effort.



Financing Restoration

Since 1989, Sarasota Bay Program staff have been directly involved in the award of grants, contracts and interagency agreements totaling \$18.8 million, of which approximately \$8.4 million (44.6 percent) was federal funds and \$10.4 million (55.6 percent) was non-federal. The following chart presents commitments made by agencies participating in Sarasota Bay Program activities. These resources have provided funding for master planning for infrastructure, demonstration projects, wetland and artificial reef construction, acquisition of sensitive lands, citizens' outreach activities, research and technical studies and staff.



CONSERVE RESOURCES
Conserve and share our natural resources wisely.
Remember: Reduce, Reuse, Recycle & Refuse.

... Financing Bay Restoration

Federal	Total
U.S. Environmental Protection Agency	\$4,927,000
U.S. Fish and Wildlife Service	1,050,000
National Oceanic & Atmospheric Administration	70,000
U.S. Geological Survey	320,000
U.S. Army Corps of Engineers	2,000,000
U.S. Department of Agriculture (NRCS)	10,000
Subtotal:	\$8,377,000

Non-federal	Total
State of Florida	\$1,462,000
MSBB-Southwest Florida Water Management District	1,848,000
Regional Planning Councils	27,000
Manatee County	1,747,000
Sarasota County	699,000
City of Sarasota	1,166,300
Town of Longboat Key	3,347,000
City of Holmes Beach	1,000
NGO's and Private	121,000
Subtotal:	\$10,418,300

Additional funds have been committed to fully implement the Comprehensive Conservation and Management Program (CCMP) by local, state and regional agencies as follows:

Source	Total
Sewers	*\$31,800,000
Regional Reuse	**28,000,000
Stormwater	***41,500,000
Subtotal	\$101,300,000

Grand Total	\$120,095,300
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* Committed by Sarasota County

** Committed by Manatee County, Congress, SWFWMD.

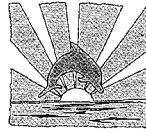
NOTE: Additional funds have been committed by the Manatee Basin Board.

City of Sarasota and Sarasota County that are not included.

*** Most in Sarasota County; partly funded by SWFWMD.

Full implementation of the "Restoration Plan" is estimated in excess of \$166,400,000.

Still to Be Accomplished



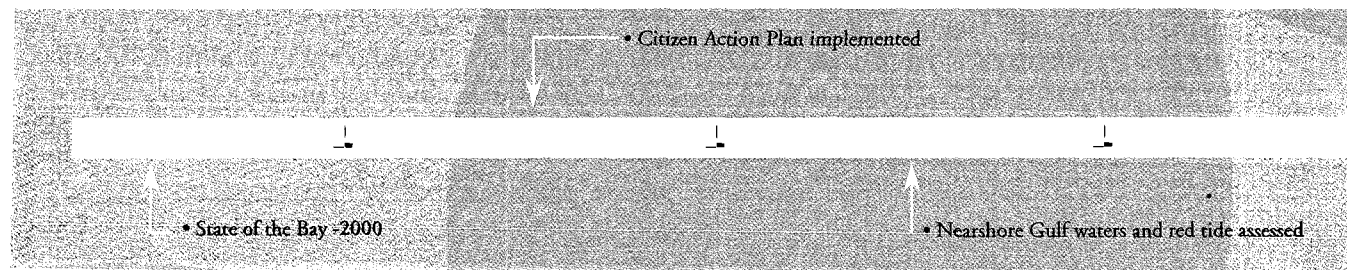
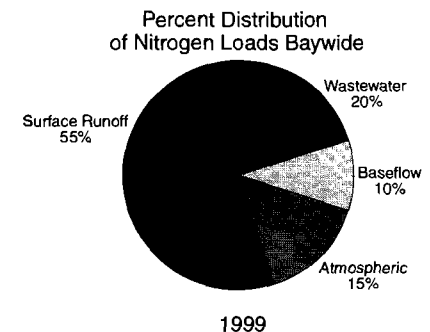
Sarasota Bay: The Future

Although much progress has been made in meeting restoration goals established in 1995, further improvements may be realized by continuing efforts initiated over the past decade. It appears prudent to continue this momentum, since federal, state, regional and local agencies have committed staff and future funds for the enhancement of the Bay. As Bay research continues and new technologies develop, an even brighter picture than the one painted in 1995 is possible for the future health of Sarasota Bay.

In this light, the new millennium offers a spirit of environmental conservation and stewardship, with points of interest in the Bay region offering messages of pride and stewardship. Research conducted by the Sarasota Bay National Estuary Program has documented the important role that citizens can play in Bay improvement.

Sewers

In November 1998, voters in Sarasota County passed a one-cent sales tax extension that would allocate \$28 million for a septic system replacement program. In 1999, the U.S. Congress approved \$1.5 million for the project and the state \$500,000. The county is currently pursuing state and federal funding to offset the costs to affected homeowners and has committed \$12 million in utility funds. The City of Sarasota has also developed an annexation plan for the affected area north of Phillippi Creek to offer connection to the City's sewer system, among other amenities. This annexation plan would take advantage of excess capacity available at the city's wastewater treatment plant. The sewer system needs to be fully implemented.



Beyond 2000—Tomorrow's Sarasota Bay

Reuse of Wastewater

While significant progress has been achieved in implementing a regional wastewater reuse system, wet-weather storage options must be developed to effectively reduce surface water discharge into Sarasota Bay. In that light, the Sarasota Bay Program has assisted local municipalities through funding several feasibility studies regarding wet-weather storage options. Sarasota County and the City of Sarasota have been investigating aquifer storage and recovery, a relatively low-cost means of providing seasonal storage that eliminates the need for less-desirable surface water discharges and other disposal practices. Aquifer Storage and Recovery (ASR) studies indicate the feasibility of ASR well sites in Sarasota County and in the City. Manatee County is also testing ASR technology at the Southwest Regional Treatment Plant.

Full implementation of ASR technology would allow the cities and counties to reclaim up to 10 million gallons of water per day to offset potable demand. ASR would also increase the reliability of a re-use distribution system by providing a water source during the

dry season, when demand exceeds current supply. Increased system reliability could also attract additional customers for re-use.

Stormwater

Revised nutrient loading estimates suggest that stormwater runoff is responsible for 56 percent of the total nitrogen input into Sarasota Bay; stormwater from residential areas alone is estimated to contribute one-third of all ni-



Neighborhood watershed and stormwater pond.

• Additional water quality and habitat improvements realized

• Implementation continues

Still to Be Accomplished

Midnight Pass Decision

In 1995, the Sarasota Bay Program sponsored a series of mediated forums regarding Little Sarasota Bay. Participants were asked to make recommendations to improve water quality and otherwise enhance the ecology of Little Sarasota Bay. The fate of Midnight Pass was singled out as a specific item for discussion and fiercely debated. In the end, consensus was reached among the participants that additional studies be done to determine whether a pass could be reopened that meets a rigid set of physical and environmental criteria.

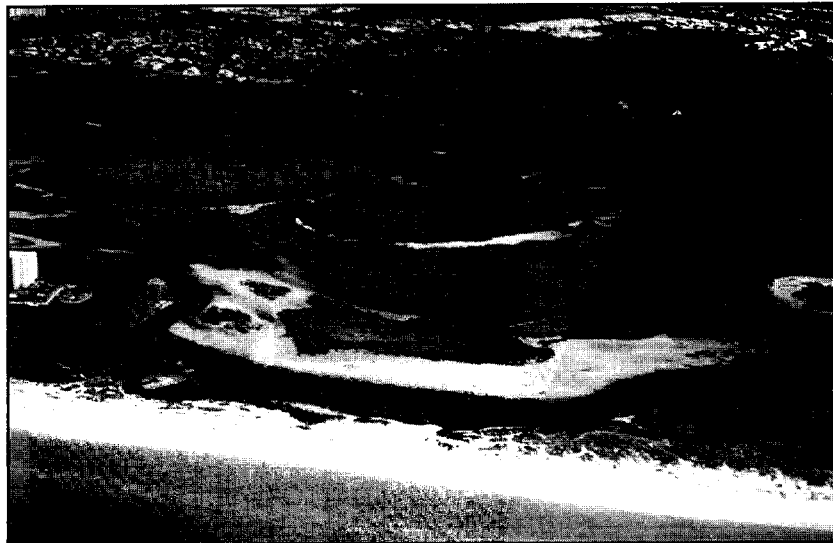
The recommendations were ultimately forwarded to the Sarasota County Commission

for its endorsement and financial support. In July 1997, the commission endorsed the recommendations and agreed to fund a study. Since that time, the Sarasota Bay Program Policy Committee agreed to assist Sarasota County with one-third the costs of the proposed \$225,000 feasibility study, not to exceed \$75,000.

The engineering firm of Camp, Dresser, and McKee (CDM), working with the Danish Hydraulic Institute (DHI) and Mote Marine Laboratory, was ultimately chosen to conduct the project.

The scope of work encompassed a comprehensive study to determine design configurations for non-hardened channels that will result in a reasonably stable pass requiring little

or no maintenance. The study considers all circulatory impacts, including both the movement of the sediment and null zones; navigation was not to be a major issue in deciding the optimal configuration of the pass. In addition, the consultants are to determine the biological and topographical changes that would be needed to complement a natural pass. The study was released in February 2000, and reopening was found to be feasible.



Midnight Pass.

Community Recreation, Stewardship and Citizen Action

The Sarasota Bay Program Citizens Advisory Committee has developed the Citizen Action Plan 2000, which involves promoting environmental stewardship and community involvement for the protection of Bay resources. Steps involved in this plan include:

- Hiring a public outreach and education intern/assistant to support CAC Action Plan implementation efforts.
- Creating a Web site initially using existing information from sources such as the Gulf Coast Heritage Trail, State of the Bay 2000, CCMP and Technical Studies before pursuing other sources.
- Collecting existing information and developing new materials in reference to key problem areas.
- Collecting and developing flora and fauna educational materials.
- Use of the Gulf Coast Heritage Trail.

Other areas of interest to be addressed through this plan include:

- Study the implications of exotic species located on waterways and shorelines after hurricane and tropical storm events.
- Establish relationships to wildlife and their

native habitats.

- Produce a "State of the Bay" video focusing on the State of the Bay 2000 Report.
- Develop five-minute segments on artificial reefs, native wildlife habitats, native vegetation and landscaping, exotics and their control, fisheries, etc. Seek sponsorship from local television stations. Consider producing a local television show.
- Highlight the Florida Yards & Neighborhoods program.
- Develop a slide show around Sarasota Bay Program accomplishments and goals to focus on Bay resources, particularly restoration sites.



*Governor Lawton Chiles and Mark Alderson,
Executive Director of Sarasota Bay NEP at the
BayWalk at KenThompson Park.*

Still to Be Accomplished

- Establish linkages with Mote Marine Laboratory.
- Develop a newspaper editorial series on important native plant species and natural habitats.
- Release "State of the Bay 2000" through a community-wide celebration.
- Create CAC teams to assist in implementing tasks in the Action Plan.
- Use the Gulf Coast Heritage Trail to promote Bay stewardship.
- Use existing information and signage (road and destination signs) as well as brochures to link the 117 established destination sites.
- Continue distribution of the Blueways companion guide.
- Develop an anti-litter campaign at Gulf Coast Heritage Trail destination points.
- Develop Millennium events involving points of interest along the Heritage Trail and possibly along the Blueways routes.
- Develop theme events (restoration, cultural and Blueways).
- Develop a mini-grants program: Heritage Trail Points of Interest.
- Establish a Sarasota Bay Program photo contest and sponsor local photography exhibits with prominent photographers such as Clyde Butcher.
- Conduct a media and community campaign for the Bay.
- Develop a list of target groups for presentations.



A Clean-up project Downtown Sarasota.

- Create a speakers bureau to supplement staff presentations.
- Develop and conduct education forums for the following audiences: the community (residents and visitors), schools, teacher training workshops, fertilizer and watering education that would stress the care and feeding of native vegetation, extension offices and curriculum development.
- Improve networking strategies through local organizations and libraries.

Acknowledgements

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Citizen Advisory Committee
Gulf Coast Heritage Trail Advisory Committee

Supporting materials used in this document were
prepared through the Sarasota Bay National Estuary
Program Management Conference:

Sarasota Bay National Estuary Program Publications:

"State of the Bay Report 1990"
"Framework for Action 1993"
"The Voyage to Paradise Reclaimed," 1995
"Gulf Coast Heritage Trail
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"A Chronicles of Florida's Gulf Coast" 2000

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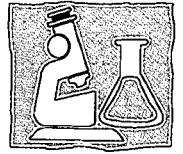
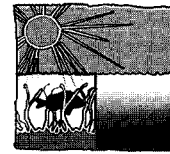
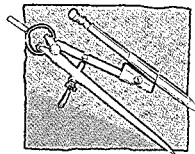
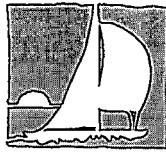


Photo Credits

Tom Cross Inc.: Cover photo, Quick Point Nature Preserve: page: 36, 45.

Elka Photography: Inside front photos on cover of aerial view of Sarasota Bay, photo on pages: 4, 5, 8, 9, 12 (North Sarasota Bay), 17, 37 (Sister Keys, Little Edward's Island).

Mote Marine Aquarium: pages: 47, 48.

Reed Photography: pages: 18, 37 (1912 School House).

Paul Roat: page: 37 (Grassy Point Preserve).

Sarasota Bay National Estuary Program Photo Library: Inside front photos on cover of sunset at City Island and sailboat on beach, photo on pages: 12 (Downtown Bayfront, Sarasota), 19, 27, 31, 32, 33, 36 (Selby Shoreline Restoration Project photo), 37 (Leffis Key, Sarasota BayWalk, Boardwalk at Sarasota BayWalk, Durante Park, Cortez Fishing Village), 39, 44, 46, 47, 50, 55, 56, 57, 58, 59, 60. Inside back cover of people on beach.

