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State of Tampa Bay 2000

Tampa Bay Regional Planning Council (TBRPC)

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State of Tampa Bay

Longitude in degrees and tenths of degrees

2000
TAMPA BAY REGIONAL PLANNING COUNCIL’S AGENCY ON BAY MANAGEMENT - 2000

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Lagrangian Residence Time Plot Based on Estuarine and Coastal Ocean Model (ECOM). This shows rates of flushing based on conditions observed during the fall and winter of 1997-98. The range is from about 1 week (red colors) to over 150 days (dark blue colors). The use of this type of sophisticated technology is further explained in the report starting on page 56 of this document. Published as Burwell, D., M. Vincent, M. Luther, and B. Galperin, 2000. Modeling Residence Times: Eulerian vs Lagrangian. In: Estuarine and Coastal Modeling, M. L. Spaulding and H. L. Butler, eds., ASCE, Reston, VA, pp 995-1009.
<table>
<thead>
<tr>
<th>Name</th>
<th>Organization/Department</th>
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</thead>
<tbody>
<tr>
<td>Bruce Ackerman</td>
<td>FL Fish &amp; Wildlife Conservation Commission - Marine Research</td>
</tr>
<tr>
<td>Walt Avery</td>
<td>City of Tampa Bay Study Group</td>
</tr>
<tr>
<td>David Burwell</td>
<td>University of South Florida Marine Science</td>
</tr>
<tr>
<td>Tom Cardinale</td>
<td>Environmental Protection Commission of Hillsborough County</td>
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<tr>
<td>Peter Clark</td>
<td>Tampa BayWatch</td>
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<tr>
<td>Michael Coates</td>
<td>Tampa Bay Water</td>
</tr>
<tr>
<td>Suzanne Cooper</td>
<td>Tampa Bay Regional Planning Council/Agency on Bay Management</td>
</tr>
<tr>
<td>Frank Courtney</td>
<td>FL Fish &amp; Wildlife Conservation Commission</td>
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<tr>
<td>Judy DeGraff</td>
<td>Southwest Florida Water Management District - Surface Water</td>
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<td>Improvement &amp; Management Section</td>
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<tr>
<td>Laura DeLise</td>
<td>Hillsborough River Greenways Task Force</td>
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<tr>
<td>Eric Fehrman</td>
<td>Pinellas County Planning Department</td>
</tr>
<tr>
<td>Charles Feldschau</td>
<td>Cockroach Bay Users Group</td>
</tr>
<tr>
<td>Mark Flock</td>
<td>Pinellas County Environmental Management</td>
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<tr>
<td>Lynn French</td>
<td>Florida Power &amp; Light Company</td>
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<tr>
<td>Steve Grabe</td>
<td>Environmental Protection Commission of Hillsborough County</td>
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<tr>
<td>Glenn Harman</td>
<td>Clearwater Marine Aquarium</td>
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<td>Kerry Hennenfent</td>
<td>City of Tampa Bay Study Group</td>
</tr>
<tr>
<td>Don Hicks</td>
<td>Pinellas County Environmental Management</td>
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<tr>
<td>Nanette Holland</td>
<td>Tampa Bay Estuary Program</td>
</tr>
<tr>
<td>Craig Huegel</td>
<td>Pinellas County Environmental Management</td>
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<tr>
<td>Lisa Perry Hull</td>
<td>Tampa BayWatch</td>
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<tr>
<td>Roger Johansson</td>
<td>City of Tampa Bay Study Group</td>
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<td>Environmental Protection Commission of Hillsborough County</td>
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<td>Pam Leasure,</td>
<td>Pinellas County Environmental Management</td>
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<tr>
<td>Cynthia Lederer</td>
<td>US Coast Guard - Marine Safety Office Tampa</td>
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<tr>
<td>Kelli Hammer Levy</td>
<td>Pinellas County Environmental Management</td>
</tr>
<tr>
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<td>University of South Florida Marine Science</td>
</tr>
<tr>
<td>Lucy Mattern</td>
<td>Environmental Management Dept. of Manatee County</td>
</tr>
<tr>
<td>Robert McConnell</td>
<td>Tampa Bay Water</td>
</tr>
<tr>
<td>Tom Miller</td>
<td>City of Clearwater</td>
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<tr>
<td>Nancy Page</td>
<td>Pinellas County Highway Department</td>
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<tr>
<td>Ann Paul</td>
<td>Audubon of Florida’s FL Coastal Islands Sanctuaries</td>
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<td>Rich Paul</td>
<td>Audubon of Florida’s FL Coastal Islands Sanctuaries</td>
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<tr>
<td>Melanie Poirier</td>
<td>Pinellas County Dept. of Environmental Management</td>
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<tr>
<td>Douglas Robison</td>
<td>Post Buckley Schuh &amp; Jernigan, Inc.</td>
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<tr>
<td>Ken Sides</td>
<td>City of Clearwater</td>
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<tr>
<td>Jim Spangler</td>
<td>Egmont Key Alliance</td>
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<td>Andy Squires</td>
<td>Pinellas County Dept. of Environmental Management</td>
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<tr>
<td>Richard Sullivan</td>
<td>Hillsborough County Resource Management Section</td>
</tr>
<tr>
<td>Mark Vincent</td>
<td>University of South Florida Marine Science</td>
</tr>
<tr>
<td>Alan Wright</td>
<td>Hillsborough County City-County Planning Commission</td>
</tr>
<tr>
<td>Angela Young</td>
<td>Pinellas County Environmental Management</td>
</tr>
</tbody>
</table>
## Table of Contents

### EXECUTIVE SUMMARY

#### Tampa Bay:
- Organic Contaminants

### STATE OF INFORMATION AND OUTREACH

- Tampa Bay License Tag Hits the Road in 2000!
- Pinellas County Utilities
- C-Bug Continues Its Good Work!
- Symposium Addresses Seagrass Research Needs
- Pinellas County's Environmental Education Efforts

### STATE OF RESTORATION, LAND ACQUISITION AND MANAGEMENT

- Hillsborough County Environmental Lands Acquisition and Protection Program (ELAPP)
- Pinellas County Environmental Lands Division
- FL Fish and Wildlife Conservation Commission's Marine Research Institute Stock Enhancement Research Facility
- Manatee County Environmental Management Department
- City of Clearwater's Watershed Planning
- Egmont Key 2000
- Hillsborough River Greenways Task Force
- Pinellas County Environmental Foundation
- 1993-2000 Summary of Monitoring Results in the Ft. DeSoto Park and Aquatic Habitat Management Area

### STATE OF RESEARCH AND MONITORING

- Egmont Key National Wildlife Refuge
- Hillsborough Independent Monitoring Program: Benthic Monitoring Element
- Clearwater Marine Aquarium
- Sediment & Benthic Monitoring Program for

### STATE OF BAYWIDE MANAGEMENT

- Tampa Bay: Organic Contaminants
- Pinellas County Department of Environmental Management's Bay-Related Activities
- New Research Shows Seagrass Declines in Tampa Bay
- Hillsborough River Interlocal Planning Board & Technical Advisory Council
- Annual Update of Tampa Bay Chlorophyll-A Concentrations
- Algae Blooms in Tampa Bay
- Clearwater's Entryway Roundabout
- Reestablishment of Seagrass Meadows in Hillsborough Bay
- Decreasing Phytoplankton Trends in Tampa Bay
- Agency on Bay Management
- Surface Water Improvement and Management Section of the Southwest Florida Water Management District
- Tampa BayWatch
- Colonial Waterbird Nesting in Tampa Bay, 2000
- Bay Expected to Benefit from Power Plant Improvements
- Marine Safety Office Tampa
- Tampa Bay PORTS
- Three-Dimensional Hydrodynamic Circulation Model of Tampa Bay
- Hydrobiological Monitoring for New Water Supply Development in the Tampa Bay Region, Florida
Executive Summary

This is the fourteenth edition of the “State of Tampa Bay” Report. It has been prepared by the Agency on Bay Management and funded by the Tampa Bay Regional Planning Council. The Report’s primary purpose is to inform our legislators and the general public about the projects and programs underway around Tampa Bay and its watershed, and the issues and challenges that faced us during 2000 or are expected in 2001.

The cover of this year’s edition reflects the over-riding influence that water quality and circulation play in the Tampa Bay estuary’s health. Many of the reports within this document address these aspects of the Bay, directly or indirectly, when describing such issues as seagrass growth, chlorophyll-a levels, exotic species, habitat restoration, wading bird nesting, a desalination plant and other water supply projects, oil spill prevention and cleanup, fishing tournaments, and contaminated sediments. Alterations in the Bay’s bathymetry (bottom elevations) due to ship-channel improvements, causeway construction, and such have resulted in changes in salinity regimes and freshwater flow throughout the Bay. It is clear that we all have a stake in ensuring that Tampa Bay’s water is as clean as possible, and that circulation is restored and maintained.

Summaries of programs of Baywide significance have been contributed by some of our most important Bay stewards. Reports from several organizations and agencies recap their activities in 2000 and describe planned projects for 2001. Many of these are actually updates, as these entities have contributed to the State of Tampa Bay Reports for more than a few years. For example:

- the annual monitoring of chlorophyll-a levels in the Bay, as well as other studies of Bay problems, are reported by the City of Tampa Bay Study Group;
- updates on water quality monitoring, Lake Tarpon management actions, Lake Seminole restoration, Manatee protection efforts, County Preserves' management and public education and outreach activities, to name a few, are provided by various Pinellas County departments;
- the wide variety of programs underway by Manatee County Environmental Management Department are described;
- key accomplishments in many areas, as well as issues identified in 2000, are presented by the Tampa Bay Estuary Program;
- the U.S. Coast Guard Marine Safety Office’s report reminds us of the vital role this agency plays in keeping the Tampa Bay area’s humans and environment safe;
- Tampa BAYWATCH presents its myriad activities involving volunteers and innovative projects;
- Environmental Protection Commission of Hillsborough County describes its monitoring efforts, which have been underway since the early 1990s and provide invaluable data on Bay water quality trends;
- Hillsborough River Interlocal Planning Board and Technical Advisory Council reports on the many issues addressed each year;
- Southwest Florida Water Management District’s Surface Water Improvement and Management Section recaps its progress on regionally-significant water quality and habitat restoration projects;
- Pinellas County Planning Department reports on seven years of work in the Ft. DeSoto Park and Aquatic Habitat Management Area;
- Audubon of Florida Coastal Islands Sanctuaries notes nesting success of wading birds in Tampa Bay; and
- The Agency on Bay Management describes the issues it addressed during the year and the actions it took.

The many other contributors add to the wealth of information about special or on-going activities around the Bay, and allow us to understand the magnitude of what is being done on behalf of Tampa Bay’s estuary and watershed. The diversity of projects and programs confirms the serious commitment that has been made by federal, state, regional and local agencies, independent groups and the private sector to understanding, restoring and protecting the natural resources of the Tampa Bay region, including our most precious jewel—the Tampa Bay estuary.
State of Information and Outreach

TAMPA BAY LICENSE TAG HITS THE ROAD IN 2000!

A specialty license tag that will aid the restoration of Tampa Bay went on sale to motorists throughout the Tampa Bay region, and the state, in the Spring of 2000.

The tag, featuring a lifelike illustration of a tarpon created by local artist and fishing guide Russ Simmons, was approved in 1999 by the Florida Legislature. Primary sponsors of the bill authorizing the license tag were Sen. Jim Sebesta (R-Pinellas) and Rep. Bob Henriquez (D-Tampa). The bill was co-sponsored by a number of other Tampa Bay-area legislators.

The tag costs $17 annually - with $15 going directly to projects that will advance the bay restoration goals adopted in the Comprehensive Conservation and Management Plan for Tampa Bay. The Tampa Bay Estuary Program will receive 80 percent of the revenues from the license plate, and disburse the money in the form of grants awarded yearly. Local governments, regulatory agencies, and non-profit organizations are among the groups that can apply for funds each spring. Eligible projects include habitat restoration and stormwater improvements, as well as environmental education initiatives. TBEP also will dedicate a portion of the proceeds to supplement its Bay Mini-Grant program for community groups, and allocated $10,000 of the first year's revenues to fund these grassroots bay improvement projects. The Tampa Bay Regional Planning Council's Agency on Bay Management, an advisory group of local governments, regulators, industry, scientists, interest groups, commercial and recreational fishermen and citizens, will receive 20 percent of the tag revenues, up to $50,000 a year, for bay improvement and awareness projects identified in the Agency's Action Plan.

Motorists can purchase the Tampa Bay Estuary tag by going to the nearest tax collector's office or by enclosing a note and payment with their mail-in renewal notice indicating they wish to purchase the Tampa Bay Estuary plate.

PINELLAS COUNTY UTILITIES

Water Pig Pilot
Pinnellas County Utilities teamed up with the Southwest Florida Water Management District (SWFWMD) to bring the local production Water Pigs to Pinellas County schools. Based loosely on the children's classic, The Three Little Pigs, Water Pigs is an interactive play about three pigs, who initially waste water but are taught to conserve by "B.B. Wolf." Pinellas County Utilities, the Southwest Florida Water Management District, the City of St. Petersburg, and the Pinellas County Arts Council partnered to bring this production to Pinellas County schools as a way to teach younger children about conserving water.

Finance Park
Pinellas County Utilities is an education partner with the Stavros Institute, which opened the doors to Finance Park in October 1999. At Finance Park, eighth graders put theoretical learning about money and budgets into practice. At the Pinellas County Utilities learning center, students must determine their utility bill using real world figures and determine how they will conserve water. Students find ways to conserve water and learn about both the environmental and economic benefits of conserving water as they watch their utility bill drop. Students may also complete an interactive water conservation survey.

Reclaimed Water
Pinellas County Utilities is currently expanding its reclaimed water service area along the Pinellas County beach communities. These communities have historically used potable water for irrigation. Additionally, Pinellas County Utilities is completing a wastewater retrofit that will improve reclaimed water quality through a tertiary treatment process. The new and improved reclaimed water can be used on a vast assortment of plants, trees, and groundcovers, which will decrease a home's potable water consumption by approximately 20-40%.
TV / Radio
Throughout 1999-2000, Pinellas County Utilities regularly ran environmentally-conscious spots on public television (WEDU) and Radio Disney (AM 1380). These spots taught children easy, practical ways they could help conserve water and practice the three R’s (Reduce, Reuse, and Recycle). Additionally, Pinellas County Utilities launched a two-week radio campaign in June. Geared towards an adult audience, these Dragnet™-themed spots took a humorous approach to conserving water. These advertisements were written to increase customer awareness about the Tampa Bay area’s watering restrictions and the ways adults can conserve water.

ULVT
Each year Americans flush away an estimated 9000 gallons per person of potable drinking water to remove small amounts of waste from their homes and businesses. Historically, toilets used 3.5-7 gallons per flush, but starting with the Energy Policy Act of 1992, ultra low-volume toilets (which use an average of 1.6 gallons per flush) were developed. Although these toilets have been in use for almost five years, no entity has studied the actual water savings potential of ultra low-volume toilets (ULVTs) in multi-family settings. Since 1997, Pinellas County Utilities has been studying ULVTs in seven Pinellas County Housing Authority complexes throughout the County. Over 1,100 toilets were replaced with low-flow toilets, providing the first accurate look at the water savings and public opinion of ULVT technology in Florida. These results will help developers and builders assess the benefits of ULVTs, and the public opinion portion will gauge customer satisfaction with regard to these fixtures.

CVB
In March, Pinellas County Utilities teamed up with the Convention and Visitor’s Bureau to launch a Conservation Awareness campaign. Geared towards hotels, motels, and resorts, this campaign focuses on educating both proprietors and guests about ways they could effectively decrease their water usage. Pinellas County Utilities provided all area lodgings with the following:

- Key card inserts - with water conservation tips printed on them.
- Table tents for guest rooms - freestanding cards instructed guests as to what course of action to take if they chose not to have their sheets and/or towels laundered daily.
- Brochures - including children’s games, conservation facts, and ways for visitor’s to conserve water while visiting Pinellas County.
- Brochure insert - containing both indoor and outdoor conservation tips.
- Checklists - including conservation tips for hotel/motel proprietors to implement at their establishment.

C-BUG™ CONTINUES ITS GOOD WORK!

The year 2000 was an exciting one for the Cockroach Bay Users Group (C-BUG). With a continuing expansion of completed projects as well as brand new ones, the C-Bug educational focus for protecting the environment continued to capture the attention of conservationists around the country and the world. To satisfy this expanding interest, a quarterly publication called ‘C-BUG NEWS’ was launched, under the editorship of Rachel Ayers Meredith.

Our web site at http://www.c-bug.org, under the web mastership of Dolly Cummings, continued to be popular with the computer audience. Dolly is also involved as Project Leader with the newly-organized Camp Bayou, which C-BUG has endorsed. This parcel consists of 160 acres on the north side of the little Manatee River, three miles south of SR 674 at the end of 24th Street SE. This is basically a recreational and educational park supported by the County and Ruskin Community Development Foundation.

The first C-BUG meeting of 2000 took place on January 18th in TECO Hall, Ruskin. The speaker for the evening was Jack B. Canterbury, S.O.B.A.C., who described the various environmental problems surfacing around the Apollo Beach area. The meeting also covered the fish line discard boxes at Bahia Beach featured in the Bob Hite Earthwatch television program. Also, a report on the status of the Cockroach Bay Boat Ramp and November Ruskin Seafood Festival was presented. Nick Toth, manager of the preserve, resigned and will be missed. Richard Sullivan, Nick’s replacement, moved right into the job and will certainly make his mark on the preserve.

The Articles of Incorporation for Cockroach Bay User’s group, Inc. were filed on March 27, 2000, with the Florida Department of State, and assigned document number N00000002123. This completes C-BUG’s pending legal tasks for now.

The second C-BUG meeting was held on April 18th at the Bahia Beach Marina Yacht Club. Thomas H. Fraser, Ph.D., Senior Scientist, and Michael Dad detailed the Manatee Protection Plan for the new Harbor Bay Project in Hillsborough County. Also on the program were details of the Frank Sargeant Fishing Show Booth, and release of our new flyer: “The Blue Reusable Bag with the Green Label” for recycling used fishing line. Thanks go to the Tampa Bay Estuary Program for picking up the cost of the bags and flyer printing. We are now out of stock on both items!

The third C-Bug meeting of 2000 took place on July 18th. Gus Muench, local crabber, addressed the crab...
trap concerns on the Alafia and Little Manatee Rivers. Also on the agenda was an update on the Sunshine Skyway Bridge boat launch ramp proposal, which continues to generate interest from the membership.

The highly-mechanized sea grass planting and fertilizing boat patented by Jim Anderson continues to perform in many parts of Florida, including the Key West and Tampa Bay areas, and along the Texas shore. It continues to impress local governmental and environmental agencies. In locations where it has seen service, it has completely restored the accidental damage done to sea grass beds from boat propellers.

The fourth C-BUG meeting of 2000 took place on October 17th. The speaker for the evening was Edward M. Newberg, Sulfur Project Coordinator, who addressed the sulfur handling facility planned for the Big Bend Terminal at Apollo Beach. Discussion included the status of the Sunshine Skyway Bridge boat launch ramp proposal, Cockroach Bay boat launch ramp improvements, Cockroach Bay oil boom readiness command program, and distribution of the all-new Cockroach Bay Boater’s Guide.

The C-BUG Officers currently in office are: Jim Anderson of Ruskin, President; Charlie Feldschau of Sun City Center, Secretary; and Dan LaValley of Ruskin, Treasurer, and will continue in office until the election is held.

The Cockroach Bay Users Group continues to advocate “Environmental CPR” (Conservation, Preservation and Restoration) within the Cockroach Bay Aquatic Preserve. The Cockroach Bay Preserve of 8,500 acres was established 20 years ago. It extends from the Manatee County line north to the Little Manatee River, upriver to U.S. 301 and west into Tampa Bay approximately 2,000 feet from shore. There are flats throughout the area which support sea grasses.

The C-BUG charter continues to direct attention towards protection of the preserve:

1. To maintain and improve the environment of the Cockroach Bay Aquatic Preserve through a wide variety of educational programs.
2. Assist other organizations in developing programs to restore seagrass areas that are damaged.
3. Develop programs similar to the “neighborhood watch” to report incidents and individuals that damage the area to law enforcement authorities.
4. Oppose any activities that could cause the loss of the historic and traditional uses of the preserve.

Recreational and commercial fishermen, birders, educators, environmentalists, boaters, and lovers of the great Florida outdoors are most welcome to join this most active “give-back” group. Membership is $10.00 per year, which includes an attractive C-BUG boat decal, cap or 10 ft. push pole. Donations of time and/or money are always welcome in support of our many projects.

There is a great variety of volunteer opportunities for everyone to become a winner: the Environment, the County and You! Talented individuals are needed to design, build and maintain displays; serve as preserve hosts; conduct interpretive programs; help with shoreline clean-ups; restore and survey habitat; design artwork for bulletin boards; and staff informational centers - to name a few!

For more details on the contents of this article or membership in C-BUG, contact Charlie Feldschau 813-634-5592, or via e-mail: cfeldschau@aol.com.

SYMPOSIUM ADDRESSES SEAGRASS RESEARCH NEEDS

More than 100 scientists from throughout the United States participated in a symposium on seagrass ecology hosted by the Tampa Bay Estuary Program (TBEP) during the summer.

The three-day symposium, held at the Holiday Inn Sunspree Resort in St. Petersburg, brought together local and national experts to discuss factors that may inhibit seagrass recovery in Tampa Bay and other Southeastern estuaries. Sponsors included TBEP, the Gulf of Mexico Program, Florida Sea Grant, Charlotte Harbor National Estuary Program and Sarasota Bay National Estuary Program.

Among topics explored during the symposium were: the amount of light required for seagrasses to grow; various methods of transplanting seagrasses into barren areas; and various rehabilitation techniques aimed at recovering seagrass beds.
areas; and whether loss of offshore sandbars increases wave action that inhibits seagrass growth. Special sessions were devoted to site-specific issues in Tampa Bay, Indian River Lagoon, Sarasota Bay and Charlotte Harbor. Additionally, an interactive poster session offered students from six Florida universities an opportunity to discuss their research projects with experts in their fields.

In addition to stressing the importance of water quality to seagrass restoration, symposium sessions took a closer look at other factors, such as propeller scarring, changes in water circulation and disease, that may affect seagrass growth. A local workshop on the final day of the symposium asked participants to prioritize the most pressing research needs in Tampa Bay. By identifying where information about seagrasses is lacking - and filling in those gaps - scientists hope to shed light on why seagrass recovery is sputtering in some parts of the bay.

The priority research projects selected by symposium participants, and recommended for funding in coming years by TBEP's Management and Policy boards, include:

- An update of existing scientific research on the biology and ecology of seagrasses, to provide the scientific community access to comprehensive, timely information;
- Use of a special wave model developed by NOAA that estimates the effects of wave energy on seagrass beds and other benthic habitats;
- Additional analysis of seagrass monitoring data by the City of Tampa's Bay Study Group to develop appropriate "sentinel" sites for long-term study, and more closely examine areas with significant seagrass losses; and,
- Evaluation of various techniques available to scan historic photographs and maps of seagrass beds into easily accessible formats.

Pinellas County's Environmental Explorations television series received top honors at the National Association of Telecommunications Officers and Advisors (NATOA) conference in September. The very first show produced, which spotlighted the magical Weedon Island Preserve, took first place out of 900 entries submitted from throughout the United States.

The Weedon Island program highlights a number of features within the preserve. A scenic walk along the boardwalk with Will Davis, Director of Pinellas County's Environmental Management Department illustrates important goals for the County's environmentally-sensitive lands. An unexpected walk through a salt marsh becomes educational and entertaining, while a canoe tour through a mangrove forest is relaxing to watch and visually enchanting. Discovering ancient shell mounds and pottery left by Native Americans gives viewers a rare glimpse at early life on the island. Overall, the show leaves the
viewer wanting to see and learn more about the unique environment around us.

Pinellas County’s Department of Public Affairs writes, videotapes and produces the program. Additional shows feature the County’s Wildland Fire Team, Air Quality, and the Florida Birding Festival & Nature Expo. Future shows are being developed on Brooker Creek Preserve, Shell Key Preserve, and Seagrasses. The show airs on Pinellas 18. For more information, call the Pinellas County Department of Public Affairs at 727-464-4985.

**Pinellas County Environmental News**

Get the latest on Pinellas County environmental programs and initiatives with the newsletter designed to tell nature’s local story, Environmental News. It highlights significant partnerships with local, regional, and national partners, and serves as a resource for readers on important environmental concerns. Well written and informative, the newsletter received a meritorious award by the National Association of County Information Officers last year.

To receive Environmental News, call the Pinellas County Department of Public Affairs at 727-464-4985 or help save a tree and read on-line at Pinellas County’s website: www.pinellascounty.org. Select Publications, then go to the Environmental category.
HILLSBOROUGH COUNTY ENVIRONMENTAL LANDS ACQUISITION AND PROTECTION PROGRAM (ELAPP)

On March 3, 1987, a referendum was approved by the voters of Hillsborough County providing for the collection of a .25 mil tax, for four years, for the purchase or protection of environmentally-sensitive land. This four-year quarter mil tax provided approximately $21 million. Administration of the program was assigned to the Parks and Recreation Department. To insure citizen involvement, three teams were established for the purpose of assessing, analyzing, and selecting sites. The ELAPP Advisory Committee was established to guide the preservation and acquisition process.

In 1990, the voters approved another ELAPP referendum, authorizing the County to issue bonds up to $100 million that would be retired by the levy of ad valorem taxes not to exceed .25 mil in any one year for up to twenty years; to designate a portion of such funding for site restoration and management; and to permit conveyance of such lands to other public agencies for the purpose of preservation, provided the proceeds are used to acquire additional land or retire bonds. In 1993, the Board approved amendments to both ordinances which authorized the ability to convey property rights that are not essential for the preservation of the land, the transfer of property to settle actual potential litigation by public or quasi-public entities, and stating that the preservation of the properties acquired through these ordinances is the highest public purpose. Additionally, the ordinance associated with the $100 million referendum was amended to permit the sale of properties identified as “Acquisitions of Convenience.”

The ELAP Program was established to conserve and protect those lands which have environmentally-unique, irreplaceable and valued ecological resources. These lands must satisfy one or more of the following criteria:

- Land containing native and scarce flora and fauna;
- Lands that supply a significant habitat for endangered or threatened plants or animals;
- Land which plays a vital role in the protection and enhancement of water quality (but cannot be protected through other government agencies or regulations);
- Land that provides buffer zones, links or additions to existing environmentally-sensitive lands, or which forms part of a natural greenway;
- Land containing unusual, outstanding, or unique geological features; or
- Land containing significant archeological sites.

Lands are considered for the program after they have been nominated. Any property owner, concerned citizen, community or environmental organization can nominate property in Hillsborough County. There is no fee associated with the nomination. Applications and instructions to nominate property, known as a “site,” are available through the Hillsborough County Parks and Recreation State of Tampa Bay 7
Department. Nominations are taken annually until November 1 and are considered during the following year.

Once a site has been nominated, it goes through an assessment process to determine its environmental significance and if it meets program objectives. After the assessment, it is reviewed by a committee of citizens, environmental experts, and County staff to confirm that the site should be in the program. Selected sites are presented to the Hillsborough County Parks Board and the Board of County Commissioners for approval. Public meetings are held by the Site Selection Committee, the Parks Board and Board of County Commissioners to allow property owners of nominated sites to state their positions and citizens to express their opinions, as well as to allow the County staff to present information and answer questions.

ELAPP is a voluntary program. The current program does not plan to use eminent domain to acquire property. If a property owner does not wish to sell, ELAPP does not plan to force the sale. If a property owner wants more than the property is worth or more than the program is willing to pay, ELAPP does not have to buy the land. With the annual approval of new sites, the program has far more land to acquire than available funding.

After a site is acquired by the County, a detailed management plan is developed by County staff with citizen input. Priority is given to protecting a site’s natural resources. All sites acquired by the County will be made accessible to the public for compatible, resource-based recreation to the greatest extent possible. No sites acquired for preservation will be used for active recreation such as organized sports or athletics, or undergo any other form of public or private development.

Through the first 13 years, the ELAPP Teams have completed 254 reviews and identified 102 sites as meeting the ELAPP criteria for protection or acquisition. Forty sites are now considered as acquired. This number reflects revised site boundaries initially referenced in last year’s report. Several pairs of sites have been combined into one site: Sterling Downs and Sterling Downs Addition are now the Bell Creek Preserve; Saffold Road has merged into the Upper Little Manatee River site; and the Cockroach Bay Addition and Isles of Cockroach Bay are now just Cockroach Bay and the “Acquired” number has been reduced by three to reflect these combinations.

The program has acquired or participated in the preservation of more than 35,900 acres at a cost of approximately $126.8 million. The program has an additional 190 acres under contract for $4,575,000, with these projects expected to close in the next few months. On existing acquisitions and pending contracts, approximately 34% of the total acquisition costs have or will be funded by Preservation 2000 or by partnerships with other agencies. These programs and agencies include the Florida Communities Trust (Department of Community Affairs), the Southwest Florida Water Management District (Save Our Rivers Program), and the State Conservation and Recreational Lands Program. ELAPP has also cooperated with the City Of Tampa, City of Temple Terrace, and Plant City for funding applications on ELAPP sites. Total funding from other agencies for the preservation of ELAPP sites, either under established agreements on existing acquisitions or direct participation by other agencies, with the County providing a portion of the purchase price, exceeds $44 million. It is estimated that there is an additional $8.5 million available through existing agreements on future acquisitions for a total joint-funding received, pending and forecasted, of $52.8 million. Currently, many of the approved sites are in various stages of negotiations. The 13th year nominations submitted through November 1 totaled 18. Seven of these new sites were determined to have met the selection criteria. As mentioned earlier, boundary modifications were approved on three existing sites. One site received two nominations and three nominations were portions of sites previously nominated.

The vast majority of ELAPP lands are being managed by the County Parks and Recreation Department’s Resource Management Team, comprised of 12 permanent, four limited-duration and up to six temporary employees. This team is funded by a portion of ELAPP revenue, phosphate severance taxes, lease revenues, and restoration grants. Assisted by a large volunteer work force, Resource Management personnel carry out site management activities such as security, prescribed burning, exotic plant control, protected species recovery, and public access. Large-scale habitat restoration projects are being accomplished through Resource Management partnerships with other local, state, and federal agencies.

**PINELLAS COUNTY ENVIRONMENTAL LANDS DIVISION**

The Environmental Lands Division is the division of the Department of Environmental Management responsible for the management of Pinellas County’s preserves and other environmentally-sensitive lands. The Division is composed of land management, research and environmental education sections which work together for responsible stewardship.

**Brooker Creek Preserve**

The nearly 8,000-acre Brooker Creek Preserve is the largest tract of wildland remaining in Pinellas County. Composed mostly of pineland and cypress swamp, the Preserve also includes a significant portion of Brooker Creek and its watershed, and thus plays a major role in influencing the water quality of Lake Tarpon. Restoration
of surface water hydrology has been a priority of the land management program and several major projects were completed or initiated in 2000. Surface Water Improvement and Management Program (SWIM) funds were used to restore the historic channel configuration of the main channel (Channel "A") where it was altered by past powerline construction. It is expected that downstream wetlands will benefit from this increased input of water. Similarly, two major projects on the second largest channel (Channel "L") also were completed. A third project and the largest one on Channel "L" was funded by SWIM and will commence early in 2001. Funding for channel restoration work on Channel "F" also was secured through SWIM in 2000.

Additional wetland restoration work was conducted elsewhere in the Preserve. A 40-acre site of uplands and wetlands in the extreme southern end, that was filled nearly 20 years ago with up to five feet of clay fill, was chosen for a major restoration effort for several outside construction projects that required mitigation. This huge undertaking will require the removal of all the foreign fill to restore the original topography, and the planting of the restored site. The third year of a research study looking at the feasibility of using augmentation to restore hydrology to long-term dry cypress wetlands was completed. Augmentation was begun in two of three sites.

An active fire-management program continued during the year. A research study to compare the vegetative and wildlife responses to various management strategies was initiated. The use of prescribed fire will be compared against mechanical means to reduce ground cover, as well as fire exclusion. Areas of old pasture were planted with longleaf pine and wiregrass seedlings. A grant from FL Dept. of Environmental Protection (FDEP) was used to assist with the eradication of populations of skunkvine, Japanese climbing fern, and cogon grass.

Plans for an educational center continued. The architectural firm of Edward Hoffman Associates was hired to complete the designs and the construction management firm of Creative Contractors was hired to manage construction. It is expected that plans will be completed in 2001 and construction will commence shortly thereafter. Funding for a full-color brochure describing the Brooker Creek watershed was secured from the Southwest Florida Water Management District. A summer field camp for 6th-graders was conducted for the third consecutive year.

Public-use programs remained popular. Two horse trails, totaling 13 miles in length, received daily use by both by local equestrians and those who trailered their horses to the trailheads. A 1.75-mile walking trail, open daily from dawn to dusk, and our guided Saturday three-mile hikes continues to provide hiking opportunities. The annual 5K/10K cross country race, "Run In The Woods," had nearly 400 registrants. Our volunteer program provided more than 2,000 hours of assistance to Brooker Creek programs.

Weedon Island Preserve

Weedon Island Preserve and the associated Gateway tract comprise nearly 3,000 acres of contiguous wildland in north St. Petersburg. A lease agreement signed in 2000 between Pinellas County and Florida Power Corporation (FPC) gave management authority of more than 270 acres of FPC property to Pinellas County. An additional 90 acres were purchased by the County from FPC. An active land management program which included the use of prescribed fire and the eradication of invasive non-native plants continued. A restoration project on the Gateway tract was initiated as mitigation by FDOT for a project on I-275 near the Howard Frankland bridge. Work commenced to restore an historic scrub site near the entrance station at Weedon Island. Projects to extend public hiking opportunities at Boy Scout Trail, and to improve the public canoe launch, were initiated.

Plans continued for an education center at Weedon Island. Discussions between Pinellas County and various advisory groups have further refined the center's mission. A position for the Center's education manager...
was approved and advertised. Several summer ecology camps for youth were held at the Preserve.

Public use programs remained popular at Weedon Island. Fishing, canoeing/kayaking, and hiking all provided opportunities for the public to enjoy the Preserve. Significant efforts were made to improve the canoe launching area and to expand the hiking trail system. Both of these efforts should be completed in 2001.

Shell Key Preserve

A lease between Pinellas County and the State of Florida was approved that provides management authority to the County for the entire 1,755-acre complex known as Shell Key Preserve. This area includes the 180-acre Shell Key, an undeveloped barrier island critical for various beach-nesting wildlife, as well as many mangrove islands and seagrass flats. A management agreement was finalized which took into account input from agencies, the public and various interest groups. This management plan was approved by the State Lands Division of FDEP and the Pinellas Board of County Commissioners following public hearings. Shell Key is one of the ten most important nesting and wintering areas in Florida for shorebirds. Listed birds which nest there include Snowy Plover, Least Tern, Black Skimmer and American Oystercatcher. It provides critical habitat for a wide variety of shorebirds during the winter, both as a stop-over during migration and as winter habitat. In 1996, for example, it was estimated that nearly 13% of the state’s Piping Plover population used Shell Key. More than 100 species of birds have been observed using Shell Key at some point during the year. Many species of terns and wading birds make use of the mud and seagrass flats in the Preserve. A small population of Loggerhead sea turtles also make use of Shell Key for nesting.

The management plan seeks to balance the preservation of the region’s sensitive ecological resources with public use. To do this, areas of the Preserve will be segregated for these uses that often are not completely compatible. The north and south end of Shell Key, the historic public-use areas, will remain open for public use, including camping and dogs (within the constraints of the County’s leash law). The central area will be mostly closed to the public to protect the birds and their habitat. Enforcement of the new regulations will be done through an expansion of an existing contract between Pinellas County Dept. of Environmental Management and the County Sheriff’s Department. Boating restrictions also will be enforced to protect sensitive seagrass/wildlife areas.

Mobbly Bay Preserve

This is a 200-acre tract at the north end of Upper Tampa Bay, jointly owned by Pinellas County and the City of Oldsmar. An interlocal agreement gives both parties certain rights within this Preserve. While both parties seek to preserve the ecological integrity of the area, the City seeks to also develop an education center and various public programs at the north end on disturbed land.

A jointly written application was approved for funding by Florida Communities Trust and efforts continue to acquire additional properties. A revision of the current interlocal agreement also is being developed to better clarify each party’s role. A limited amount of restoration occurred in 2000. A wildfire burned several dozen acres of pinelands and some firebreaks were installed for future prescribed fire use. Limited surveys were conducted to determine species occurrence and status of habitat.

Allen’s Creek Preserve

This 14-acre site near the mouth of Allen’s Creek on Tampa Bay has sometimes been referred to as the Lancaster Tract by Pinellas County. Several major initiatives occurred in 2000. In November, the Board of County Commissioners approved the purchase of a nearly 20-acre tract of uplands and wetlands just upstream of the current Preserve boundaries, but not adjacent. This tract includes some significant marsh within a natural meander of the Creek and some uplands adjacent to the shoreline.
A major restoration project within the Preserve, funded by SWIM, was initiated. The consulting firm of Scheda Ecological Associates was hired by SWFWMD to design and construct this restoration which will include shoreline restoration of Allen's Creek, systems to improve water quality of the Creek downstream, removal of all exotic plants, and planting of uplands to native communities. Efforts will continue to use this site for elementary school environmental education, but much of this use currently is postponed during the design/construction phases of the restoration.

Ozona Preserve

The eight-acre Ozona Preserve is composed mostly of mangroves with some adjacent uplands near the Gulf of Mexico in historic Ozona. Once directly connected to the Gulf by a tidal creek, present-day connection is maintained by a series of underground culverts. Restoration of the uplands (which are greatly impacted by invasive plant species) and the tidal connection are the most critical management goals. Development of a passive public use component also is a consideration.

A very significant purchase of a 1.75-acre tract was made in 2000. This parcel is significant because it connects the two tracts of the Preserve to form one contiguous unit. The other important initiative to occur in 2000 was the completion of a contract to eliminate invasive, non-native plants within the Preserve boundaries. Work will be completed in early 2001 and should eliminate all current infestations; making future control efforts manageable by staff.

Joe’s Creek Preserve

This is a nearly 200-acre tract on Cross Bayou in Boca Ciega Bay. Several major restoration efforts have occurred on site during the past years and several new projects occurred/were initiated in 2000. A major salt marsh/mangrove restoration was completed on the property west of Park Street and deeded to Pinellas County as part of the Preserve following its completion. A second major restoration project is in the design phase for an upland region at the southeastern section. This project will involve the removal of old spoil piles, elimination of invasive, non-native plants and creation of wetlands and uplands to improve habitat and water quality in Joe’s Creek. Work on this project should commence in 2001. An active Bald Eagle’s nest site was again monitored and at least one chick was fledged. Staff spent time during the year eliminating some invasive plant problems west of Park Street.

Mariner’s Point Preserve

In December 2000, Pinellas County acquired a 65-acre tract of environmentally-sensitive land west of the end of Curlew Road in incorporated Tarpon Springs. Currently referred to as Mariner’s Point Preserve, this parcel contains a diverse assemblage of native plant communities, including well-drained uplands, tidal swamps and marshes on the Gulf of Mexico. An inventory of plants and wildlife will be developed in the year ahead, the perimeter of the property will be fenced to protect it from vandalism, and a preliminary management plan will be written.

FISH & WILDLIFE CONSERVATION
COMMISSION -FLORIDA MARINE
RESEARCH INSTITUTE’S STOCK
ENHANCEMENT RESEARCH FACILITY

The Stock Enhancement Research Facility (SERF) is the state’s marine fish hatchery, located at Port Manatee. SERF is currently involved with raising red drum for release into the Alafia and Little Manatee Rivers. Last featured in the 1995 State of Tampa Bay Report, SERF utilizes a man-made Spartina pond to treat hatchery water prior to discharge into tidal ditches connecting to Tampa Bay. The Spartina plants, associated animals, and microbes are effective in cycling and assimilating nutrients. Now a fully-developed marsh, this pond is a renewable source of plants for many marine habitat restoration projects. This year over 39,000 planting units of Spartina alterniflora were provided free of charge to groups willing to harvest the plants. Tampa Baywatch added four new schools to its High School Wetland Nursery Program: N.B. Young Middle School, Bloomingdale High School, Dixie Hollins High School and Madeira Middle School. The Southwest Florida Water Management District’s Surface Water Improvement & Management (SWIM) Program harvested 15,000 plants for their Palmetto Estuary project and 2,500 plants for the

SPARTINA POND HARVEST LOG - 2000

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<th>Date</th>
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<th>Agency</th>
<th>Project Site</th>
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</table>

State of Tampa Bay 11
continuing Boca Ciega Park project. The Department of Environmental Protection's (DEP) Ecosystem Management & Restoration Program harvested plants for Emerson Point, Hog Creek, and the Florida Aquarium. The DEP Office of Emergency Response harvested plants to replant a shoreline at Port Redwing following clean-up of spilled oil. Since 1997, over 130,000 planting units have been harvested to create shoreline marshes enhancing fisheries habitat and improving water quality.

MANATEE COUNTY ENVIRONMENTAL MANAGEMENT DEPARTMENT

**SEAGRASS PROTECTION & ENHANCEMENT** - In 2000, the Environmental Management Department (EMD) continued its study of seagrasses in lower Tampa Bay. Since healthy seagrasses are essential to good water quality, seagrass sampling provides a "snapshot" of a waterbody's general condition. Seagrass meadows are one of Florida's most productive ecosystems - providing food for manatees and crustaceans, serving as juvenile fish habitat, and affording hiding places for smaller creatures. EMD evaluates the four major seagrass species for percent of coverage, grass length and epiphyte density. Sediment quality is also evaluated. Water column sampling, conducted concurrently with seagrass sampling, characterizes water quality in terms of salinity, temperature, transparency, chlorophyll, turbidity and photosynthetic active radiation (PAR).

**ARTIFICIAL REEFS IN TAMPA BAY** - EMD continued to expand its Artificial Reef Program, an effort that creates new marine habitat to offset development-related losses, and enhances recreational fishing and diving opportunities. Funds secured in 2000 for EMD's Inshore Reef Program will allow construction in 2001 of five new reefs, which will consist of pre-fabricated "Reef Balls." The new reefs will provide fishing opportunities for anglers who wish to ply the shallower waters. The reef balls, dropped from barges into environmentally-appropriate areas, quickly attract the organisms that form the foundation of the marine food chain. Within a few short months, the new reef becomes a thriving, diverse habitat.

**BENTHIC MONITORING PROGRAM** - The year 2000 saw EMD's 8th year of synoptic Benthic Water Quality Monitoring. Through this TBEP-initiated effort, bottom-dwelling marine invertebrates are collected by boat at 22 different locations in the Manatee River and Terra Ceia Bay. These invertebrates are then examined under a microscope. Sediments are also sampled and analyzed for metals and toxins. This program provides excellent data on water and sediment quality. Evidence of chronic environmental pollution within invertebrate communities shows a direct cause-and-effect link, and allows scientists to predict long-term trends.

**EVERS RESERVOIR WATERSHED MONITORING** - The Evers Reservoir Watershed Monitoring Project, aimed at characterizing water quality in the reservoir and its tributaries, continued through 2000. Begun in 1998, this joint effort of Manatee County, the City of Bradenton and the United States Geological Survey (USGS) allows us to track water quality changes in the watershed. This information is critical to protection of the City of Bradenton's potable water supply. Data from five years of monitoring are in the Hydrologic Description of the Braden River Watershed, West-Central Florida (USGS Open File Report 96-634), and a second, more detailed 1999 report: Water Budget and Water Quality of Ward Lake, Flow and Water Quality Characteristics of the Braden River Estuary, and the Effects of Ward Lake on the Hydrologic System, West-Central Florida (USGS Water Resource Investigations Report 98-4251). These reports describe the surface water monitoring network and the general hydrologic and water quality information generated.

**STORMWATER MANAGEMENT - NPDES MS4 PERMITTING** - EMD entered the third year of the five-year, EPA-mandated National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer (MS4) Program. MS4 operators must implement a multi-faceted stormwater management program to limit non-point source pollution to local rivers and estuaries. Manatee County Ordinance 00-02, enacted in early 2000, gave EMD regulatory authority over stormwater discharges to the County's
MS4 to ensure the County stays in compliance with its EPA permit.

EMD is responsible for several parts of the stormwater management program. In 2000, staff began inspecting and mapping all outfalls to the MS4. EMD inspectors look for illegal connections to the system. The latest in Geographic Information System (GIS) technology helps EMD staff accomplish their NPDES compliance tasks.

Water quality monitoring requirements of the County's NPDES permit are met by EMD's current ambient water quality and benthic monitoring programs, both of which use an innovative stratified random sampling design. EMD continues to conduct separate surveys of sediment metal concentrations within the MS4.

- MERCHANT POWER PLANT SITING - EMD staff are reviewing plans for a gas-fired merchant power plant, proposed for a location in north County near Tampa Bay. If built, the plant will increase the total air pollutant load from in-County and regional sources. This is a serious concern, since a significant portion of the region's nitrogen emissions ultimately find their way to Bay waters. Once in the water, nitrogen "fertilizes" algae, leading to blooms that decrease water quality and cause habitat losses.

CITY OF CLEARWATER'S WATERSHED PLANNING

The City of Clearwater has begun watershed planning to address numerous natural system and flood protection level of service concerns in its largest watershed basin, the Stevenson Creek Watershed. This approximately 6,000-acre basin, developed primarily as residential and commercial land use, drains into Clearwater Harbor and St. Joseph's Sound, an Outstanding Florida Harbor and identified as a feature of the Pinellas Aquatic Preserve. Three projects have been identified and are now being developed to address the problems noted within the Stevenson Creek Basin. Those projects include:

Watershed Plan - Development of a (WMP) for the Stevenson Creek basin and implementation of projects to provide flood protection, water quality and natural systems improvements. Clearwater applied for and received a commitment from the Southwest Florida Water Management District (District) Pinellas-Anclote River Basin Board, for funding the study in August 1999. The WMP is underway and anticipated to be complete by June 2001.

Estuary Restoration Plan - Develop and implement a Stevenson Creek Estuary Restoration Plan. Clearwater completed a dredge feasibility study in August 1998. Application for federal assistance through the U.S. Army Corps of Engineers (USACOE) Section 206 Program was made in August 1999 to develop and implement a restoration plan for the creek. The USACOE has completed a Preliminary Restoration Plan (PRP) which consists of a narrative outlining project information, details of the desired project, pertinent financial information and a map of the project area. The PRP acts as a request to initiate an Ecosystem Restoration Report (ERR), by the USACOE, and is submitted to the USACOE's higher authority for approval. The ERR phase should start in January or February of 2001, and will determine if the restoration is feasible and in the national interest. With federal approval, restoration dredging with federal assistance could begin in 2002.

Stormwater Retrofit Demonstration Project - Implement the Stormwater Retrofit Demonstration Project in the North Greenwood Community. Clearwater applied for and received commitment from the District's Pinellas-Anclote River Basin Board, for funding the project in August 1998. The project is underway and construction is scheduled for completion by May 2001. Water quality monitoring will continue beyond project completion for approximately one year to measure project cost effectiveness of the new technology.

These three projects work together to identify resolution alternatives to the water quality and flooding problems which have been identified by basin residents. Development of the watershed plan will improve the City's understanding of the existing conditions within the basin through development of the hydrologic, hydraulic and water quality information required to justify, prioritize and permit project alternatives. The implementation of the North Greenwood project and the recommended alternatives from the WMP will improve the quality of the water.
discharged to the estuary by reducing the sediment and pollutant loads. The improved water quality will help the restored estuary to stay healthy after the projects are complete.

**EGMONT KEY 2000**
**WOW! LOOK AT THE SAND!**
The end of 2000 saw the completion of the sand placement project on the northwest section of the shoreline at Egmont Key. This project, managed by the Corps of Engineers, took sand dredged from St. Petersburg Harbor and placed it at Egmont Key.

The shoreline around the Spanish American War gun batteries was restored with two Geotubes placed toward the northern end of the island. This should give adequate time to determine a permanent long-range solution to the erosion problem which has intensified in recent years at Egmont Key.

It is especially important to thank all of the groups who played a major role in seeing the sand placement project become a reality. Only by a well-coordinated effort at the local, state, and federal levels, and with excellent input from the environmental community, was the tight timetable for this work addressed and completed.

The sand placement was just one of a number of significant happenings at Egmont Key in the year 2000. The year 2001 should also complete the transfer of the northernmost 50 acres of the island from the control of the U.S. Coast Guard to the U.S. Fish and Wildlife Service (USFWS). The Coast Guard will continue to maintain the light as an operational “aid to navigation,” but all other responsibilities for the lighthouse building and other structures will be the responsibility of the USFWS.

Also of major importance was the transfer of State Park Manager, Bob Baker, who had been Park Manager since Egmont Key State Park was established. Egmont Key is now a unit of the Gulf Islands GEOpark system. The new manager is Perry Smith, who manages Egmont Key and the Skyway fishing pier, Anclote Key, Caladesi island, and Honeymoon Island, as well as additional properties.

It was announced that the Florida State Park Service is exploring the turnover of the Park to the federal agencies which are the actual landlords. This is a result of state government efforts, initiated by the Governor, to manage the size of state government. The State would terminate the co-management agreement, which would mean that there would be no state presence on the island. This issue will be resolved in the upcoming session of the Florida Legislature, in the spring/summer of 2001. The role of the Egmont Key Alliance is to “preserve, protect, and restore” Egmont Key, and we look forward to working closely with the USFWS.

Utilizing funding from the State of Florida, the Guard House, another significant structure from the Spanish American War period, had the exterior and interior concrete repaired, and a wood truss roof was installed over the entire building. A modern heating and air conditioning system, new electrical supply and wiring, interior walls, and a new drop ceiling were installed. These renovations, along with new windows and doors, go a long way toward making the Guard House a major focal point in depicting 1898-era structures. It will also move us much further toward utilizing the building as a visitor’s center and highlighting the unique environment and history of Egmont Key.

**NATURAL RESOURCES**
The programs to eradicate exotic vegetation continued during the year. Garlon 4 and JBL applications were made across the entire island; 450 Australian pines and Brazilian peppers were killed.

Loggerhead turtle nesting decreased from 1999. Because there was so little beach area available in the northern half of the west shoreline, little nesting was observed in this area.

The Park staff and volunteers continued to survey the Gopher tortoise population on the island; 826 tortoises
were identified. Shorebird nesting data was not available from the USFWS at the time this report was submitted. Much work is still needed to fully utilize the native plant nursery which was established in 1999.

**VISITOR SERVICES**

The number of visitors to the island decreased in 2000, partly due to the colder weather at the end of the year and partly due to the sand placement work being done along the northwestern anchorage areas of Egmont Key. With the new beach in place, we would anticipate a major increase in visitations, once the boating public is aware of the new beach areas adjacent to the gun batteries.

The interpretive program schedule was again conducted on the second and fourth Sundays throughout the summer months and the fall period as interpretive personnel were available. Forty-seven programs were conducted using volunteers and park staff. A total of 4,723 volunteer hours were logged in, covering all aspects of activities from exotic plant removal and interpretive programs to Gopher tortoise monitoring.

For the third year the Egmont Key lighthouse, along with many other lighthouses in Florida, was brightly decorated with over 1,000 lights for the Christmas holidays.

The Alliance continues to have as its main priorities: Restoration of Egmont Key to a more natural state, and to preserve our unique historic structures. We look forward to the challenges of 2001.

**HILLSBOROUGH RIVER GREENWAYS TASK FORCE**

The Hillsborough River Greenways Task Force (HRGTF) is a non-profit, public-private partnership. Its mission is to facilitate the implementation of permanent protection of the natural resources of the upper Hillsborough River greenway. 2000 saw the HRGTF focus on its core objectives while also striving to recruit and sustain new volunteers for its State-recognized program, the Frog Listening Network (FLN).

The FLN is a volunteer research project initiated by the HRGTF in partnership with the Florida Fish and Wildlife Conservation Commission, the Florida Department of Environmental Protection, the Southwest Florida Water Management District (District), and numerous other HRGTF participants and volunteers in late 1998. The purpose of the FLN is to monitor the environmental health of the Hillsborough River watershed through citizen involvement and participation.

Frogs are excellent barometers of general ecosystem health due to their sensitivity to changes in their environment. Additionally, frogs are good biological indicators because their lifecycle includes both upland and aquatic habitat needs. Thus, frogs are early indicators of environmental changes affecting their habitats and they may alert us, humans and scientists, to such environmental changes and potential concerns.

The HRGTF directed much of its efforts over this past year to the FLN. A total of approximately 3,000 citizen volunteers have received official FLN training in order to participate in this ongoing amphibian monitoring program. Additionally, innumerable citizens were less formally introduced to the FLN by several important educational projects initiated throughout the year including the following.

The HRGTF/FLN web pages: [www.hrgtf.usf.edu](http://www.hrgtf.usf.edu) and [www.seaworld.org/fln/in.htm](http://www.seaworld.org/fln/in.htm) respectfully, were enhanced and improved to include much more information about the HRGTF and Frog Listening Network programs. Over 7,000 people visit our website each year and are informed about the FLN. With the enhanced site, the HRGTF believes these numbers will be increasing dramatically. The site includes information such as species descriptions, photos and call information on all 21 species of frogs, toads and exotics found in the Tampa Bay area. The web page enhancements were made possible by FICUS and Sea World/Busch Gardens Tampa Bay.

New to the array of training materials this year is the FLN full-color poster. The poster includes original artwork by local artist Stephen Koury done in watercolor. Each frog is depicted as it would be found in nature, with distinguishing characteristics slightly exaggerated to allow for easier identification. The poster was made possible through a Community Education Grant from the District. The FLN poster, West Central Florida's Frogs
and Toads, complements other FLN training materials such as the CD, tape and Identification cards.

One of HRGTF’s biggest accomplishments this year was the creation and production of a new, hands-on, interactive display at the Florida Aquarium called Frog Music. This is a stand-alone display telling the story of the role of a frog in environmental protection. The display highlights local frog species and integrates touchscreen computer technology and hands-on highlights that are fun for all ages. The Florida Aquarium gets over 500,000 visitors each year. All these visitors will now be exposed to the important role that frogs take in environmental protection.

To complement the exhibit at the Florida Aquarium, the HRGTF and Aquarium developed and produced numerous FLN children’s activities and educational programs. These activities include children’s games, storytelling stories and pamphlets to hand out to interested visitors. The exhibit was made possible through two grants provided by the Tampa Bay Estuary Program and the Tampa Port Authority. The children’s activities were made possible by the Stormwater Permit Public Education Committee of the Florida Department of Transportation.

Finally, the HRGTF is in the midst of producing their first interactive CD-ROM for the FLN. This CD-ROM will include all the information found in other FLN training materials plus much more. Additions include habitat information such as descriptions and visuals, and information on habitat protection through stormwater runoff and pollution control. Photos of each frog and toad species are provided, including an in-depth look at the natural history of each frog species, as well as the base GIS map used to track all data reported by FLN volunteers. The CD-ROM is scheduled for completion by the end of February 2001 and is made possible through the Stormwater Permit Public Education Committee.

Data submitted by all FLN volunteers is compiled and mapped on GIS. The map is updated annually and provided to local scientists to use as part of their environmental assessments of local areas. Every volunteer is asked to adopt a local habitat to monitor and provide monthly updates to the HRGTF regarding what frog species are heard/not heard at their adopted site. Yearly trend analysis will be completed in order to assess habitat situations.

Another important project completed by the HRGTF during 2000 was our Fourth Annual “A River Runs Through It” event, held May 6th at the USF Riverfront Park. As in previous years, citizens of the watershed experienced a day-long celebration of one of our most precious community resources, the Hillsborough River. Free canoe rides, nature walks and stewardship activities for kids of all ages were available throughout the day. The purpose of the event was to celebrate the River and to educate citizens on ways in which they can become involved in its protection; to highlight Hillsborough County’s Lake Watch and Stream Waterwatch volunteer programs; to commemorate the City of Tampa’s “Drinking Water Week”; to highlight the State Recreational Canoe Trail; and to support Nature’s Classroom and ARC at the Park through the sale of event refreshments. We hope to see you on April 22, 2001 as we plan to partner with Friends of the River in celebration of Earth Day. The River Event will be transformed to include all aspects of Earth Day to make for a bigger and better event!

Finally, one of the greatest accomplishments of the HRGTF was the ability to secure a federal grant from the Federal Highway Administration for our CLIPS project (Coordinated Linear Infrastructure). This grant is in partnership with the Southwest District of the FL Dept. of
Environmental Protection and will allow the HRGTF to complete its Economic Analysis and Mock CLIP. The implication of the federal grant brings the possibility of taking this initiative national, once completed.

The Task Force continues to address and promote issues such as proper land use and water conservation; land acquisition; coordinated linear infrastructure; and when inevitable, seeking "greenways-compatible" development design. To that end, with all the growth in the Tampa Bay region, it is imperative that we continue to work together as a community to protect and preserve the upper Hillsborough River watershed, one of the last remaining natural areas in the watershed.

The HRGTF is primarily a volunteer organization with one staff person: Laura Maniscalco DeLise, Executive Director. Officers and Project Group Chairs for 2001 are: Roger Stewart, Chair; Linda Andrews, Vice Chair; Dave Bracciano, Treasurer and Finance Committee Chairs; Mike Zavosky and Stefan Katzaras, Education and Outreach Co-Chair; Bill Smith and Jim Beever, Frog Listening Network Co-Chairs; Nick Nichols and Stan Maloy, CLIPS Co-Chairs; Stuart Marvin and Dave Sumpter, Land and Water Use Co-Chairs.

The HRGTF is open to anyone and everyone who is interested in protecting and preserving the Hillsborough River Greenway. Please join us - we welcome your participation! To get involved in any or all of the Task Force issues or activities, please call us at 813-744-6100, ext. 479, or write: the HRGTF, 3804 Coconut Palm Drive; Tampa, FL 33619, or email us through www.hrgtf.usf.edu

**PINELLAS COUNTY ENVIRONMENTAL FOUNDATION**

The future of the environment in the Tampa Bay area is much brighter, thanks to a historic partnership between the National Fish and Wildlife Foundation (NFWF) and Pinellas County, Florida. The NFWF and Pinellas County have created the **Pinellas County Environmental Foundation (PCEF)**, which brings to the County’s environmental programs all of the advantages of a national, not-for-profit foundation. It is NFWF’s first formal partnership with a county government. The PCEF will enable the County to pursue a more proactive approach with wildlife management and endangered species programs.

**Mission Statement:** Pinellas County and the National Fish and Wildlife Foundation share the common goals of actively pursuing the protection, restoration and enhancement of fish and wildlife habitat, of developing creative and sustainable solutions to natural resource challenges, of environmental education and outreach, and of forging partnerships among stakeholders to implement long-term solutions.

The NFWF manages the funds and has established a Challenge Grant program through the PCEF. A nine-member advisory committee reviews proposals that meet foundation goals, and makes final funding recommendations to the Fish and Wildlife Foundation’s Board of Directors. The NFWF considers awarding grants of federal funds on a case-by-case basis.

Program areas representing the PCEF’s priorities include: **Species Management and Conservation, Environmental Education and Outreach, Research, Habitat Management, Ecosystem Management, and Environmental Monitoring.**

Here’s a brief overview of current Grant projects:

**Project: Millennium Islands for Millennium Children**
Grantee: Clearwater Marine Aquarium
Funding: PCEF $1,610
Challenge $1,610
Total $3,220
Location: Clearwater Harbor

**Project description:** Through the Marine Life Adventures environmental stewardship program, the Clearwater Marine Aquarium will work with community volunteers, biologists, and Pinellas County school children to restore an island in Clearwater Harbor. The project will replace exotic vegetation with native plants and remove garbage from the island to create an outdoor living classroom for students and a pleasant recreation area for the community.

**Project: Bird Colony Protection in Pinellas County**
Grantee: National Audubon Society and Florida Coastal Islands Sanctuaries
Funding: PCEF $15,200
Challenge $15,200
Total $30,400
Location: Clearwater Harbor, Coffee Pot Bayou, St. Joseph Sound, Anclote River, and Alligator Lake.

**Project description:** Approximately 7,000 pairs of colonial waterbirds nest on 18 coastal sites in Pinellas County. This project seeks to develop a comprehensive bird colony protection program by focusing on important nesting sites. Activities include posting nesting colony sites as necessary, monitoring and patrolling, habitat and predator management, fishing line removal, and public education and outreach.
Project: **High School Wetland Nursery Program**  
Grantee: Tampa BayWatch  
Funding: PCEF $32,930  
Challenge $32,930  
Total $65,860  
Location: Tampa Bay Estuary  

**Project description:** In partnership with local middle and high school students, Tampa BayWatch works to conserve and restore coastal wetland habitats in Tampa Bay through the establishment of salt marsh nurseries. The nurseries provide a source of native wetland plants which are used in habitat restoration projects. As it matures, a single plug or stock plant multiplies into 10 - 15 plugs which are then harvested and planted. The remaining half of the stock is separated into individual plugs that are then re-planted in the nursery for another growing season. There are six established nurseries in Pinellas County and plans include establishing two new nurseries during the 2000/2001 school year.

Project: **Egmont Key Exotic Plant Control**  
Grantee: U.S. Fish and Wildlife Service  
Funding: PCEF $17,500  
Challenge $17,500  
Total $35,000  
Location: Egmont Key National Wildlife Refuge  

**Project description:** The U.S. Fish and Wildlife Service will remove invasive exotic trees and shrubs, particularly Australian pine and Brazilian pepper, on 30 acres of the Egmont Key National Wildlife Refuge. This will initiate the restoration of the area to a native plant community which will provide habitat for 25 species designated as threatened, endangered, or of special concern.

Project: **Clam Bayou Habitat Restoration**  
Grantee: Southwest Florida Water Management District  
Funding: PCEF $30,000  
Challenge $30,000  
Total $60,000  
Location: Clam Bayou, St. Petersburg  

**Project description:** This project will restore approximately 87 acres of intertidal, freshwater, transitional, and upland coast habitat surrounding Clam Bayou through the removal of invasive exotic plants and construction of wetland areas. This restoration effort is part of a larger, bay-wide program, and will provide essential nursery areas for fish habitat and other wildlife.

PCEF awards challenge grants of County funds. Challenge grants require a third-party match of cash or contributed goods and services from the PCEF grantee. A challenge grant therefore challenges grantees to match PCEF awards with funds, goods, or services. Matching funds may be secured from a single third party, or from multiple parties. To be considered, an applicant must first submit a pre-proposal. Pre-proposal annual deadlines are June 1 and October 15. If pre-proposals meet funding guidelines, full proposals will be considered. Deadlines for the full proposal are July 15 and December 1. For more information about the Pinellas County Environmental Foundation, contact Peter Stangel, National Fish and Wildlife Foundation, Southeast Partnership Office, 1875 Century Boulevard, Suite 200, Atlanta, GA 30345; 404-679-7099; e-mail stangel@nfwf.org

**Pinellas Gets Hooked on Fishing!**  
The Pinellas County Environmental Foundation (PCEF) has coordinated a new nature tourism program that's sure to become the model program for conservation of local fisheries. *Spring on the Flats* premiered on May 5-6, 2000. The debut event was made possible by a New Product Development grant from the Clearwater/St. Petersburg Convention and Visitors Bureau.

*Spring on the Flats* is designed as an annual near-shore, catch-and-release fishing tournament featuring renowned guides and citizens. In addition to being an exciting and fun event for fishing enthusiasts, the PCEF will place the value of and need for wise management of the area's near-shore fisheries in the national spotlight. The PCEF, in partnership with the National Fish and Wildlife Foundation, renowned area fishing guides, and many others, believe the community will embrace and support the area's new nature tourism event as they have the successful *Florida Birding Festival & Nature Expo*.

It's a natural partnership for sustainable nature tourism to engage the angling public in a fund-raising event, with profits returned to the Foundation for the improvement and management of the area's estuaries. With more than 30 miles of white Gulf beaches, Pinellas County enjoys the status of one of the world's top vacation travel destinations - attracting more than 4.25 million visitors each year. All types of fishing, including the natural bounty of in-shore fisheries, are a staple of the area's nature-based tourism opportunities. And each year, springtime on the shimmering grass flats in Tampa Bay finds anglers from around the world hooking plentiful tarpon, redfish, snook, and trout.

All of the waters around Pinellas County are in an aquatic preserve; all of the attention we can draw will serve us well. *Spring on the Flats* will bring regional and national media awareness and support for these precious natural resources. All proceeds generated by the event will be distributed through the PCEF grant program for management of the estuary and its watersheds, public outreach and education. **Mark your calendars now for the second annual event March 23 - 24, 2001.** For information, call 1-800-822-6461.
A Weekend For The Birds!

People and children of all ages and from various parts of the country flocked to the Florida Birding Festival and Nature Expo October 5 - 8, 2000. Close to 800 registered for the Festival, taking more than 40 field trips to see birds and other wildlife in their natural habitats. The mission of the Festival is to promote appreciation and conservation of Florida’s birds and their habitats through responsible nature-based tourism and public awareness. It’s a program within the Pinellas County Environmental Foundation.

The Nature Expo featured lots of wonderful experiences for children and families, including a butterfly tent with more than 1,000 winged beauties! Many bought plants to attract butterflies in their own backyard. Kids built bird house nest boxes and learned about the kind of bird their nest box would attract. They also made crafts and joined in on the fun and games at the Science Safari. Searching through owl pellets with the staff from the Florida Fish and Wildlife Conservation Commission was an unusual yet fun experience for those who took part.

Lots of exhibits and displays featured the latest equipment to make nature experiences even better.

This year’s Festival also featured an impressive lineup of keynote speakers who amazed birders and non-birders alike, including: John W. Fitzpatrick, Birds Can Save the World; Kenn Kaufman, Why Nothing Beats Birding; and Scott Weidensaul, Living on the Wind. A book signing with these and other Festival authors was extremely popular. Hundreds picked up the latest books by many of the Festival’s speakers, including Aububon’s Sibley Guide to Birds, the latest field guide written by David Sibley.

Proceeds from the Festival benefit Shell Key Preserve, a Gulf Coast barrier island rich in bird and marine life. It’s one of the last intact ecosystems of this type in the state, providing ideal habitat for shorebirds, wading birds and marine life. It’s well-known to local fishermen as well for providing excellent fishing opportunities.

The Florida Birding Festival & Nature Expo was hosted by the Pinellas County Board of County Commis-
EGMONT KEY NATIONAL WILDLIFE REFUGE

Due to persistent patrols by U.S. Fish and Wildlife Service Law Enforcement, Florida Park Service personnel, and volunteers, bird nesting in the wildlife sanctuary at Egmont Key National Wildlife Refuge and State Park was successful for the first time in many years! Brown Pelicans nested for the first time in at least 17 years. A total of 126 pairs of Brown Pelicans produced 189 young. Three thousand pairs of Laughing gulls produced 4500 young. Seventy-eight pairs of Royal terns produced 78 young and 56 pairs of Sandwich terns produced 56 young. Only six pairs of American Oystercatchers nested, with one young fledged.

A Special Use Permit was issued to the U.S. Army Corps of Engineers in September 2000. The dredged material from the St. Petersburg harbor was deposited on the northwestern portion of Egmont Key to prevent further erosion to the historic structures. Approximately 600,000 cubic yard of material were deposited on Egmont Key; some up to the tops of the Howard and McIntosh batteries. The sand should help prevent erosion to the historic structures and provide additional beach for sea turtles to nest. The project was completed in November.

Joyce M. Kleen, Chassahowitzka National Wildlife Refuge Complex, 352-563-2088.

HILLSBOROUGH INDEPENDENT MONITORING PROGRAM: BENTHIC MONITORING ELEMENT

The Environmental Protection Commission of Hillsborough County (EPC) was directed by the Hillsborough County Board of County Commissioners to develop a monitoring program to address concerns of potential environmental impacts from proposed Tampa Bay Water water production projects. These include flow diversion/withdrawal projects in the Hillsborough, Palm, and Alafia rivers as well as the area of the proposed desalination plant at TECO's Big Bend Generating Station. As part of this Hillsborough Independent Monitoring Program (HIMP), the Little Manatee River was added as a "spatial control" estuary and sampling of McKay Bay (downstream of the Palm River) is also part of the program.

Data generated by this monitoring will supplement data collected since 1995 under the auspices of the Tampa Bay Benthic Monitoring Program and supported, in part, by the Southwest Florida Water Management District since 1998.

Formal HIMP benthic sampling commenced during August 1999 and is to continue for at least six years (three years pre- vs. three-years post-production). Objectives are to characterize the spatial patterns of benthic macroinvertebrates within the study areas and ascertain whether there are differences in community structure and species distributions vis a vis salinity pre-production vs. post-production. Results from the 1999 sampling have been summarized in a series of Technical Memoranda which are available from EPC. For further information contact: Stephen Grabe or David Karlen at 813-272-7104.

CLEARWATER MARINE AQUARIUM

Several species of marine turtles inhabit the Tampa Bay waters, including the Loggerhead (Caretta caretta), Green (Chelonia mydas), Kemp's ridley (Lepidochelys kempi), Hawksbill (Eretmochelys imbricata), and the Leatherback (Dermochelys coriacea). All of these species, except for the Loggerhead, are critically endangered. Females are found nesting throughout the area's coastal beaches during the summer. The primary threats to marine turtles are from man, they include entanglements in fishing gear, being hit by boats, and loss of habitat due to coastal development. In Tampa Bay all of these factors have contributed to the decline of marine turtles. The majority of suitable nesting habitat within Tampa Bay is highly developed coastline, which creates numerous problems for nesting marine turtles. The primary species that nests on the beaches located in and around Tampa Bay is the Loggerhead. In addition the Kemp's ridley and the Green turtle have also been documented nesters. Nesting activity is monitored by a number of groups including the Clearwater Marine Aquarium (CMA), Pinellas County Park's Department, the Florida Fish and Wildlife Conservation Commission (FWC), and local residents.

In Pinellas County, stranding events are responded to by FWC and CMA biologists. Stranding events can be either live or dead specimens; live specimens are taken
sioners, the Pinellas County Environmental Foundation, and the St. Petersburg/Clearwater Area Convention and Visitors Bureau. An event this great wouldn't be possible without wonderful sponsors, including the St. Petersburg Times and Wheelabrator-Pinellas. Special thanks to: Birdwatch America, Cargill Fertilizer, Contractors and Builders Association, Banning Lumber & Millwork, Eagle Optics, Hooters Restaurants, JMC Communities, National Fish and Wildlife Foundation, Pinellas County Utilities, Swarovski Optik, Wild Birds Unlimited, and Zephyrhills Bottled Water.

We also thank our partners whose support and guidance helped to present this exceptional program: National Audubon, Audubon of Florida, the Audubon chapters of Clearwater, St. Petersburg, and Tampa, The Florida Fish and Wildlife Conservation Commission, Gulf Islands GEOpark, Partners In Flight, Florida Park Service, Barnes & Noble, and Kempfer Saw Mill.

Plans for next year's Festival are already well underway. Mark your calendar now for October 4-7, 2001. To make sure you're on the mailing list to receive information, call Pinellas County Public Affairs at 727-464-4600 or e-mail jgillesp@co.pinellas.fl.us

1993-2000 SUMMARY OF MONITORING RESULTS IN THE FT. DE SOTO PARK AND AQUATIC HABITAT MANAGEMENT AREA

Most people in the Tampa Bay area are now familiar with the protection zones and seagrass recovery efforts that have taken place in the Ft. De Soto Park and Aquatic Habitat Management Area over the past seven years. The County took the first detailed aerials in 1992, to gather baseline data prior to installing signs delineating the areas or enforcing the seagrass protection ordinance. The signs were installed in 1993 and aerials were taken on at least an annual basis thereafter. The aerials were digitized and analyzed to determine the scar rate within each type of protective area (non-combustion or seagrass caution) and then compared to the unprotected areas.

The County has tracked the prop scar rate over the years and has successfully slowed the increase in accumulated damage to the seagrass beds. Hindering our success was the fact that many signs were lost after the first few years. What was once thought to be vandalism turned out to be a galvanic reaction of bird droppings, salt water and dissimilar metals corroding the sign attachment points. Eventually, strong winds would pull the signs off the poles. New mounting methods resulted in minimal loss of new signs. Better signage, as well as increases in enforcement, education and experimental seagrass re-growth efforts, have resulted in a huge reduction in seagrass scars in the Ft. De Soto area.

These successes, and the fact that the Caution Areas have been about as effective as the Non-Combustion Areas in protecting the seagrass, resulted in modifications to the zones. The Board of County Commissioners recently approved modifications within the Ft. DeSoto Habitat Management Area that change some zones from "Non-Combustion" to "Caution." More significantly, large areas that previously had no protection were designated as "Caution" areas. Discussions are also continuing to extend the seagrass re-growth experiments that have been successful in this area. These efforts should provide faster and more complete recovery of this valuable resource.

As in past years, Pinellas County has continued to provide aerial photography of the seagrass areas surrounding Honeymoon and Caladesi Islands to the park managers. This continued cooperation between the County and the State enables improved management of this State Park for the benefit of the citizens of Pinellas County.
to CMA for rehabilitative care. Pinellas County continues to generate one of the highest incidence of marine turtle strandings in the state. So far this year, 57 stranding events have been documented. These are broken down into 26 Loggerheads, 19 Greens, 11 Kemp’s ridleys, and one Leatherback. Of particular interest was the Leatherback stranding. Originally this female Leatherback stranded on Anna Maria Island. The turtle was caught up in a line that got wrapped around the turtle’s right front flipper. The line nearly cut the flipper off. Because of the damage to this flipper CMA’s veterinarian decided to amputate. After surgery to remove “Anna’s” necrotic right front flipper, she was placed in a portable “K-d” pool. It was decided to place her in the portable pool, because Leatherbacks have been known to do serious damage to themselves in concrete enclosures. The pool Anna was placed in had soft sides that prevented her from doing serious damage when she came close to the walls of the pool. Typically, Leatherbacks do not do well in captivity.

This was also the case for Anna. The portable pool Anna was placed in provided some protection, however it did not protect her delicate skin from the constant rubbing when she swam. It was determined by staff veterinarians and biologist that Anna’s best chance for recovery would be in the open Gulf. After two releases and two subsequent strandings, biologists felt that Anna’s condition was more serious than first believed. After the second stranding it was determined that a prolonged rehabilitation was necessary, and that there was a good chance that the rehabilitation may kill her. Our first priority was getting Anna to eat on her own. We also needed to perfect diagnostic techniques that had rarely been done on Leatherbacks. After several days back in her rehabilitation pool, Anna became the first Leatherback in captivity to eat on her own. Anna began eating five lbs. of squid per day, and before long was eating up to 14 lbs. of squid per day. After Anna began eating everything appeared to be going well, except for her elevated white blood count and the continued damage being done to her skin. During her entire stay Anna was kept on regular doses of antibiotics to cure the infection that ultimately claimed her life. Anna showed us that Leatherbacks can be cared for in captivity, and that unlike other species of turtles, Leatherbacks require both front flippers to adequately survive in the wild. On the morning of May 23rd Anna died after three months of care. Anna was just one of the turtles rehabilitated and released this year at CMA. All told 37 turtles were rehabilitated and released during the year 2000.

Marine turtles, primarily Loggerheads, use the coastal beaches each nesting season to incubate clutches of eggs. The final tally of nesting activity for the area monitored by CMA was 168 nests, of which 139 produced hatchlings. This area extends from the northern portion of Clearwater to Blind Pass, in Treasure Island. The remaining 29 nests did not produce hatchlings due to inundation or predation. From the 139 nests that produced hatchlings 10,829 hatchlings were released into the Gulf of Mexico. Nesting also occurs on St. Petersburg Beach, Ft. DeSoto Park, and on Egmont Key. St. Petersburg Beach and Egmont Key reported 30 nests and Ft. DeSoto Park reported a record-nesting season with 59 nests on Mullet Key. Nesting was up slightly (1 nest), making 2000’s nesting total the highest number of nests ever documented in CMA’s survey area. The one nest that put the numbers over the previous record was not from a Loggerhead, but from a Green sea turtle. This was the first green turtle nest ever documented by CMA biologists in Pinellas County, and yielded two perfect little Green turtle hatchlings. The nest was deposited on one of the darker beaches, Belleair Shores, which in some places lacks suitable habitat because of erosion. The
female Green turtle crawled as high on the beach as she could get, but ran into a sea wall. During the process of nesting the female destroyed almost half of her own eggs. This again was due to the poor nesting conditions found in the chosen area. In addition to many of the eggs being destroyed by the female, more were destroyed after the nest was inundated by high tides and storms. Even so, the two hatchlings that did emerge were very large, by hatching standards, and possessed a great deal of energy. They seemed strong enough to cope with the many dangers that exist in the open ocean, and hopefully someday will come to nest again in Pinellas County.

Artificial lighting continues to be the main threat to marine turtles on the beach. We continue to cage nests in an attempt to prevent hatching death from artificial lighting, however this is only a temporary solution. The problem of artificial lighting is a very difficult situation to resolve. Pinellas County, being such a tourist destination, creates additional challenges to preventing light spillage onto the beaches. Many who visit this area have no idea that sea turtles nest on the beaches and that artificial lighting is so detrimental the nesting process. Education has always been and will continue to be at the forefront of our sea turtle program. The primary education tools are posters and brochures, in addition to educational tours and an adopt-a-nest program. There is the need for cities within Pinellas County to enact and enforce lighting ordinances. These ordinances can be written in a way that is beneficial to the public as well as to marine turtles.

Overall the year has been a busy one for CMA's marine turtle programs. We have handled many strandings, and gained valuable experience handling unusualstranding events. Nesting on Pinellas County beaches continues to increase or remain stable. This trend is a positive one, and we hope that it will continue. Marine turtles still face many threats to their continued existence, however it is hoped that, with the help of people in our community, they will be around for future generations.

For more information contact Glenn Harman, Director of the Marine Turtle Program at the Clearwater Marine Aquarium; 727-441-1790 ext. 224; e-mail turtles: turtles@cmaquarium.org

SEDIMENT & BENTHIC MONITORING PROGRAM FOR TAMPA BAY: ORGANIC CONTAMINANTS

Bay-wide monitoring of the sediments and sediment-associated organisms ("benthos") is a cooperative effort between the Tampa Bay Estuary Program, Manatee County's Environmental Management Department, Pinellas County's Department of Environmental Management, and the Environmental Protection Commission of Hillsborough County. This program has been in-place since 1993 and is an integral element of the Comprehensive Conservation & Management Plan for Tampa Bay.

Sediment contaminant monitoring for trace metals, organochlorine pesticides, polycyclic aromatic hydrocarbons [PAHs], and polychlorinated biphenyls (PCBs) was initially carried out only in the Old Tampa Bay (OTB), Hillsborough Bay (HB), Middle Tampa Bay (MTB), and Lower Tampa Bay (LTB) segments. By 1996 Boca Ciega Bay (BCB), Terra Ceia Bay (TCB), the Manatee River (MR) and four tributaries—Hillsborough (HR), Palm (PR), Alafia (AR), and Little Manatee (LMR) rivers had been added to the program. This report will summarize the status of Tampa Bay sediments with respect to the three classes of organic contaminants: organochlorine pesticides, PAHs, and PCBs.

Organic contaminants are of ecological concern since they have been implicated in development of tumors, may affect sexual differentiation, fertility, can contribute to ontogenetic abnormalities, and are toxic to aquatic organisms. The use of many organochlorine pesticides has been discontinued (e.g., Chlordane in 1988). However, these pesticides remain potential environmental hazards since they are generally long-lived in the environment (e.g. Chlordane has a half-life of about four years in soil) and can affect aquatic life either through resuspension from disturbed sediments, volatilization from agricultural fields, or by atmospheric transport from countries where their use is still permitted. PAHs (components of petrochemicals—although there are also natural sources) generally enter Tampa Bay via runoff from roadways or as a consequence of combustion. PCBs, whose manufacture was discontinued in 1976, have primarily been used as a dielectric in transformers. The most common

![Areal Extents of PCB Status](chart.png)
Some sediments are toxic to aquatic life. Most of Tampa Bay is at least "marginally" contaminated by organochlorine pesticides (based upon a composite assessment of DDT, Chlordane, Dieldrin and Lindane). However, 30% of the Hillsborough River could be considered "degraded" (high probability of toxicity to aquatic life). Only in Boca Ciega and Terra Ceia bays did "clean" sediments exceed 60% of the study area.

Contamination of Tampa Bay by both PAHs and PCBs appears to be negligible. This is especially the case for Lower Tampa Bay, Boca Ciega Bay, Terra Ceia Bay, the Manatee River, and the Little Manatee River, where 80% of these bay segments can be considered as "clean" (low probability that sediments are toxic to aquatic life). Conversely, larger proportions of the Hillsborough and Palm rivers are classified as either "degraded" (high probability that sediments are toxic to aquatic life) or "marginal" status.

These data suggest that contaminated sediments are localized within Tampa Bay. The most contaminated regions are the Hillsborough and Palm rivers, although some residential canal communities show evidence of degradation by pesticides. Future monitoring should better resolve the extents of tributary contamination and may afford the opportunity to investigate other "hot spots" as well. For further information, contact Stephen Grabe or David Karlen at 813-272-7104.

PINELLA'S COUNTY DEPARTMENT OF ENVIRONMENTAL MANAGEMENT'S BAY-RELATED ACTIVITIES

Surface Water Ambient Monitoring Program - The Water Resources Management Section of the Pinellas County Department of Environmental Management (PCDEM) launched a surface water monitoring program in October 1990 and began reporting results in January 1991. The program monitors water quality in a variety of creeks, streams, lakes, and open marine water bodies, including St. Joseph Sound, Clearwater Harbor and Boca Ciega Bay. Much of the rationale behind the water quality monitoring program is associated with County watershed planning initiatives consistent with State Water Policy (Chapter 62-40, Florida Administrative Code) and the County Comprehensive Plan.

The monitoring program is in part a result of the adoption of the Comprehensive Plan in 1989, which mandated implementation of ambient water quality monitoring under Goal 3 of the Conservation Element. The Plan was amended in 1998 and provisions for water quality protection of receiving waters now appear in the Surface Water Management Element.

Specifically, Goal 1 of the Surface Water Management Element states:

"...SURFACE WATERS SHALL BE MANAGED TO PROVIDE FLOOD PROTECTION FOR THE CITIZENS OF PINELLA'S COUNTY, TO PRESERVE AND ENHANCE THE WATER QUALITY OF RECEIVING WATER BODIES, AND FOR THE PURPOSES OF NATURAL RESOURCE PROTECTION, ENHANCEMENT AND RESTORATION, PLANT AND WILDLIFE DIVERSITY, AND ESTUARINE PRODUCTIVITY."

Comprehensive Plan Objectives and Policies emphasize the critical link between watershed management planning and monitoring of the County's waters to prioritize planning efforts based on need, as well as to evaluate the effect of implemented management activities on the quality of receiving water bodies. Furthermore, objectives and policies call for continued collaborative efforts with federal, state, regional, and local agencies and governments in assessing water pollution problems and evaluating management actions to remedy identified problems. The County water quality sampling network was originally designed to carry out the goals of the Comprehensive Plan, specifically (1) to characterize the relative priority of each receiving water for development of management plans, (2) to identify those tributaries...
contributing the greatest amount of pollutants, and (3) to provide a baseline for evaluating the impacts of management programs on receiving water quality.

The baseline data are used to illustrate current conditions, monitor long-term trends, assess effects of specific impacts, and to identify areas in the County where management efforts may be needed. Most of the County's 52 drainage basins contain at least one primary station located at or near the final discharge point from the basin. Sampling at these downstream stations allows water quality parameters and nutrient loads representative of the basin to be estimated. Stations are also located in bayous, inlets, near-shore areas, open bays, lakes, and at sites where major tributaries join the basin's main channel. In 2000, 79 primary sites were sampled monthly and 48 secondary sites were sampled every two months. Different groups of sites were monitored each week of the year. The results illustrate differences in runoff water quality, possible impacts of runoff to the receiving waters, and water quality by specific sites and basins.

Mean annual corrected chlorophyll-a concentrations are shown for the two largest County lakes and three marine embayments along the western coast of Pinellas County. Chlorophyll-a serves as a good indicator of phytoplankton biomass and the relative level of eutrophication in a water body. The 1996 Water-Quality Assessment report for the State of Florida (305(b)) summarized chlorophyll-a data from 421 lakes statewide. Median Chlorophyll-a concentrations (mg/m3) for oligotrophic, mesotrophic, and eutrophic lakes were 5, 24, and 78, respectively. Lake Tarpon is a mesotrophic (good-fair water quality) lake, while Lake Seminole is a hypereutrophic (poor water quality) lake. Mean annual chlorophyll values for the marine embayments of St. Joseph Sound, Clearwater Harbor, and Boca Ciega Bay indicate relatively good water quality, with chlorophyll-a concentrations for most years ranging from about 4-8 mg/m3. The higher mean annual chlorophyll values in 1998 are probably the result of higher rainfall and associated nutrient loads from the El Nino event occurring in 1997-98.

Contact Andy Squires at PCDEM, 727-464-4425, to request water quality data or to obtain more information about the monitoring program.

Watershed Management Plans - Pinellas County has been actively working to develop and implement watershed management plans in three drainage basins during the last several years. These basins include Allen's Creek, Lake Tarpon, and Lake Seminole. Last year's State of Tampa Bay edition (1999) provides a detailed summary of each plan, including the latest developments through 1999 in each of these basins. Work towards developing a management plan for the Cross Bayou Canal watershed is slated for fall 2001. An update of year 2000 activities for each basin is provided below.

Allen's Creek Watershed - This is a typical urban stream in the central portion of Pinellas County. Pinellas County, the City of Largo, and the City of Clearwater agreed to fund and develop a watershed management plan to address the problems of poor creek water quality and degraded habitat. The Board of County Commissioners adopted the watershed plan in October 1996. During 2000, work continued on numerous projects to evaluate and improve the creek, including: monthly creek water quality sampling, restoration of the "Lancaster" tract, continued post-construction monitoring at Maple Swamp, a shoreline stabilization project along the creek, removal of septic tanks, and sewer hook-up and installation of reclaimed water lines.

The PCDEM's Water Resources Management section continued sampling six creek water quality sites. Year 2000 results are not yet available, however; during the late 1990s, the creek had typically ranked among the worst 20% of all basins monitored countywide in terms of relative water quality.

The County acquired the 14-acre "Lancaster" tract along a lower stretch of the main creek channel in 1999. County staff continued to monitor wildlife (birds, mammals, reptiles, and amphibians) that were using the site. During 2000 design of a restoration plan for the parcel was initiated. Although not complete, the site restoration plan is likely to include shoreline plantings to help stabilize the shoreline and improve wildlife habitat, removal of exotic vegetation within the entire parcel, a stormwater pond, and eventually a public education/learning center. Construction is scheduled to begin late in 2001.

The Maple Swamp site restoration was completed in 1999 and the City of Clearwater has since been maintaining the numerous plantings to ensure that satisfactory survival is attained. County staff continued wildlife monitoring in 2000, but the next wildlife surveys are not planned for at least 2-3 years in order to allow the restored site to mature.

State of Tampa Bay 25
The City of Clearwater has projects underway to survey remaining homes with septic tanks north of Belleair Road, and to stabilize and realign the creek channel between Arcturas Pond and Gulf to Bay Boulevard.

Finally, the City of Largo has recently extended sanitary sewer service to 53 and 153 Largo and County properties, respectively. Only two septic tanks remain in Largo's service area south of Belleair Road. Late in 2000, work by the City was underway to install reclaimed water lines on St. Paul's Drive.

**Lake Tarpon Watershed** - The Lake Tarpon Drainage Basin Management Plan was adopted by the Pinellas County Board of County Commissioners in 1999. In 2000, the County and the Southwest Florida Water Management District (SWFWMD) worked on several projects recommended in the management plan.

One recommendation is to establish a water level fluctuation schedule that more closely mimics natural lake water level changes. The intent is to improve water quality by flushing accumulated nutrients from the lake and to promote the establishment of desirable shoreline vegetation. One additional benefit is the availability of up to eight million gallons per day of water that normally flows into Old Tampa Bay. A study is currently underway to determine the feasibility of storing discharge water from the lake in an underground aquifer for later use. The feasibility study will consider numerous potential uses of the stored lake water and the environmental concerns associated with such activity.

Another study is evaluating the existing fish population. Block netting took place this year to determine the community structure of the fish population. Preliminary findings indicate that the largemouth bass, bluegill and redear populations are very healthy. Black crappie has been a good fishery in the past; however, their numbers have declined in recent years.

Water quality data collected since 1988 show Lake Tarpon becoming more eutrophic in recent years. Six areas, or Manageable Hydrologic Units (MHUs) were identified in the management plan as primary pollutant loading basins that are contributing to these eutrophic conditions. One project initiated during 2000 is evaluating the possible construction of the first alum injection system in the Lake Tarpon Basin to reduce nutrient loadings in the MHU located just north of Chesnut Park. Plans to improve an existing pond system in Chesnut Park are also underway. The goal of the pond project is to improve circulation, establish native aquatic vegetation, and improve fishing and other recreational opportunities.

Sampling to enumerate and identify phytoplankton taxa found in Lake Tarpon was initiated in 2000. This effort along with water quality sampling will continue on Lake Tarpon in order to evaluate trends in phytoplankton community composition as well as water quality within the lake.

For more information about Lake Tarpon and its management plan contact Don Hicks, PCDEM, 727-464-4425.

**Lake Seminole Watershed** - Lake Seminole, the second largest lake in the County, has had poor water quality for many years. Recent data show worsening conditions. In 1999, the trophic state index for the entire lake was above 80, placing Lake Seminole within the hypereutrophic classification for Florida lakes. In 2000, sampling to identify and enumerate phytoplankton in Lake Seminole began. Results from this study have revealed that the blue-green algae, *Cylindrospermopsis* sp., as the primary contributor to the algal biomass in Lake Seminole. This algae is of special interest to scientists in the state and further testing to evaluate its possible impact to Lake Seminole's water quality will begin early in 2001.

Several projects have been implemented in the watershed as previously detailed in the "State of the Bay 1999" report. Those projects include the design of an adjustable water level control structure, the design and construction of a new retention pond, the refurbishment of an existing stormwater pond, and the cattail harvesting program. The cattail removal program has now removed about 45 acres of cattail habitat from the lake. A watershed management plan is scheduled for approval in early...
2001. The plan will recommend activities and programs to improve water quality, flood control, and wildlife and vegetative habitat in the lake and watershed. The draft plan recommendations include:

- construction of regional (alum) stormwater treatment facilities in priority basins;
- diversion of flow through the lake from the Seminole Bypass Canal;
- dredging of flocculent deep sediments;
- improve efficiency of existing stormwater facilities;
- sediment phosphorus inactivation via alum;
- dredging of organic shoreline sediments;
- in-lake habitat restoration projects;
- fluctuation of lake levels; and
- biomanipulation of fish populations.

For more information about Lake Seminole, contact Andy Squires, PCDEM, at 727-464-4425.

Cross Bayou Canal Watershed - The County is planning to initiate a diagnostic feasibility study of the Cross Bayou Canal Watershed in 2001. The diagnostic study will encompass the first 18 months of a 36-40 month project to develop a Watershed Management Plan. The Plan will recommend specific implementation strategies to address and improve, as appropriate, drainage, water quality, and natural habitats within the project boundaries. The contractor for the diagnostic feasibility study will utilize existing basin information and collect new information and data as necessary to develop a detailed description of the basin. The detailed description will include information about the physical (e.g., flow magnitude and direction, areas prone to erosion and flooding, sub-basin delineation, water bodies, land use, soils, impervious surfaces), chemical (e.g., water and sediment quality), and biological (e.g., vegetation types, habitat types, wildlife, fish) environments. The completion of the diagnostic feasibility study and subsequent Watershed Plan will provide information essential for developing cost effective actions to improve drainage and water quality, and expand viable habitat for fish and wildlife in the basin.

The Cross Bayou Canal watershed is located in central Pinellas County and encompasses approximately 7,800 acres. The 10.5 mile long Cross Bayou Canal bisects the watershed and connects to both Old Tampa Bay and Boca Ciega Bay on its northeastern and south-western ends, respectively. Canal water can flow in either direction depending upon tidal conditions, but normally water from the north and south halves do not mix.

Since 1991, water quality samples have been collected at three sites on Cross Bayou Canal as part of the County’s monthly ambient water quality monitoring program. Relative to other water bodies in Pinellas County, Cross Bayou Canal has very poor water quality. A significant number of the monthly surface water quality samples collected from the canal (1991-1997) have exceeded state water quality standards and reference water quality values developed for the State by the Florida Department of Environmental Protection. Parameter concentrations most often exceeding state standards or reference values included five-day biochemical oxygen demand, nitrate nitrogen, nitrite+nitrate nitrogen, dissolved oxygen, chlorophyll-a, orthophosphate, total and fecal coliform, and fecal streptococcus.

During 2000, County staff conducted a number of activities to characterize the basin in preparation for the anticipated diagnostic study in 2001. Reconnaissance and sampling trips were made along the length of the canal, confirming that canal water is not free-flowing between the north and south halves under normal tidal conditions. Water quality samples were collected in each of ten canal zones on two subsequent sampling trips in...
June and August. Staff also noted the location of stormwater outfall pipes into the canal. Furthermore, publicly-owned lands located adjacent to the canal were identified as potential habitat restoration sites or stormwater treatment facilities. Finally, annual estimates of stormwater pollutant loads into the canal were calculated for each sub-basin within the watershed based on land use-specific stormwater runoff water quality concentrations, soil-specific runoff coefficients, mean annual rainfall, and sub-basin acreage.

As a part of the Pinellas County Millennium Celebration, the Department of Environmental Management coordinated the first annual cleanups of priority watersheds. The Cross-Bayou Cleanup was chosen to promote awareness of the upcoming Watershed Management Plan. Volunteers with canoes, kayaks and small boats carried out the cleanup. Thirty participants collected over 1.6 tons of trash. The 2nd annual cleanup event is slated for Spring 2001.

Ultimately, the Watershed Management Plan will serve to increase functional habitat in the Tampa Bay watershed and will reduce pollutant loads to Old Tampa Bay and Boca Ciega Bay. Habitat enhancement, water quality improvement, and pollutant loading reductions to Tampa Bay are in accord with the goals in SWFWMD's Surface Water Improvement and Management Plan for Tampa Bay and the Tampa Bay Estuary Program's Comprehensive Conservation and Management Plan (CCMP).

For more information about Cross Bayou, contact Andy Squires, PCDEM, 727-464-4425.

**Manatee Protection in Pinellas County** - Pinellas County has made great progress toward protecting West Indian manatees and their habitat. As early as 1976, in the Conservation and Coastal Zone Management Element of the Pinellas County General Plan, the importance of marine habitats were recognized and policies addressing the protection of seagrass beds and habitat for endangered and threatened species were developed.

In 1989, the Pinellas County Comprehensive Plan went a step further, adding policies and guidelines to enhance manatee habitat and provide manatee protection. Pinellas County Policy 1.1.8 of the Coastal Management Element in the Comprehensive Plan required that we would adopt the State's Manatee Protection Plan. At the time, this Policy met State requirements on manatee protection. In addition to this Policy, there were other policies in the Conservation Element that were intended to protect, enhance and restore natural systems such as seagrass beds, a prime manatee habitat.

Since 1989, the State has changed its approach with regard to manatee protection and Policy 1.1.8 of the Coastal Management Element was no longer considered to be an accurate assessment of the state's approach. By early 1998, Pinellas County updated and adopted significant revisions to the Plan to support such measures as enforcing no-wake zones, seagrass protection areas, and providing manatee caution signage. Additionally, there are specific requirements for coordination with other agencies in the development and implementation of manatee protection measures. Other policies in the Plan continue to provide for protection, enhancement and restoration of natural systems such as seagrass beds, and to regulate development that may impact coastal resources and habitats. Pinellas County's efforts to adhere to the various elements of the Plan are reflected in the various programs that are in place to protect manatees.

In 1992, the Pinellas County Manatee Watch Line was first activated to help document manatee use patterns. A database of manatee sightings in Pinellas County waters, as reported by the public, is maintained. The Watch Line logs an average of 450 reported sightings per year. Calls have been received from Pinellas County residents as well as tourists visiting from other states and countries. The program has raised awareness of the prevalence of manatees in Pinellas County waters. Areas reportedly used most often by manatees include: Ft. DeSoto at the southern tip of the County, Coffee Pot Bayou in northeast St. Petersburg, McKay Creek in the Indian Rocks Beach area, and Spring and Whitcomb Bayous in Tarpon Springs. Manatees are drawn to these areas for a number of reasons. For example, freshwater springs located in Coffee Pot, Spring and Whitcomb Bayous attract manatees seeking fresh water to drink. Seagrass beds in the Ft. DeSoto area and McKay Creek are prime feeding spots.

Pinellas County has led and participated in numerous monitoring programs and management advisory groups formed through the Tampa Bay Estuary Program and the Agency on Bay Management. In 1999 Pinellas County,
in cooperation with SWFWMD, began assessing seagrass health and its areal extent in Boca Ciega Bay, Clearwater Harbor, and St. Joseph Sound. Seagrasses were monitored at fixed transects and by photo-interpretation of aerial photography. A Pinellas County environmental specialist served as co-chair for the Manatee Protection Strategies Task Force, a group responsible for developing protection recommendations for Tampa Bay. County staff also helped develop the Boaters’ Guide to Tampa Bay, a brochure with helpful boating information and a seagrass map of Tampa Bay.

The County has been implementing recommendations from the Manatee Protection Strategies Task Force. One recommendation was to regulate the operation of watercraft from the Florida Power Bartow Plant warm water discharge southward along the Weedon Island Preserve. An existing ordinance protecting manatees was amended in November 2000. This ordinance will not only regulate watercraft near the Florida Power Bartow Power Plant and along the Weedon Island Preserve, but it will also regulate watercraft in the Ft. DeSoto Seagrass Protection area and the Shell Key Management area located immediately north of Ft. DeSoto Park. Pilings will be placed to mark grass beds and shallow waters, thus providing warning to approaching boaters. In addition, informational kiosks will be placed at heavily-used boat ramps to show the locations of the manatee caution areas.

Through the Good Mate Marina Program, Pinellas County has an up-to-date inventory of all of the marinas in the County, including the number of wet and dry slips. One of the elements of the Good Mate Marina Program is to teach manatee protection and awareness to marina owners, operators, and employees. It is hoped that manatee appreciation, in the form of improved boater education, is passed down to boating customers who comprise a large fraction of the boating population.

County staff has given over 40 presentations on manatee protection each year to boater groups, civic organizations, local schools and other community organizations. Pinellas County has a variety of programs that protect, enhance and restore habitats; protect water quality; and educate the public. Continued acquisition and responsible management of endangered lands throughout the County will serve to protect both manatee habitat and water quality.

For more information about manatee protection in Pinellas County, contact Pam Leasure, PCDEM, 727-464-4425.

Stormwater Education - The Pinellas County Stormwater Education program continued to soar in 2000. The County’s educational program on stormwater began about eight years ago when specific programs were identified to train public sector workers and educate the public about stormwater pollution. Several County departments, including Planning, Public Works, the Cooperative Extension Service, and Environmental Management, created an array of educational materials.

The idea of M. Phibian was born, or “hatched,” to promote public awareness about stormwater pollution. A frog costume that is worn by County representatives was designed to match a frog illustrated in a variety of educational materials now being distributed by the County. M. Phibian was first introduced as our life-sized stormwater mascot in September 1999 when he appeared at the Plumb Elementary School carnival. During 2000 M. Phibian Frog has made numerous appearances, including the Pinellas County Enviro-Fair, The Great American Teach In, St. Pete Kid’s Fishing Tournament, Pond Purge 2000, the stormwater education booth at the County courthouse, and others.

As a part of Pinellas County’s National Pollutant Discharge Elimination System (NPDES) stormwater permit to provide stormwater training, County staff held Illicit Discharge and Illegal Dumping training classes for Pinellas County Highway Department field staff. The training has increased calls to the County Stormwater Watchline. Additional training classes are planned for other County departments as well as staff from the 21 incorporated municipalities who are co-permitees on the County’s NPDES stormwater permit.

The storm drain-marking program and Stormwater Watchline (727-464-5060) have continued to be a success during 2000. For information about stormwater pollution, County stormwater training programs, marking storm drains, or scheduling a special appearance by M. Phibian, please contact Melanie Poirier, PCDEM, 727-464-4425.

**NEW RESEARCH SHOWS SEAGRASS DECLINES IN TAMPA BAY**

Data released in 2000 by Southwest Florida Water Management District (District) scientists working with the Tampa Bay Estuary Program shows that more than 2,000 acres of Tampa Bay’s seagrasses have disappeared since 1996. Overall, District scientists estimate that Tampa Bay lost 7.8 percent of its seagrasses between 1996 and 1999.

Some scientists speculate that the losses are largely the result of the El Nino rains of 1997-98, which poured huge volumes of freshwater runoff and nutrients into Southwest Florida’s estuaries. Although seagrasses can withstand a broad range of salinities, the El Nino event dramatically lowered salinity levels for an extended period in some parts of Tampa Bay. Typical annual rainfall in the Tampa Bay area was 46 inches between 1998 and 1999; however, during 1997, rainfall reached 70 inches,
Scientists believe, however, that even the record-setting rains of El Nino do not adequately explain the losses calculated for Old Tampa Bay, the area of the bay north of the Gandy Bridge. Although that segment experienced the largest drop, some 24 percent between 1996 and 1999, seagrasses there have been declining since 1994. Most of the losses have occurred just north and south of the Howard Frankland Bridge on the Pinellas side, according to monitoring conducted by the District.

Baywide seagrass assessments are made approximately every two years. The process involves extensive aerial photography of seagrass beds followed by ground-truthing to verify the accuracy of the photos. The results are then plotted on maps using digital imagery.

The news isn’t all bad. Two bay segments, the Manatee River and Middle Tampa Bay, showed an increase in seagrasses over the 1996-99 period. The Manatee River gained nearly nine acres of seagrass, while Middle Tampa Bay (extending roughly from the MacDill peninsula to Pinellas Point in St. Petersburg) added more than 98 acres. In fact, the newly reported declines come after several years of seagrass expansion bay-wide. In the late 1980s and early 1990s, seagrasses were returning at the rate of 500 acres a year as Tampa Bay responded to improving water quality. That expansion slowed to about 350 acres in the mid-1990s, and the latest figures show an overall loss of seagrass back to pre-1990 levels.

Seagrasses are the nurseries of the bay, sheltering and supporting an amazing variety of juvenile fish and other marine creatures. The Tampa Bay Estuary Program has set a goal of restoring 12,000 acres of seagrasses bay-wide.

Scientists noted that the seagrass declines reported for Old Tampa Bay are more than twice as large as those reported for any other bay segment, and account for two-thirds of the baywide declines noted for the period 1996-1999. From 1984-1996, progress toward that goal remained on track, with more than 5,000 new acres reported. However, in the last three years, more than 2,000 acres have been lost. Since water quality apparently remains good enough for seagrass expansion to continue, scientists want to explore other potential causes of the recent declines.

Among factors that the Tampa Bay Estuary Program hopes to investigate are the impact of wave energy on seagrasses; how much sunlight different types of seagrass require, and whether that changes with the seasons; and what effect various types of algae that grow on seagrass blades have on the overall health of the plants. “Even though Tampa Bay has seen a setback, we’ve seen the same magnitude of setback in other Southwest Florida estuaries, indicating that the overall decline is likely a regional response to El Nino,” said Holly Greening, senior scientist with the Estuary Program “But we’ve obviously got additional work to do in Old Tampa Bay, where something else may be going on.”

The Estuary Program, the City of Tampa Bay Study Group, and Lewis Environmental Services financed additional aerial photography of the bay in November 2000 to assess changes in seagrass coverage in the bay over the last year. The results of those surveys will be available in early 2001.

### SEAGRASS CHANGES IN TAMPA BAY 1996-1999

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HILLSBOROUGH RIVER INTERLOCAL PLANNING BOARD & TECHNICAL ADVISORY COUNCIL
Created by Special Act 86-335

HILLSBOROUGH RIVER 2000 - CONTINUED COMMUNITY CONNECTIVITY

The Hillsborough River was the focal point of many issues and activities in 2000. Continued community interest in River issues and events demonstrated connectivity with the Hillsborough River in its role as a significant regional natural resource, source of drinking water and recreational amenity. On several occasions the public continued to be outspoken on issues such as public access, regulation of marine craft zones, water quality and minimum flows. As the River Board Interlocal Planning Board & Technical Advisory Council (HRB&TAC) reviewed, discussed, and acted upon River-related issues, the public's interest and input were consistently important considerations. Not every concern or issue could be resolved, as many of them are long-term in nature and will necessarily need a considerable amount of further study, data collection, funding and planning. Long-term issues will continue to be evaluated in 2001. The following summary of the HRB&TAC 2000 activities demonstrates that the Hillsborough River continues to be a dynamic and unique natural resource within Hillsborough County, and serves as a special connection to the region.

RIVER BOARD & TAC MANDATES - Interlocal Connections

The HRB&TAC carried out their functions through 2000 as directed by the enabling legislation, Special Act, 86-335, Laws of Florida. Development, redevelopment, and numerous other activities throughout the River corridor within Hillsborough County, the City of Tampa and the City of Temple Terrace were monitored. River management strategies were recommended to local governmental jurisdictions, regulatory agencies, and others. The HRB&TAC also monitored and commented on activities outside their legislatively mandated purview, on issues that held the potential to directly impact the River. The following narrative illustrates various River-related projects with which the HRB&TAC were associated. It also shows that the HRB&TAC continues to respond effectively to community concerns, and explore and advocate innovative River-related management strategies within Hillsborough County and at times outside the county.

COMPREHENSIVE/MASTER PLAN IMPLEMENTATION - Plan Connections

The HRB&TAC continued the task of implementing River-related policies adopted in the local comprehensive plans from the original Hillsborough River Master Plan, which was written in the mid-1980s and adopted in 1989. Part of this effort included monitoring activities along the River corridor by evaluating them to assure that the proposed activities maintained or exceeded community standards set by the local plan's statements. The local plans' policies suggest direction as to how the communities, through local government, agencies and other entities, can optimize opportunities to achieve the goals set for the River. Land use designation changes, regulatory rule revisions and local jurisdictional code modifications were reviewed based on those plans, and from the standpoint that such changes could impact the River's overall viability and function and/or have a more localized, limited impact. In all cases, the HRB&TAC balanced environmental concerns and the ideals of the community as set forth in the plans, with the practical use such proposed changes.

MONITORING ACTIVITIES - Making Connections

The most prevalent concern facing the Hillsborough River in 2000 was on-going drought conditions. Impacts from record-low precipitation were seen, particularly upstream of the City of Tampa dam. Downstream flow to the reservoir was extremely low and was supplied by Crystal Springs as the sole source of flow for the River during much of the Spring. Dry, windy weather conditions contributed to an extensive evaporation loss from the River, hastening a decline in water levels. It was also possible that lower-than-normal groundwater levels contributed to a loss of water in the River through leakage and absorption into the surrounding soils. At the same time that natural processes were depleting the River’s water supply, demand for irrigation and other human-related uses was on the increase as well.

At that time, the region was under a mandatory two-day watering limit with some local jurisdictions having additional limitations on water use. Water levels contin-
ued to drop in the City of Tampa reservoir during the dry Spring months to the point that Tampa City Council enacted emergency measures that curtailed outdoor water use to once/week and limited other activities that involved outdoor water use. Hillsborough County also instituted once/week watering with a variation of limitations of other outdoor water use, different but similar to the City of Tampa’s emergency measures. Shortly following the actions taken by the City of Tampa and Hillsborough County, the Southwest Florida Water Management District (District) declared a water emergency and issued an order that tightened its water use restrictions to once/week on a District-wide basis. The City of Temple Terrace followed the parameters set by the District’s emergency order while the City of Tampa and Hillsborough County’s restrictions were more expansive than the District’s.

Supplemental restrictions and approaches have been applied by some jurisdictions within the District in an effort to encourage even further water savings. In some instances alternative daily-allotted timeframes were adopted to minimize demand on resources. The County reassigned fewer users to an expanded number of days per week but still maintained a mandatory once/week watering schedule for its customers.

In addition to expanded water conservation measures, the District’s emergency order allowed for augmentation of the Hillsborough River from traditional alternative sources, including Sulphur Springs, Blue Sink/Curiosity Creek, and the Tampa By-Pass Canal. Conditions were so severe that the District permitted supplemental withdrawals on an experimental basis from a sinkhole located near Morris Bridge Road in northern Hillsborough County. Water from the sinkhole was pumped through a temporary piping system into the River at Nature’s Classroom. This experimental alternative water source was a limited success, as it did not recharge as quickly as expected and surrounding private wells were impacted, some of which went dry.

Extreme drought conditions persisted until mid-June when the Summer afternoon rainfall pattern began to bring very limited relief to the region. Still, lower than expected rainfall resulted from these rainfall events, as they did not produce the historically strong, frequent or widespread storm events. Even as Hurricane Gordon brushed Florida’s West Coast, that storm brought little rainfall to improve low-water conditions. Since that time, District-wide watering has been limited to once/week as the primary water conservation tool. The long-term outlook for the Hillsborough River into 2001 remains a delicate balance between prevailing weather conditions, adherence to enacted conservation measures, and the natural environment’s needs.

Due in part to the HRB&TAC’s monitoring of the River in relation to the drought conditions, a review of local ordinances and landscape codes was encouraged. These reviews were recommended to ensure that regulations enacted by local jurisdictions are consistent with and supportive of water conservation goals. The HRB&TAC also encouraged local governments to exert their influence in the approval process of development/redevelopment projects governed by deed restrictions or homeowner association rules, so that they too comply and support water restrictions.
The HRB&TAC monitored the District’s adoption of a rule setting a minimum flow for the lower Hillsborough River, downstream of the dam, of 10 cubic feet per second (cfs). The District’s rule stated that flow could be provided by diverting water from Sulphur Springs and piping it to the face of the dam for release. The adopted rule directed long-term studies to be conducted in relation to this management recommendation. The HRB&TAC deliberated on this issue at nearly every meeting as the rule was going through the adoption process. Although there were various rule revisions, they never sufficiently resolved some of the concerns the TAC expressed throughout the process. Those primary concerns were the source of flow and duration of studies. The TAC did not support these components of the rule and brought them to the River Board’s attention repeatedly. An Independent Peer Review Panel was convened by the District following rule adoption and issued its report at the end of 1999. The Peer Review Panel’s Final Report supported the TAC’s contention that providing flow from Sulphur Springs alone did not meet scientific criteria as freshwater. The panel’s findings went on to state that a 10 cfs flow did not appear to be scientifically-based to meet specific management goals. The panel’s findings also recommended a shorter timeframe for the study of whatever flow regime was adopted in a final rule. The report was presented to the District Governing Board in December 1999. The Governing Board adopted the provisional rule unchanged. A citizen’ group, Friends of the River, contested the adopted rule, as did the City of Tampa Water Department and Crystal Springs Preserve. Through an agreement between those contesting the adopted rule and the District, the adopted rule was revised to state that the 10 cfs flow would be provided through 2007 from the reservoir when it exceeds a 22.5’ level. The rule language also established a five-year timeframe in which additional study would be carried out to assess the relation of various amounts of downstream freshwater flow and any benefits to biological communities downstream of the dam at the varying flow rates. Since that time, the District, in cooperation with the City of Tampa, has been working to commence studies and provide flow as the rule allows.

The HRB&TAC continued to monitor activities and conditions upstream of the Hillsborough County line that held the potential to impact the River downstream. The HRB&TAC were briefed by concerned citizens on water level conditions in the upper Hillsborough River Basin that are believed to result from blockage of southerly water flow from the Withlacoochee River/Green Swamp systems into the Hillsborough River Basin. The impediments to flow cited were transportation facilities, portions of US 98 and the CSX Railroad, that act as barriers to water flow. On-site inspection of the road and railroad resulted in finding that, although there is room for flow under the structures via bridge gaps, it is not possible due to debris and sediment deposition under the bridges. This blockage of flow has allegedly resulted in flooding of portions of Pasco County in the past. The River Board contacted the FL Dept. of Transportation and CSX Railroad in an effort to advise these entities about the conditions found under the roadway and railroad bridges, and continues to work to resolve these flow issues.

In an indirectly-related action, the US Army Corps of Engineers announced its intention to carry out a preliminary basin-wide assessment for the Withlacoochee River/Green Swamp. The primary focus of this initial study is to determine if there is a basis for further study and the potential for federal interest/funding for these areas of Florida. A similar assessment will also be carried out for the Hillsborough River Basin. The assessments will focus on ecological issues such as water quality/quantity, flood control, wildlife protection and habitat preservation. The studies will attempt to evaluate the impacts of human encroachment on the natural environment and to identify potential projects/associated costs that could be undertaken to restore altered natural conditions. This multi-step process is expected to take numerous years to complete.

During 2000 the District continued to process unresolved requests by Perrier and Two Rivers Ranch for water withdrawals within the Hillsborough River Basin in Pasco County. The District’s decision to deny the Perrier request for additional withdrawals from Crystal Springs was appealed through court processes. Subsequently, Perrier submitted a revised proposal to withdraw a reduced amount from the spring, which is now under consideration by the District. The Two Rivers Ranch wellfield proposal has been granted extensions to provide further clarification. The HRB&TAC remain as parties of record on these permit applications.

In other River-related water issues, the HRB&TAC have been involved in or are monitoring the state’s devel-
development of standards and rules by which the level of impairment of State waters are assessed, including the Hillsborough River. This process was prompted by the state's proposal to de-list some waterbodies or segments of waterbodies without apparent criteria upon which to base that action. Rule development continues and is expected to be concluded in 2001. The HRB&TAC have also been informed of the District's Draft Water Supply Plan, which includes discussion of the River, Tampa By-Pass Canal and other associated waters as potential sources for the region's future water supply.

The HRB&TAC tracked legislation proposed in 2000 that had the potential to result in a loss of sovereign submerged lands throughout the state. The legislation attempted to redefine the line separating uplands and sovereign submerged lands. By moving the line waterward under the new definition, it would have resulted in the return of thousands of acres of land once defined as state-owned sovereign submerged lands to the adjacent property owners. In the instance of the Hillsborough River, this was not an issue as the sovereign submerged lands within Hillsborough County were deeded over to the Tampa Port Authority many years ago, and a provision in the legislation exempted such cases. This legislative initiative failed to garner enough support to be passed this year.

Information pertaining to a new stormwater treatment filtration system, designed to address solid pollutants such as styrofoam products, plastics and paper, known as Continuous Deflection and Separation (CDS), was presented to the HRB&TAC. The City of Temple Terrace announced its intention to put this new technology to work along the River. The City of Tampa also expressed interest in making use of the technology. This system uses centrifugal force and a filter to strain solids out of stormwater prior to release to a receiving body. This technology holds promise in alleviating at least one aspect of stormwater pollution in the River for the future.

The HRB&TAC undertook two major land use policy reviews in 2000. In one, the HRB&TAC supported amending City of Temple Terrace Development Code to accommodate residential infill projects on riverfront parcels by allowing a relaxation of stringent setback requirements. In the other, the TAC responded to a proposed Planned Development Alternative (PDA) development in the New Tampa area known as Grand Hampton. The TAC recommended Tampa City Council stipulate modifications to the development plan to address potential environmental impacts to both Cypress and Trout Creeks that border the project property on its east and west boundaries. Both creeks are Outstanding Florida Waters. The TAC also expressed concerns about other water quality issues, setbacks, open space requirements and a planned golf course as proposed for incorporation into the development. The TAC forwarded these concerns directly to Tampa City Council, as there was a limited timeframe in which to respond. The River Board was apprised of the TAC action but did not take a formal position regarding the proposed development plans.

PUBLIC ACCESS TO THE RIVER - Connecting Communities

The HRB&TAC demonstrated their continued interest with periodic reports provided on the City of Tampa Parks Department’s efforts to establish the City of Tampa Greenway and Trails. This concept, initially proposed in the 1980s during formulation of the Hillsborough River Master Plan, is reflected in the local comprehensive plan policies. The City of Tampa has worked diligently to identify a network of trails and greenways throughout the City of Tampa, some of which may follow along the Hillsborough River, that will serve as a recreational asset and promote alternative transportation uses. The HRB&TAC monitored and supported the public participation process of this public access project. A draft Master Plan is expected to be presented to Tampa City Council in early 2001.

The HRB&TAC have been monitoring proposals for redevelopment of Tampa Heights and the creation of a Cultural Arts District in downtown Tampa. Central in plans for both these projects is maintaining or expanding public open spaces along the River and encouraging activities along the waterfront, which the HRB&TAC supports.

The 13-acre Tower Property in Sulphur Springs was the subject of much community scrutiny and debate in 2000. The HRB&TAC reviewed a request for abandonment of the site’s Development of Regional Impact (DRI) order that would have allowed a hotel and commercial mixed use on the site. The property owner, MacDill
Columbus, requested rezoning of the property that proposed locating commercial uses on the site, including a Walgreens Drug store. Community support for acquisition and use of this vacant riverfront tract in some form of public use, such as a park or other passive green space, was organized to the point that Walgreens Corporation withdrew its intended plans. The Planning Commission was requested to conduct a study of the area to assist Tampa Council in deciding the site's future use. The draft report supported the uses allowed by the DRI or as a public space. Because of the public's continued support for the site to be acquired by the City of Tampa and the withdrawal of the Walgreens development proposal due to public protest, the request for the DRI abandonment and subsequent rezoning was withdrawn by the owner. The City of Tampa continues to keep negotiations open with the property's owners.

Near the Tower Property, east of Interstate 275, south of Waters Avenue and on Nebraska Avenue, the City of Tampa opened the new Sulphur Springs Pool Park complex. The park areas were spruced up with improved picnic and playground areas and the pool was full to capacity on a continuous basis throughout the summer months. The old Sulphur Springs continues to flow into the lagoon, providing a semi-natural shady respite from otherwise bleak urban surroundings. The City's park and pool improvements were strongly endorsed by the HRB&TAC.

The City of Temple Terrace announced its intentions to acquire 18 riverfront lots located on West River Drive in 2000. The acquisition of these properties would enhance other waterfront properties owned by the City along the River. The HRB&TAC first identified these parcels in the early 1990s for purchase through the Hillsborough County Environmental Lands Acquisition and Protection Program (ELAPP). Over the summer, the City submitted the proposal and the transaction was completed in August 2000. The cost for the purchase was approximately $742,500. Plans for the parcels are to keep them in a relatively natural state, in keeping with the surrounding residential uses, and with minimal improvements, such as a path for pedestrian use along the waterfront.

An application to extend designation of a portion of the Hillsborough River as a State Canoe Trail was endorsed by the HRB&TAC. The proposal is to extend the canoe trail from Riverhills Park in the City of Temple Terrace downstream to Rowlett Park in the City of Tampa. The part of the River from Riverhills Park upstream to Crystal Springs was previously designated, upon a request initiated by the HRB&TAC in 1997. The application is currently under review by the State Office of Greenways and Trails, and action is expected to be taken on the request in early 2001.

In the fall of 2000, the TAC reviewed limited information regarding a proposal that would change the current use of Riverfront Park in downtown Tampa as a public greenspace/playground area, to serve as the site for an aquatic center for the Olympics in 2012. Although there is considerable uncertainty as to the area's Olympic bid being selected, the proposal stirred concern regarding the City of Tampa's policy regarding changes in use of designated park space and the apparent lack of process to effect such a change. The TAC proposed that the River Board recommend the City of Tampa establish a public review process through which changes in use of the city's dedicated public parks would be handled.

PUBLIC INFORMATIONAL PROJECTS - Maintaining Connections

The Planning Commission, in support of the HRB&TAC, staffed the River Hotline throughout 2000. The River Hotline is a central point of communication with the public. The public, elected officials and others sought information pertaining to the River through this public information resource. The public also used the River Hotline to report activities in and along the River that at
times warranted further investigation by regulatory and law enforcement agencies. Issues of the River News were published and distributed to nearly 1,000 readers on a bi-monthly basis. This publication kept readers informed about River-related issues and activities. Another public outreach project, funded by Tampa Port Authority, distributed an Aquatic Plant Guide to Riverfront property owners in the Cities of Tampa and Temple Terrace and unincorporated Hillsborough County. The guide illustrates many of the aquatic plants found in and along the River. In addition, the HRB&TAC supported the City of Tampa Mayor’s 13th Annual Hillsborough River Clean Up event, which was held on Saturday, November 4th. The HRB&TAC staff also worked on expanding River-related information posted on the Planning Commission’s website that is located at www.plancom.org

COOPERATIVE PARTNERSHIPS - Extending Connections
The HRB&TAC continue to actively participate with other groups and agencies in partnerships focusing on the River. Some groups address basin wide concerns, while others encompass the ecosystem of the River and surrounding areas. Citizen groups such as neighborhood and community associations have been assisted by the HRB&TAC staff with information and direction to achieve their more focused, specific projects within their localized areas of interest. The years of HRB&TAC involvement in community River-related projects serve as helpful, experienced support for these groups’ on-going successes.

Funding was successfully sought through the HRB&TAC on behalf of the Hillsborough River State Park to pay for materials for the restoration of portions of the boardwalk. This state park is visited by hundreds of thousands of people annually and allows visitors who take the scenic boardwalk to view the River in its natural form, including densely-vegetated shorelines of native plants, wetlands and the southern-most set of rapids in the state formed by a limestone outcropping. A variety of wildlife can often be seen in its natural habitat in the park. The improvements made with the grant monies awarded through the Tampa Port Authority Sovereign Lands Management Initiatives Program will assure the public’s continued safe access to this beautiful portion of the Hillsborough River.

LOOKING FORWARD - Future Connections
As of 2001, the HRB&TAC will have been an active, contributing entity in the community for 15 years. The HRB&TAC’s role in bringing a focus to the issues associated with management of the Hillsborough River has been challenging and rewarding. The leadership demonstrated over these several years has come to reinforce the notion that community activism can result in action, that problems can be solved through a touch of tact and a bit of tenacity, and that a changing landscape can be integrated with the natural environment such that form and function work hand in hand. They have also shown how important it can be to look beyond their own limitations for the good of the River and their communities. The past 15 years’ work makes the River’s next 15 years brighter.

ANNUAL UPDATE OF TAMPA BAY CHLOROPHYLL-A CONCENTRATIONS
The amount of phytoplankton present in Tampa Bay waters can be estimated from measurements of the green plant pigment chlorophyll-a. Phytoplankton is one of several major forms of plants that exist in Tampa Bay and most other estuaries. Other major plant types are: submerged seagrass, macro-algae and benthic micro-algae. The different plants can be viewed as being in competition with each other for required resources, such as light and nutrients. Studies conducted in urbanized estuaries have shown that excessive loading of nitrogen generally is accompanied by an increase of phytoplankton and
macro-algae, including epiphytic and drift macro-algae, and by a reduction of seagrass. Relatively little is known about the response of benthic micro-algae to changes in nutrient availability. From a resource perspective, the loss of seagrass means a loss of essential habitat for a multitude of marine animal species. Therefore, the amount of chlorophyll-a present in the water column not only measures phytoplankton biomass, but the amount present also gives a general understanding of resource competition within the Tampa Bay ecosystem.

**Chlorophyll-a Targets**

Recognizing that chlorophyll-a can be used as an effective means to monitor water quality in Tampa Bay and to protect natural resources such as seagrass, the ABM Task Force on Resource-Based Water Quality in 1989 established yearly average chlorophyll-a target concentrations for the four major subdivisions of Tampa Bay. The targets chosen for the four subdivisions were based on monthly measurements by the Environmental Protection Commission of Hillsborough County (EPC).

In 1996, the Tampa Bay Estuary Program (TBEP) adopted modified chlorophyll-a targets for the major subsections of Tampa Bay (Table 1). These targets were calculated from model predictions that related chlorophyll-a, water column light transparency and seagrass depth distribution. The targets reflect the chlorophyll-a concentration which will support the TBEP goal for restoration and protection of seagrass to near 1950s levels which has been estimated at about 38000 acres. Targets will also be developed for Boca Ciega Bay, Terra Ceia Bay and the estuarine portion of the Manatee River when sufficient data is available. Table 1 shows the TBEP target concentrations for the four major subsections of Tampa Bay as well as the EPC measured annual concentrations since 1992 and the average annual concentrations for the nine year period, 1992 through 2000.

**Long-Term Chlorophyll-a Record**

The measured annual chlorophyll-a concentrations are generally below the TBEP targets for all years except 1994, 1995 and 1998. The elevated values for these three years were most probably caused by an increased supply of nutrients (specifically nitrogen) to the bay as a result of a period of increased rainfall. River discharge and runoff from the land, as well as rain falling directly over the bay, are important sources of nutrients to the bay.

Chlorophyll-a concentrations decreased substantially in all four major bay segments in 1999 and remained below the TBEP targets in 2000 as well (Table 1). In fact, the annual average for Hillsborough Bay in 2000 (8.8 ug/l) is the lowest value recorded for this bay segment during the entire 26-year EPC record. The low values apparently resulted from the relatively dry weather in 1999 and 2000. The total annual rainfall in 1999 and 2000 at Tampa International Airport was about 34 and 29 inches, respectively. The year 2000 rainfall is almost 19 inches below the long-term average for this station. In addition, the Southwest Florida Water Management District reports that 2000 was the driest year of the 85-year record for the District. Although the data needed to calculate nitrogen loading to the bay for 1999 and 2000 are not yet available, it can be assumed, based on rainfall amounts, that nitrogen loading was relatively low during this period.

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**Table 1.** TBEP Chlorophyll-a targets and EPC measured annual average concentrations (ug/l) for the major subdivisions of Tampa Bay: MB=Hillsborough Bay; OTH=Old Tampa Bay; MTH=Middle Tampa Bay; LYN=Low of Tampa Bay.
Figure 1. Annual average chlorophyll-a concentrations for the major subdivisions of Tampa Bay, 1953-1999 (HB=Hillsborough Bay; OTB=Old Tampa Bay; MTB=Middle Tampa Bay; LTB=Lower Tampa Bay).

The cause of the large chlorophyll-a reduction in the early 1980s is not completely understood, but it is almost certainly linked to a substantial reduction in nitrogen loading from anthropogenic sources. This reduction was the result of management actions taken, within the past two decades, specifically to reduce the impact by domestic wastewater and fertilizer industry effluents. In addition, recent nitrogen loading reductions from fertilizer storage facilities and ship-loading terminals located in Hillsborough Bay and from domestic wastewater plants in Old Tampa Bay should also have contributed to the continued downward chlorophyll-a trend. Also, in-bay chlorophyll control processes may have become increasingly important as a result of the anthropogenic nitrogen reductions and improved bay conditions. These "natural control processes" include, among others, utilization of the phytoplankton population by benthic filter feeders and benthic denitrification.

The scenario of reduced loadings agrees with the nitrogen loading/chlorophyll-a concept established in other estuaries and laboratories. The substantial reduction of chlorophyll-a concentrations suggests a recovery of Tampa Bay water quality and the potential for significant natural seagrass recolonization.

Ecological Considerations

The demonstrated trend of decreasing phytoplankton biomass, as well as a recent reduction of drift macro-algae biomass in upper portions of Tampa Bay, should benefit seagrass growth and allow for the expansion of seagrass meadows, ultimately resulting in a more abundant seagrass-dependent animal community. Although both phytoplankton and macro-algae are important components of the Tampa Bay ecosystem, the current standing crop of these algae may better resemble the biomass found prior to the period when algal biomass was artificially elevated through high anthropogenic nitrogen discharges to the bay. For more information on this subject please contact Roger Johansson, City of Tampa Bay Study Group, at 813-247-3451.

ALGAE BLOOMS IN TAMPA BAY

Tampa Bay experienced two relatively unusual algae blooms in August and September. They were unusual in that they were both widespread and one species was a known toxin producer. Both produced very noticeable reddish discoloration on the surface of the water and both were dinoflagellates. During the 1970s dinoflagellate blooms were very common and widespread, but these blooms appeared to have subsided as water quality improved over the next 20 - 30 years. There has not been a major fish kill in Tampa Bay related to dinoflagellates since 1974.

The Hillsborough Bay bloom, which lasted one month, was produced by the potentially-harmful species Alexandrium monilatum (aka Gonyaulax monilata). The organism is easy to identify because it grows in chains resembling a string of hamburgers. The picture below is a single cell, photographed with an electron microscope (courtesy of the FL Marine Science Institute). Concentrations exceeded 2,000,000/liter in some samples but never produced any visible fish kills. The bloom appeared to be concentrated at the surface of the water column, perhaps explaining the lack of a fish kill. Scientists at the Environmental Protection Commission of Hillsborough County feared that the high salinities (29 to 33 ppt), coupled with high nutrients, sunny skies and warm waters, might sustain the
bloom, but another non-toxic dinoflagellate (*Ceratium hircus*) took its place!

Upper Old Tampa Bay, particularly near the Pinellas County Bayside Bridge, was the area, experiencing a bloom of the dinoflagellate *Pyrodinium bahamense*. Salinity during this bloom ranged from 25 to 27 ppt. This bloom, which also lasted about one month, produced no fish kills.

**CLEARWATER’S ENTRYWAY ROUNDABOUT**

In the environmental field great attention is paid to fixed (stationary) pollutant generators such as power plants, and also to mobile sources, mainly automobiles. Generally overlooked is reducing emissions of mobile sources at fixed locations, such as vehicles generating exhaust fumes at major intersections. Until recently, the most that was ever done was to fine-tune the signal timings and add turn lanes to make the intersections operate as efficiently as possible, and those potential reductions are on the order of only 1-5%. But a traffic control system that relies on halting cross-traffic to allow the other traffic flow to proceed will always be a location for emissions generation, because red lights force cars to decelerate, idle, and accelerate - and that’s when internal combustion engines produce excess emissions.

Building separated-grade intersections is one way to get rid of red lights, but it is prohibitively expensive.

The City of Clearwater recently constructed an alternative intersection configuration that replaced three signalized intersections to keep traffic flowing more smoothly. This $12 million project, a large modern roundabout on Clearwater Beach, handles up to 60,000 vehicles per day so the emissions reductions really add up. Computer models were constructed using SIDRA software and the emissions of the pre-existing configuration were compared to those of the roundabout configuration. The results show quite large emissions reductions over the life of the project: 493,456 fewer kg. Daily emissions of NOx are reduced 50.1 kg. The roundabout also saves thousands of gallons of fuel per year.

Another environmental benefit of replacing the signalized intersections with the roundabout was a net reduction in asphalt or impermeable surface.

One of the most interesting aspects of the roundabout is that, in addition to moving up to 60,000 vehicles per day, it also moves up to 8,000 pedestrians per day and does so with very little delay. These numbers make this efficient, pedestrian-friendly and environment-friendly intersection unique in the United States.

**REESTABLISHMENT OF SEAGRASS MEADOWS IN HILLSBOROUGH BAY**

Seagrass coverage in Tampa Bay has expanded in the past decade and this trend has been attributed to improvement in water quality. Hillsborough Bay, considered to be the most polluted section of Tampa Bay, is one portion of the bay where seagrass revegetation may be most visible.

Alteration of seagrass habitat and degraded water quality resulted in the loss of nearly all seagrass in Hillsborough Bay by 1980. However, management actions reduced nutrient loading to the bay and improvements in Hillsborough Bay water quality began in the early 1980s. Concurrent with improving water quality, seagrass started to revegetate areas near southern Hillsborough Bay.

The City of Tampa Bay Study Group (BSG) began monitoring seagrass in Hillsborough Bay in 1986. In the initial seagrass survey, the BSG found about 0.2 hectares (10,000m²) of the shoalgrass, *Halodule wrightii*. Seagrass surveys conducted in 1989 and 1991-1997 found a substantial increase in shoalgrass coverage. Expansion of *H. wrightii* meadows slowed in 1998-99 as gains in some portions of Hillsborough Bay were offset by losses. This was possibly due to the effect that unusually high rainfall had on water quality during the El Nino period. However, in 2000, *H. wrightii* coverage increased to nearly 70 hectares. An estimate of annual *H. wrightii* areal coverage in Hillsborough Bay from 1986-2000 is presented in Figure 1.

A considerable increase in *H. wrightii* areal coverage was noted in several areas of Hillsborough Bay (Figure 2) between 1999 and 2000. Just south of Pendola Point in northeastern Hillsborough Bay, *H. wrightii* coverage increased an order of magnitude to about 4.4 hectares.
to improving water quality. Several areas of the bay which have had little or no seagrass coverage one decade ago developed sizable stands of shoalgrass. Although there was little change in *Halodule wrightii* areal coverage during the El Nino period, conditions were favorable in 2000 and allowed recolonization to continue in several areas of Hillsborough Bay. For further information contact Walt Avery with the City of Tampa, Bay Study Group at 813-247-3451.

**DECREASING PHYTOPLANKTON TREND IN TAMPA BAY**

Phytoplankton, or micro-algae, include a wide range of photosynthetic plants that constitute the bottom of the food chain. When anthropogenic sources contribute excessive amounts of nutrients to the environment, phytoplankton concentrations may become elevated, cloud the water, and be characterized as “nuisance species” that upset the balance of the estuary. The City of Tampa, Bay Study Group has been monitoring phytoplankton trends as a water quality indicator for Tampa Bay since 1979. Water samples from Hillsborough Bay and Middle Tampa Bay have been examined for phytoplankton taxonomy and enumeration on a monthly basis. These results, shown in the adjacent graph, represent the annual average taken from the monthly totals of phytoplankton concentrations in cells/mL. Due to a change in plankton counting procedures, only results from 1981-2000 are shown. Over this 20-year period, a decreasing long-term trend is apparent, although intermittent peaks in the average concentrations have occurred. This long-term decrease in the phytoplankton population, an indication of improved water quality, may be coupled with the decrease in nutrient loading to Tampa Bay. Phytoplankton biomass is discussed further by Roger Johansson in this issue. For more information please contact Kerry Hennenfent, City of Tampa, Bay Study Group, at 813-247-3451.

**State of Tampa Bay** 40
AGENCY ON BAY MANAGEMENT - 2000

Tampa Bay Regional Planning Council
Agency on Bay Management

ABM is the natural resources committee of the Tampa Bay Regional Planning Council. It provides recommendations to the Council on issues affecting Tampa Bay and the regionally-significant natural resources. Discussions cover current research, water resource planning, development and regulatory activities, as well as habitat restoration strategies. The Agency serve as an open forum for the myriad issues involving the Tampa Bay estuary, and as a voice for the protection, restoration and wise use of the Bay by the entire region.

During this year the Agency on Bay Management continued to support the Tampa Bay Estuary Program. Progress was made on the goals of the Tampa Bay Regional Planning Council/Agency on Bay Management Action plan, which was adopted to help achieve the Estuary Program’s Comprehensive Conservation and Management Plan for Tampa Bay. There are several active Committees: Natural Resources/ Environmental Impact Review (co-chaired by Mr. George Henderson and Mr. Jacob Stowers), Legislative (chaired by Ms. Sally Thompson), Public Education (chaired by Mr. Fred Webb), the Executive Steering Committee, as well as the Habitat Restoration Subcommittee (chaired by Mr. Peter Clark).

This year the Agency on Bay Management addressed many pressing issues related to the health, protection and restoration of the Tampa Bay estuary, under the leadership of Ms. Barbara Romano, its Chairman. As listed on the inside cover of this State of Tampa Bay Report, the Agency’s membership includes the myriad interests that enjoy, utilize, or study this most precious of our region’s natural resources. Its membership includes commercial, industrial, regulatory, research, all levels of government, recreational and commercial fishing, and the public-at-large. Input from all sectors of the Bay community are sought when considering issues placed before the Agency, and discussions are usually lively, informative, and thought-provoking. One of the greatest accomplishments of the Agency on Bay Management has been in bringing the disparate interests from around the Bay together to educate all on the needs of each. This has led to a much deeper understanding of all parties’ responsibilities and desires, and a willingness to work together.

Significant actions were: adoption of a long-range plan for the Agency and, at the request of the Hillsborough County Commission, forums on the water resource projects planned in Hillsborough County and Tampa Bay. The forums were conducted jointly with the Tampa Bay Estuary Program’s Technical Advisory Committee, and resulted in a lengthy report to the Commission on the issues of concern and information available to date to address those issues.

Among the topics presented to, researched or discussed by the Agency during 2000 were:

- The use of dredged material from the St. Petersburg Harbor maintenance for Egmont Key beach nourishment and structure protection. The Agency was instrumental in bringing the appropriate parties together to accomplish this mutually-beneficial project.
- A proposed Clean Air policy for the State of Florida, presented by Manatee County Commissioner Joe McClash.
- The planned improvements for Tampa Electric Company’s Big Bend and Gannon facilities, which will dramatically reduce air emissions that add to pollution of Tampa Bay.
- Management plan for the Shell Key Preserve in Pinellas County.
- Forever Florida legislation and its ramifications for the Tampa Bay region; 2000 environmental legislation.
Conflicts between waterfront residents, boaters and crab trappers on the Alafia River; addressing the needs and impacts of each on the other.

The City of St. Petersburg's municipal wastewater disposal problems, including the unintentional release of 120 million gallons of treated water to Tampa Bay and the potential U.S. Environmental Protection Agency requirement for discharge of treated wastewater to the Bay.

Proposed federal rules concerning wintering grounds (beachfront) for the endangered Piping Plover.

U.S. Environmental Protection Agency's proposed TMDL (Total Maximum Daily Load) rule changes and the potential effect on implementing the Comprehensive Conservation and Management Plan.

The planned phosphogypsum stack expansion by Cargill, Inc. and its Net Environmental Benefits.

Potential impacts of the proposed Gulfstream Natural Gas pipeline, planned to cross the Gulf of Mexico and enter Tampa Bay, with landfall at Port Manatee. Recommendations were forwarded for impact minimization and mitigation.

Development of information and management plans for the spoil islands in the Pinellas County Aquatic Preserve, being performed by the FL Department of Environmental Protection.

A regional environmental impact statement for the phosphate mining projects in central Florida.

The history of electric power generation in the Tampa Bay area.

A plan for deepening the Alafia Channel, modifying the turning basin, and disposing of five million cubic yards of spoil material.

The Draft Environmental Impact Statements for the proposed Buccaneer and Gulfstream Natural Gas Pipelines within the Tampa Bay region.

Water Quality studies for the Little Manatee River and the methodology for establishing ambient water quality for the State's Outstanding Florida Waters.

The results of modeling by S&W Water, Inc. of the potential effects of desalination and the surface water projects of Tampa Bay Water on salinity in Tampa Bay.

Development of a position on an important issue for the 2001 legislature: increase aquatic law enforcement in the Tampa Bay region.

OTHER ACTIVITIES - The Agency staff, which is also the environmental staff of the Tampa Bay Regional Planning Council, serves on various committees on behalf of the Agency or the Council:

The West Central Florida Air Quality Coordinating Committee, which includes a seven-county area to address air-related issues. This group sponsored a workshop/forum to educate local officials and the general public about the state of air quality in the region, the impending changes in our designation as an attainment area, and the ramifications of such a change.

The Hillsborough River Interlocal Planning Board's Technical Advisory Council, reviewing issues affecting the health of the river.

The Tampa Bay Harbor Safety Committee, a group of public and private interests devoted to implementing a Vessel Traffic System for the Bay. This system will increase safety and reduce the incidence of spills and collisions by providing substantially more information to pilots and ship captains as they traverse the Bay's long and narrow channels.

The Tampa Bay Estuary Program's Technical Advisory Committee, providing scientific expertise as requested by the Program.

For more information contact Suzanne Cooper, ABM staff, at 727-570-5151, ext. 240.

SURFACE WATER IMPROVEMENT AND MANAGEMENT (SWIM) SECTION OF THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT

The Southwest Florida Water Management District's SWIM Program remained focused on habitat restoration projects and stormwater retrofit projects consistent with the Tampa Bay SWIM Plan and the Tampa Bay Estuary Program's Comprehensive Conservation and Management Plan (CCMP). Since the inception of the District's
SWIM Program, 46 habitat restoration projects have been completed, resulting in the restoration of approximately 485.5 acres of coastal habitat for Tampa Bay. Over 30 projects totaling in excess of 3,300 acres are in various stages of land acquisition, design, permitting, or construction. For stormwater, 31 projects have been completed resulting in the treatment of approximately 20,143 acres and in nitrogen reduction of more than 28,686 lbs per year. Two other stormwater projects to treat 732 acres are in the design and permitting phases. All of the SWIM Projects are implemented in cooperation with various partners, including local governments, other agencies, and private entities. To date, over $80 million has been invested in the restoration of Tampa Bay through the District’s SWIM Program. This includes approximately $20 million from the District and its Basin Boards, $20 million from the State SWIM Program, $30 million from local governments, and $10 million from Federal, State, local, and other granting sources. The level of funding demonstrates the exceptional commitment made by all partners involved in the restoration of Tampa Bay.

For the 2000 State of the Tampa Bay Report, the District is highlighting three significant habitat restoration projects rather than trying to describe the progress on all of the projects. In addition to the habitat restoration and stormwater retrofit projects, the District’s SWIM Program continues to fund the seagrass mapping efforts for Tampa Bay, as well as actively participate in the management-related committees, work groups, and special meetings.

Clam Bayou

Clam Bayou is surrounded by highly urbanized portions of St. Petersburg and Gulfport (southeastern reaches of Boca Ciega Bay). With completion of the award winning Osgood Point restoration project (mouth of Clam Bayou) during 1995, the SWIM Program began discussions with various parties having jurisdiction and/or interest in the complete restoration and proper management of Clam Bayou: Cities of St. Petersburg and Gulfport, Pinellas County, Florida Department of Environmental Protection (FDEP), FDEP Aquatic Preserves Program, and various citizens and community groups. All parties wish to ultimately create and implement master stormwater and ecosystem restoration/management plans for the bayou. The area is envisioned to become the Clam Bayou Nature Preserve, a green-space nature preserve.

Following the initial Osgood Point effort, two Phase 2 restoration projects were completed during 2000: Clam Bayou Park and the Twin Brooks Golf Course. Located in the southeastern and northeastern reaches of the bayou, respectively, both projects were done in cooperation with the City of St. Petersburg. The pre-restoration sites offered limited habitat values due to dredge and fill activities, exotic plants, and stormwater runoff. In concert with St. Petersburg, SWIM and its environmental consultant (King Engineering Associates) drafted restoration plans that would create various coastal habitats, polish stormwater, and help create salinity gradients/low salinity nursery areas.

Construction was performed during July-December, using staff of the Operations Department of the District, construction management by SWIM, staff and equipment of the City’s Park and Recreation and Engineering Departments, and a trucking firm. Ten acres of coastal habitats have been created, enhanced, and/or restored: tidal channels, lagoons, marsh platforms, marsh and hammock islands. Water quality of the bayou should improve due to stormwater polishing for drainage from portions of the watershed. Volunteers from Lakewood and Palm Harbor High Schools (coordinated by Tampa BayWatch and SWIM) installed over 7,000 smooth cordgrass plants grown by the students. An additional 18,350 plants were installed by professional crews, of which 3,600 smooth cordgrass units were provided by the Florida Fish and Wildlife Conservation Commission (FWC) from their marsh grow-out pond at their Port Manatee fish hatchery. Project expenses were in part met with a $200,000 grant from the U.S. Fish and Wildlife Service (USFWS).

The SWIM Program, in concert with all parties listed above, continued the planning of the bayou’s complete rehabilitation and proper management. The District and the City of St. Petersburg are pursuing land acquisition of bayou tracts important for stormwater and ecosystem restoration efforts. Portions of the final Phase 3 effort have begun with drafting of Request for Proposals for stormwater and environmental consultants to assist with the development of bayou plans, and District crews have cleared/mulched exotic plants from 20+ acres of public lands. In addition, the stage has been set for 2001 to perform topographic and archaeological surveys, eradicate additional exotic plants from the bayou, remove tons of construction debris illegally deposited throughout project sites, and coordinate with the U.S. Army Corps of Engineers concerning the feasibility of dredging the bayou to restore its original sand substratum.

Palmetto Estuary Preserve

This 30-acre coastal habitat enhancement/restoration project was conducted by the District’s SWIM Program in cooperation with the City of Palmetto and the Riviera Dunes Resorts. Located in the southeastern reaches of Tampa Bay, on the northern shore near the mouth of the Manatee River, this project involved 12 acres of public property purchased by the City of Palmetto for $1.4 million (using a grant from the Florida Communities Trust (Preservation 2000) Program. This parcel was combined with 18 acres of public lands owned by the State of Florida. The site had experienced significant

State of Tampa Bay 43
environmental degradation due to fill activities, ditching/diking, and invasion of exotic plants (i.e., Brazilian pepper, Australian pine, lead tree). Once restored, the area will become the Palmetto Estuary Preserve, a greenspace nature park to be managed by the City of Palmetto.

Preliminary site clearing was performed by Riviera Dunes Resorts, and all exotic plants were chipped into mulch and spread over the site. Some Australian pine trees were recycled as firewood and given away to the public. Working with the environmental consultant hired by Riviera Dunes Resorts (Scheda Ecological, Inc.), an integrated project plan was crafted that would create a mosaic of coastal habitats: tidal passes, channels, and lagoons, marsh platforms and islands, and upland hammocks and peninsulas. In coordination with Palmetto and Riviera Dunes Resorts, project construction was performed during March - June 2000 by personnel of the District's Operations Department, construction management provided by SWIM staff. During June, over 225 volunteers and two contractors installed 35,300 plants during a planting coordinated by Scheda Ecological, Riviera Dunes Resorts, and the SWIM Program. Of that total, 14,500 units of smooth cordgrass were provided by the Florida Fish and Wildlife Conservation Commission (FWC) from their marsh grow-out pond at their Port Manatee fish hatchery. The site is providing excellent habitat for fishes, invertebrates, birds, and human uses. Some stormwater polishing is being accomplished for runoff draining from the adjacent U.S. 41.

After marsh planting, the City of Palmetto coordinated with the Sanitation Department of the City of St. Petersburg for the delivery and spreading of additional recycled mulch, an upland restoration method used to reduce exotic plant growth, increase survivorship of installed native plants, and improve the site's aesthetics. The City of Palmetto, in coordination with the SWIM Program, will be developing educational kiosks and have begun plans for a Phase 2 project north and contiguous with Phase 1. The City envisions creating nature trails, shelters, parking, and restroom facilities for the preserve.

**Wolf Branch Creek Restoration and Enhancement Project**

The Wolf Branch Creek Habitat Restoration Project is District SWIM and Alafia Basin Board-sponsored project, cooperatively funded by the FDEP, the Environmental Protection Commission of Hillsborough County (EPCHC), and the USFWS. The 1,080-acre project site was acquired by the Hillsborough County Environmental Lands Acquisition and Protection Program (ELAPP) in 1993 with the specific intent to accomplish ecological restoration on the parcel. This is the largest habitat restoration project currently proposed for the Tampa Bay Estuarine System.

Located along the eastern shore of Tampa Bay, between the Alafia and Little Manatee Rivers, the site contains approximately 565 acres of mangrove, salt-marsh and saltern habitats which have been extensively ditched for mosquito control. Agricultural and mining activities have resulted in the virtual elimination of pristine native upland and palustrine wetland communities which historically existed on the site. These disturbances to the native habitats allowed the subsequent invasion of nuisance and exotic plant species, principally Brazilian pepper and Australian pine.

Restoration objectives for this project include:
- the preservation and enhancement of the remaining native habitats which have been severely fragmented;
- the restoration of the historical palustrine, oligohaline and mesohaline wetland communities which were severely impacted due to mining and agricultural activities;
■ the re-establishment of historical hydroperiods and salinity regimes;
■ the restoration (and expansion) of the saltern land form which historically covered most of the parcel, between the mangrove fringe and the high marsh/upland margin; and
■ removal and control of the exotic and nuisance plant infestation which covers a large portion of the site.

This project will employ an ecosystem restoration approach by enhancing, restoring and creating habitat mosaics. This restoration strategy will focus major earthwork components of the restoration plan on areas which have experienced the most severe historical disturbances. Similarly, areas in which native habitats are more intact will receive less intensive restorative activities such as removal and maintenance of exotic and nuisance plant cover.

In order to effectively accomplish this complex restoration plan, extensive habitat mapping and assessments were performed. A restoration plan has been prepared based upon these assessments, and is presented in the Wolf Branch Creek Habitat Restoration Project Construction Plan set, (Sheets 1 through 34, dated May, 1999) prepared by Peninsula Design & Engineering, Inc. The proposed work involves the backfilling of a network of old borrow pits with on-site soils, and the surrounding overburden spoil which was previously excavated from these pits. Due to the large volume of material which was historically removed from these pits, additional areas of disturbed ruderal habitat (principally pasture) will be excavated to wetland elevation and the excavated material will be placed in the borrow pits to augment fill required to construct littoral shelves and wetland platforms.

Additionally, areas of saltern will be constructed adjacent to existing saltern/high marsh habitats. This will be accomplished by backfilling previously-constructed ditches and selectively excavating berms and areas of disturbed ruderal habitat to appropriate elevations. Wetland habitats will also be constructed along the margins of Wolf Branch Creek by the removal of berms and spoil deposited during previous dredging operations. A small roadbed with failed culverts will also be removed, and the excavated material will be placed in the borrow pits to augment planting platform construction. Any surplus material will be stockpiled on site, stabilized with a minimum 4:1 slope and seeded, mulched and watered until final acceptance of the project by the District.

Exotic and nuisance plant removal and control is another major restoration plan component. Associated with this work will be the removal of berms and selective backfilling of ditches to accomplish exotic plant removal, preservation of desirable native plants and the re-establishment of historic hydropatterns and salinity regimes. Created wetland areas will be planted with native plant species specific to the constructed hydrologic and salinity regimes within each wetland planting area.

When completed this mosaic of freshwater and low saline habitats will provide important refugia and nursery ground for estuarine-dependant species.

**Miscellaneous Sites**

During FY 2000 SWIM, in concert with various cooperators, continued the planning and implementation of various phases of numerous other coastal restoration sites. These sites include, but are not limited to: Cockroach Bay, the Kitchen, Terra Ceia, DeSoto Park, MacDill Air Force Base, Gateway Tract, Balm Road, Apollo Beach, Joe’s Creek, Tappan Site, Fort Brooke Park, and Palm River. SWIM continued to capitalize on various creative funding opportunities involving local, state and federal grants and various mitigation options. In addition SWIM, working with students from the Environmental Science and Policy Program of the University of South Florida, conducted various baseline studies of restoration techniques. SWIM personnel also were invited speakers at numerous scientific meetings, providing project overviews, restoration strategies, and state of the bay for various parameters (habitats, seagrasses, etc.).

Lastly, SWIM closely coordinated with the District’s Land Resources Department and regional programs for acquisition of coastal tracts important for restoration projects and wildlife habitats for the watershed. For more information on any SWIM restoration project or other activity, please call SWIM at 813-985-7481/800-836-0797.

**TAMPA BAYWATCH**

Tampa BayWatch is a non-profit environmental stewardship program dedicated to the protection and restoration of the Tampa Bay estuary. By utilizing trained professional staff and coordinating thousands of volunteers, students and other youth groups, Tampa BayWatch is able to accomplish large-scale restoration and protection projects for the bay. In addition, Tampa BayWatch also strives to reach out to our community’s youth by providing hands-on educational programs and opportunities specifically for students and kids of all ages, fostering a sense of responsible stewardship and resource conservation among our decision-makers of tomorrow.

During 2000 alone, Tampa BayWatch was able to:

■ bring together more than 4,129 community and youth group volunteers in bay restoration activities, bringing our all time total volunteers to 13,969!
■ restore 13 acres of critical saltmarsh habitats by installing 38,000 salt marsh plants throughout the bay area;

*State of Tampa Bay*  45
- clear 60 bird nesting islands, of nearly 57 pounds of deadly monofilament fishing line and other debris;
- participate in numerous coastal and river cleanup efforts to remove marine debris from the bay's shorelines;
- transplant 3,400 seagrass units with our high school and college student Internship Program;
- monitor and document the health and population of the Bay scallop during the “Great Bay Scallop Search”; and
- provide hands-on environmental stewardship programs and educational opportunities for the bay area's student, youth and at-risk kids groups.

Following is an update on some of Tampa BayWatch's community projects and activities of 2000:

**Community Saltmarsh Planting Projects**

Tampa BayWatch coordinated numerous community planting projects throughout Tampa Bay. Thirteen acres of wetland habitat were restored through our volunteer projects. More than 300 students, supervisors and other volunteers restored three acres of coastal habitat at MacDill Air Force Base in Tampa during the Spring. In addition, Tampa BayWatch has been working diligently with the Southwest Florida Water Management District's Surface Water Improvement and Management Program to assist with the ongoing restoration of Clam Bayou. Other sites restored this year include Tarpon Key, Cooper's Point, Cypress Point, Boca Ciega Bay and “Peri” Island. Most of the salt marsh restoration efforts included the participation of local high school students, who transplanted their own salt marsh plants, cultivated from their on-campus nursery, as part of Tampa BayWatch's High School Wetland Nursery Program.

**High School Wetland Nursery Program**

Tampa BayWatch's High School Wetland Nursery Program grew significantly in 2000. With the addition of Young Middle School (which is also a mentoring school for Lockhart Elementary), and the slated addition of Admiral Farragut Academy and Seminole High School in Spring, 2001, the program will boast a total of 13 participating schools! Students in the program are afforded a hands-on opportunity to learn about coastal restoration and native plant cultivation. This year alone, more than 3000 students, teachers and other volunteers participated in the program. Over 30,000 native salt marsh plants were raised in student-tended, on-campus school nurseries, providing a significant amount of vegetation that was used to restore coastal areas in Tampa Bay!

**The Great Bay Scallop Search**

This year proved again how much the community cares about monitoring the health of Tampa Bay! About 150 volunteers turned out at this year's Great Bay Scallop Search to document scallop populations in Boca Ciega Bay and Tampa Bay from Ft. DeSoto to Coquina Key along Pinellas County. While this year's count continued a three-year decline (only 18 scallops found), the enthusiasm from our dedicated volunteers never waned. Tampa BayWatch will continue this annual monitoring effort.

**Seagrass Transplanting Internship Program**

During the Summer, 50 high school and college students helped restore the bay's seagrass habitats. Working with Tampa BayWatch, the students removed donor seagrass from permitted areas in the bay where seagrass is abundant, and transplanted the plugs into 10 meter by 10 meter plots in areas of the bay where seagrass is depleted but water quality has improved enough to allow for new growth. In total, 3,400 seagrass plugs were installed into 17 new plots in Tampa Bay. These plots will be monitored regularly by Tampa BayWatch staff for survival rates. Seagrass provides critical nursery and foraging habitat for several species of fish and wildlife in the estuary. This transplanting program is helping to jump start new seagrass growth in the bay in an effort to combat the dramatic losses of the past.
Tampa Bay Manatee Watch

Tampa BayWatch's boater education and manatee protection program continued to expand, bringing together 1,273 community volunteer and student interns committed to improving the fate of Tampa Bay's beloved manatees. These trained volunteers distribute free safe boating kits and information to Tampa Bay boaters, to help boaters avoid manatees that seek refuge in our bay's warm waters. A corresponding boat monitoring research effort is being conducted by the Florida Marine Research Institute to enhance the program's success assessment.

Seawall Oyster Reef Program

Tampa BayWatch constructs and installs seawall oyster reefs around the bay's hard shoreline developed areas, in an effort to improve water quality conditions in deep water canals and other altered coastline areas. During the Spring and Summer, Tampa BayWatch staff, interns, volunteers and students at Admiral Farragut Academy, St. Raphael's Catholic School and Countryside High School combined forces to produce and install 250 seawall oyster reefs. This was the second year of the program, and our program total now equals over 430 installed seawall reefs - well on our way to exceeding the three-year goal of 500!

This year's reefs were made with marine-friendly concrete. An added benefit of the concrete is that it creates more hard surface for the oysters to settle on, possibly speeding up the growth process. Recently-monitored reefs that were installed last spring are now covered in juvenile oysters.

If you own a waterfront home in St. Petersburg, and would like to participate in this program, please call the Tampa BayWatch office at (727) 896-5320.

For more information or to find out about volunteer and membership opportunities, contact Tampa BayWatch at 727-896-5320 or visit us on the Web at www.tampabaywatch.org

COLONIAL WATERBIRD NESTING IN TAMPA BAY, 2000

Audubon of Florida maintains a sanctuary program that, for over 65 years, has protected critical coastal nesting sites for "colonial waterbirds" - birds that gather in large groups to reproduce - and allied species. In the last 15 years, the program has been broadened to include islands from Tarpon Springs to Sarasota. With the vital assistance of volunteers, some 37 active colonies are now monitored (half in Tampa Bay), with protective efforts established or in development as needed.

This year 17 active colonies were monitored in the Tampa Bay system, with the breeding population totaling about 30,000 pairs of 27 species (see table below). This represents a net decline of nearly 10% from the 1999 nesting effort. Declines were particularly serious in Black Skimmer (-32%), Brown Pelican (-27%), Anhinga (-28%), Laughing Gull (-22%), and Double-crested Cormorant (-17%). Other species increased over the previous year, notably Sandwich Tern (+41%), Reddish Egret (+21%), White Ibis (+14%), and Roseate Spoonbill (+9%). Other species, particularly many of the herons and egrets, were present in numbers about equal to 1999.

Overall, nesting was similar to 1999 and in marked contrast to the spectacular effort in 1998. Dry conditions predominated during both breeding seasons, with two primary results: few storms occurred that might have disrupted nesting, and wetlands were much drier (and less productive) than normal. Therefore numbers of most "beach-nesting" birds (terns, skimmers, oystercatchers, but not gulls) remained stable, but numbers of most wading birds, that depend on productive freshwater wetlands for food, were low. Raccoons remained a serious terrestrial predator on Shell Key, Washburn Sanctuary (=Terra Ceia Bird Key), Tarpon Key, and possibly Johns Pass. On the other hand the Courtney Campbell Causeway colony, abandoned due to raccoon predation for the last several years, was again active.
Other factors affected nesting. Passage Key was much smaller than in past years due to erosion, forcing most Laughing Gulls and Brown Pelicans to move. Many relocated to Egmont Key, which was the site of a large nesting effort for the first time in over 20 years. This is a good example of the need to protect “secondary” or “insurance” sites within a system. Monofilament fishing line, which when discarded may entangle and kill birds of many species, remains a serious threat at many colonies. We are pleased to acknowledge our partnership with Tampa BayWatch and the assistance of 100 volunteers in the annual monofilament cleanup, which in October cleaned 60 islands of fishing line. We estimate that this one-day event saves the lives of several hundred pelicans, herons, gulls, terns, skimmers and other birds annually.

With the assistance of the U.S. Fish & Wildlife Service and (again) Tampa BayWatch and two local high schools, we carried out two Spartina planting projects to stabilize eroding shorelines of Tarpon Key National Wildlife Refuge. This project will continue.

We also continued to post and patrol colonies as needed, to prevent disturbance by people and their pets. The Hillsborough Bay Boaters’ Guide was prepared to inform the public about some of the sensitive areas of the bay, both to increase their appreciation of the wildlife there and to aid in its protection.

These and other efforts all have one primary goal: the safeguarding of the colonial waterbird populations of the Tampa Bay area, and the natural wetland systems that support them. The success we have is the result of the partnerships we enjoy, the assistance of volunteers, and the natural affection that the public has for wildlife. Nevertheless we continue to lose habitat, for colonial waterbirds and for other wildlife as well. In an era of rapid growth and development throughout the region, existing mechanisms to protect, acquire and manage habitat are inadequate. Restoration programs are still too small. State park staffs are being reduced. The list of nonnative plants and animals that affect natural communities grows longer, with leadtree, cogongrass, carrottwood, and the Asian green mussel among the species that have recently come to our notice in Tampa Bay. We continue to debate ways of extracting more potable water from limited natural systems.

These issues and discussions all affect our ability to protect and manage colonial waterbirds. We are extremely fortunate to have such forums for discussion as the Tampa Bay Regional Planning Council, the Agency on Bay Management, and the Tampa Bay Estuary Program, but in these forums, as in the public at large, the discussion lacks a sense of urgency. If colonial waterbirds are to have a stable future in the region, local and state governments must engage the issues of growth management much more fully, and natural systems must be assigned a much higher value. For now, wetlands, wildlife, and open space continue to pay the hidden costs of growth.

For further information about colonial waterbirds in Tampa Bay, contact Rich Paul or Ann Paul of Audubon of Florida at 813-623-6826.

**BAY EXPECTED TO BENEFIT FROM POWER PLANT IMPROVEMENTS**

Pollution-control improvements mandated for Tampa Electric Company’s power plants in Hillsborough County are expected to allow the region to take a giant step
toward achieving adopted water quality goals for Tampa Bay.

When completed, the improvements may lower the amount of nitrogen entering the bay via air emissions by approximately 12 tons per year for the next 10 years. The Tampa Bay Estuary Program's nitrogen management strategy for the bay calls for reducing nitrogen from all sources by 17 tons per year to keep pace with continued growth and its associated increases in pollution.

In spite of the huge contribution TECO will be making toward achieving the nitrogen reduction goal, TBEP Executive Director Dick Eckenrod cautioned that, "Estuary Program partners need to renew their commitment to additional nitrogen reduction projects to ensure that the bay-wide goals are met with a comfortable margin of safety."

Nitrogen oxide (NOx), which is discharged by power plants as well as cars, boats and other "mobile sources," is a major source of nitrogen to the bay. Excess nitrogen is harmful because it increases algae growth, preventing sunlight from reaching seagrasses that are vital to the bay's health.

Estimates developed for other estuaries suggest that at least one ton of nitrogen reaches the water for every 100-400 tons of NOx discharged into the air. Clarifying and expanding scientific knowledge of the link between air and water quality has been a priority of the Estuary Program since early research indicated that about 27 percent of all the nitrogen entering Tampa Bay comes from the air.

Separate legal agreements reached with TECO by the state Department of Environmental Protection and the U.S. Environmental Protection Agency require TECO to spend $1 billion to retrofit its Gannon and Big Bend power plants. Both settlements call for TECO to convert the Gannon plant to natural gas and install pollution-control scrubbers at Big Bend. The federal agreement also imposes a fine of $3.5 million and requires TECO to keep scrubbers at Big Bend operating at all times to facilitate removal of sulfur dioxide, which is implicated in human respiratory ailments.

The overall result of the retrofit projects will be a 91 to 99 percent decrease in key pollutants released from the power plants by the year 2010, according to the U.S. Environmental Protection Agency.

Meanwhile, the Tampa Bay Estuary Program, the Hillsborough Environmental Protection Commission, DEP and others are continuing a cooperative multi-year research effort designed to more comprehensively evaluate the sources and impacts of atmospheric deposition, or air pollution, on the bay. Data collected during this intensive 4-year sampling program are now being analyzed to assist in developing management strategies for addressing sources of airborne contaminants. Additionally, sampling for airborne toxics such as heavy metals and organic pesticides was initiated in 2000 to better understand the severity and effects of heavy metals and other toxic substances on the bay's health.

These ongoing projects will provide baseline information for a detailed evaluation of air pollution, spearheaded by DEP. The Bay Region Atmospheric Chemistry Experiment, or BRACE, will provide bay managers with improved estimates of the amount of airborne nitrogen falling on Tampa Bay and its watershed, and determine the relative nitrogen contribution of mobile, stationary and natural sources.

UNITED STATES COAST GUARD MARINE SAFETY OFFICE TAMPA

The United States Coast Guard Marine Safety Office (MSO) Tampa, under the direction of Captain Allen L. Thompson, Jr., has continued its efforts to ensure the safety of the waterways and the quality of the environment of Tampa Bay. MSO Tampa's area of responsibility stretches from just west of the Fenholloway River (Stake Point) to Cape Romano, Florida, including over 380 miles of coastline and the three deep-draft ports of Tampa, Manatee and St. Petersburg. In addition, the Port of Tampa rated 10th in the nation for tonnage, is the gateway for 50% of the hazardous materials shipments in the state of Florida. The three ports provide a $12 billion economic impact for the region. The summaries below provide a snapshot of significant events, accomplishments, and initiatives of the past year. The MSO continues to set national standards in the arenas of marine environmental protection, vessel inspection and safety, casualty investigations, waterways management, and exercises and contingency planning.

MARINE ENVIRONMENTAL PROTECTION - MSO Tampa responded to 163 pollution cases in 2000 with a spillage potential of 2.2 million gallons. However, the total amount spilled into the waterways was less than 0.1%, or 1,987 gallons. This is a strong indication that pollution prevention initiatives, coupled with critical oversight and enforcement, are working to reduce pollutants entering our waterways.

Although minor pollution incidents comprised the majority of response activities, the most challenging response occurred when weathered oil from a previous spill (1993) was discovered in Blind Pass near Sunset Beach, during a dredging project. The discovery of sub-
merged oil within Blind Pass and the resultant clean-up operations removed over 30,000 gallons of oil from the environment. The unified and coordinated oil recovery response that ensued was highlighted by the development of innovative response strategies and the successful use of dredging as a vehicle of oil recovery. The overall success of this project was due to a strong partnership formed between all of the involved federal, state, and local agencies, particularly the U.S. Coast Guard, the U.S. Army Corps of Engineers, and the Florida Dept. of Environmental Protection. This resulted in the successful recovery of submerged oil in an environmentally sound manner and the successful renourishment of Upham Beach. This joint operation effectively laid the groundwork for continued teamwork in all aspects of planning and response.

**Environmental Outreach and Response Programs:** MSO Tampa places a significant emphasis on partnerships with the maritime and environmental communities, the general public, and other federal, state, and local agencies to combat oil and hazardous material pollution in Tampa Bay. Programs such as “Solutions to Pollution” that target the prevention of mystery spills from recreational boaters and marinas, as well as the “Sea Partners” program that educates young people on pollution and prevention methods that continues to reach a large and diverse audience on the west coast of Florida. The Initial Pollution Investigators program, which utilizes USCG Auxiliary and local emergency response organizations, e.g., fire and police departments, to help combat pollution incidents allows for more rapid response to pollution incidents and an earlier start to the mitigation process. As maritime activities increase in the Tampa Bay basin and beyond, expansion of the outreach and response programs to include more environmental and emergency response organizations will be necessary to keep pace with this growth.

**Marine Safety and Vessel Inspection Programs:** Marine safety and vessel inspections center on prevention through people and focus on compliance with international and U.S. standards. Enforcement of the various standards at the ports, shipyards and upon U.S. and foreign flag vessels is a key ingredient of a successful program. However, the most critical element to a solid safety program is the partnerships between the maritime industry and the Coast Guard. MSO Tampa’s excellent working relationship with industry has resulted in resounding success in the areas of crew and vessel safety, environmental resource protection, and a safe and efficient marine transportation system. Standards and operations on commercial fishing vessels were also of special interest and received greater attention during 2000.

**Shipyard Activity:** Activities within the diverse and fast-paced Tampa shipyards were high and posed some unique challenges. Inspectors oversaw several unique large-scale conversion projects, which included the conversion of Maritrans’ OCEAN 244 from a single-hull tank barge to a double-hull tank barge ahead of the mandatory requirements of the Oil Pollution Act of 1990. Work on the third barge in this double-hulling project, the OCEAN CITIES, is currently underway at Tampa Bay Ship Repair. In addition, a joint venture continues between local shipyards in the restoration of the AMERICAN VICTORY, a Victory Ship from World War II towed to Tampa from the Navy’s Reserve fleet in Norfolk, VA, where it had been laid up since 1981. International Ship Repair, Tampa Bay Ship Repair, and Gulf Marine Repair are contributing their time and expertise to restore the vessel to its days of glory when it protected our country over 50 years ago. Once completed, this ship will be moored downtown where it will serve as an area attraction and help to educate the public about the history of the Merchant Marine.

**Passenger Vessel Safety:** The Tampa area has a total of 314 passenger-carrying vessels, including 15 high-capacity vessels with a capacity of over 150 passengers each, which must meet federal inspection requirements. A new safety law came into effect March 11, 1999, requiring passenger vessels with wood or fiberglass hulls to install fixed fire-extinguishing systems in engine room spaces. Inspectors continue to work with vessel masters and operators to ensure their newly-installed, fixed fire-extinguishing systems are effective and in compliance with the requirement. The Tampa Bay region has seen a significant increase in new vessel construction this year, with several parasail and dive boats being delivered, while two new high-speed ferries connecting Tampa with Key West are slated to begin operations in 2001.

**Foreign Vessel Inspections:** The primary goal of eliminating substandard vessels from U.S. ports is accomplished through the enforcement of U.S. and
International laws, and regulations on foreign vessels calling on U.S. ports. Approximately 2300 foreign vessels called on Tampa Bay in 2000, making roughly 8,000 transits. Vessels are selected for boarding based on a risk assessment matrix, taking into account the safety record of the vessel, its owner, flag, and classification society. Vessels posing the highest risk are boarded prior to entering Tampa Bay, or must show they pose no immediate risk to the environment or the safety of the port. MSO inspectors boarded 181 foreign flagged vessels, and detained 13 substandard vessels for serious deficiencies. In ensuring the Commandant's goal of reducing these substandard vessels, MSO Tampa has been aggressively enforcing compliance with U.S. and international laws, and over the past five years have seen an annual decrease in the number of substandard vessels entering the port. In addition to safety concerns, the Coast Guard continues to actively monitor ballast water exchange within U.S. waters by ensuring compliance with the submittal of ballast water exchange information from vessels coming from a foreign port to the U.S. During random boardings a ballast water questionnaire is completed by the master for submittal to the Smithsonian Environmental Research Center for inclusion in the national ballast water survey. Additionally, the salinity of the ballast water is tested at the time of the boarding as a secondary measure to ensure that water was exchanged prior to port entry. These reports and inspections help to ensure all participating vessels are in compliance with the program, thus reducing the number of aquatic nuisance species introductions into the Tampa Bay ecosystem.

**Commercial Fishing Vessels:** The Commercial Fishing Vessel Safety Program has been in effect at the MSO since 1992 and provides oversight for a fleet of over 2,200 vessels. Over 375 voluntary dockside safety examinations were conducted this past year with more than 180 vessels brought into full compliance with safety requirements. During the winter of 1999 and 2000, Operation Safe Catch, an effort to target high-risk commercial fishing vessels for boarding in order to reduce vessel casualties, was conducted throughout the East Coast of the U.S. The MSO identified over 100 fishing vessels for inclusion on the high-risk list and more than 90 were examined, resulting in 48 vessels attaining compliance with safety requirements and 18 vessels being removed from service. Also, we enhanced our dialogue and established a better working relationship with the commercial fishing vessel industry. The overall success of the Tampa program was further recognized when the administrator of our fishing vessel safety program was one of seven Coast Guard civilian employees to receive the Secretary of Transportation's Meritorious Achievement Award.

**Casualty Investigations** - MSO Tampa investigates and tracks the number of commercial marine casualties, including groundings, collisions, allisions, equipment failures, fires, and personnel injuries to determine the root cause of the accident and determine ways to prevent such incidents from reoccurring. The program is geared towards reducing mishaps by focusing on education and community outreach efforts as well as looking at the effect of human factor elements in marine casualties. Furthermore, statistics are used to evaluate the effectiveness of efforts to reduce marine accidents within MSO Tampa's Area of Responsibility (AOR).

During 2000, the MSO investigated 136 marine casualties, 40 personnel action cases involving activities of merchant mariners or members of the maritime community and 13 marine violation incidents. The majority of the cases involve instances where actions of licensed mariners were found to have contributed to a casualty, violation of a law or regulation. Investigators worked closely with all parties, which resulted in many positive changes to marine operations within the Tampa area. For example, when rail heights on stairtowers aboard a cruise ship were determined to be an "attraction nuisance" and a contributing cause of injuries to passengers. The MSO and the cruise line worked together to modify the stairtower design and handrail height to eliminate the possibility of these accidents happening in the future. The dissemination of Port Community Information Bulletins following the investigation of cases where casualties could have been prevented, allow the commercial industry to evaluate and adjust their operations for increased safety. Also, local mariner training centers were used as a vehicle to explain the changes and the impact of the Coast Guard Drug and Alcohol Program for industry members.

Of special interest during this reporting period was the successful completion of an administrative hearing evaluating the actions of a parasail operator involved in an accident with a recreational vessel. As a result of the hearing, the parasail operator was required to take a
Rules of the Road course, refrain from operating a parasail vessel for two years, and was restricted from operating any vessel for one month. The lessons learned from this case will be applied in a training program that is being developed to improve the navigation safety standards of the parasail community. With the ever-increasing traffic operating on Tampa Bay, the risk of incidents and casualties will continue to rise. The Coast Guard will continue to work with industry to champion sound work practices and safety procedures to prevent marine-related accidents.

**WATERWAYS MANAGEMENT** - Ensuring the safety of the Marine Transportation System (MTS), as well as the lives of those working, living, and recreating on the nation’s waterways while facilitating maritime commerce and national security is one of our top priorities. The MTS consists of waterways, ports and their intermodal connections, vessel vehicles, and system users. Recently the development and implementation of MTS on the regional level increased local support and information flow for those associated with the maritime industry as well as those unknowledgeable of this vast and diverse marine transportation system. MTS initiatives have been implemented at the national level with astounding speed and the policies are being supported and adopted with great enthusiasm at the regional and local level. The MTS initiatives are of critical importance to port safety and security of the Port of Tampa, Manatee and St. Petersburg. Local initiatives include engagement in marine counter-terrorism and mass casualty response exercises, sound execution of natural disaster responses, increased focus on harbor safety committee organizations, and improvements in vessel traffic management.

As was discussed in last years report, MSO Tampa continues to work closely with the Tampa Bay Harbor Safety Committee to improve the safety of the ports’ users and to better utilize the region’s waterways. One of the most ambitious initiatives within Tampa Bay was the development of the Tampa Bay Vessel Traffic Information Service. This system is fully functional, employed by a multitude of waterway users, and has clearly reduced the risk of vessel collisions in the Tampa Bay Basin, thus reducing the potential for environmental catastrophes.

In 2000, the port experienced six major ship or tug/barge groundings associated with vessels entering or leaving the Ports of Tampa and Manatee. Each grounding put waterways and the ports at risk of environmental damage from the possible rupture of the vessel’s cargo or fuel tanks. MSO Tampa reacts swiftly to each grounding and coordinates our efforts with the Florida Department of Environmental Protection, the port community, and the involved party(s). Partnerships with environmental agencies and organizations coupled with increased knowledge of environmental concerns have allowed the MSO, the maritime industry and the port community at-large, to become active environmental stewards.

**EXERCISES AND CONTINGENCY PLANNING** - MSO Tampa hosted two exercises and completed an electronic revision of the Area Contingency Plan (ACP) this past year. The two exercises were a Marine Counter-Terrorism Field Training Exercise held on March 17, 2000 and a Search and Rescue (SAREX) Table Top Exercise held on September 21, 2000. They effectively provided opportunities for coordination, planning, and communication between all federal, state, and local agencies, and tested a unified and comprehensive response to critical safety and security incidents. The electronic ACP is a groundbreaking planning and response tool, which will increase the effectiveness of oil spill and hazardous material responses reducing environmental damage and the resulting economic impact. In addition, a comprehensive Port Heavy Weather Contingency Plan promotes port safety during hurricane season. This plan was activated on a number of occasions last year. Exercises are used to test contingency plans and the readiness of applicable players in an effort to ensure the protection of natural resources and port assets.

**Search and Rescue Exercise** - The SAREX Table Top Exercise was developed to primarily exercise the Coast Guard response system in the Tampa, St. Petersburg, and Clearwater areas to a mass casualty marine incident involving a high-capacity passenger vessel, which is a vessel with the capability of carrying more than 149 passengers. The scenario involved a collision between a gambling vessel and a commercial fishing vessel resulting in the full evacuation of both vessels, which involved the transferring, tracking, and medical care for approximately 250 passengers.

The exercise brought the three local Coast Guard Commands (Air Station Clearwater, Group St. Petersburg, and MSO Tampa) together with the local emergency response organizations for a coordinated response to this mass casualty incident. The broad objectives for the exercise were to evaluate the response management, operational response, and response support systems. One critical component of the exercise was the ability of the organizations to establish an Incident Command System (ICS) and to integrate local, state, and federal emergency response organizations into a fully functional Unified Command System.

Several key issues were identified as a result of this exercise. The primary issue was the lack of a marine disaster plan to address cross-jurisdictional large-scale maritime problems. The plan is currently being developed through a concerted effort between the Coast Guard and the local emergency response organizations. Another issue was the lack of a joint agency communication plan that would ensure all agencies were capable of interacting with each other during a
response effort. A third issue was the lack of a support agreement between the Coast Guard and the local and state emergency response agencies. Efforts are being taken to correct these deficiencies in our response posture.

Overall, this exercise increased knowledge of available resources, constraints, and jurisdictional issues for all involved agencies. This information when coupled with the lessons learned from the exercise served to increase the effectiveness of a unified response in this area. For detailed information and evaluation of this exercise visit the MSO Tampa website at www.uscg.mil/d7/units/mso-tampa under “Search and Rescue Table-Top Exercise.”

**Marine Counter-Terrorism Exercise:** With the growing threat of terrorism in the United States, our law enforcement and emergency response agencies must plan and prepare response actions for various types of terrorist acts. The Marine Counter-Terrorism Field Training Exercise was conducted in order to evaluate the response of Tampa area federal, state, county, and local authorities to a marine terrorist act using a potential weapon of mass destruction. The exercise scenario tested a multifaceted multi-agency response to a release of anhydrous ammonia (NH3). The Port of Tampa has numerous shipments of NH3 that present a risk of hazardous materials (HAZMAT) release in the port. A terrorist act at one of the NH3 facilities or on board a vessel carrying NH3 could create a weapon of mass destruction with potential catastrophic results. The exercise was conducted at a waterfront facility and involved over 25 emergency response agencies with over 100 personnel participating. The exercise was led and coordinated by the MSO, the Federal Bureau of Investigations (FBI), the City of Tampa, and Hillsborough County emergency response agencies.

The exercise served as a benchmark for the emergency response community. There were numerous lessons learned by each individual agency and by the entire emergency response community. The local, state, and federal emergency response agencies for the Tampa area were able to work together to analyze the situation and develop a response action plan for the scenario presented. The “real-time” field response enabled responders to actively test their policies and procedures. Each organization established its own ICS and was quickly ready to respond. As the exercise progressed, the responding agencies migrated to a Unified Command posture where all response systems were controlled through one command structure. The exercise demonstrated a need for the Tampa area emergency response agencies to work together to develop inter-agency protocols for response to a multifaceted, multi-level incident involving cross jurisdiction.

Overall, this exercise increased knowledge of available resources, constraints and jurisdictional issues for all involved agencies. It served as a springboard to improve the community response to an incident of this type. For detailed information and evaluation of this exercise visit the MSO Tampa website at www.uscg.mil/d7/units/mso-tampa under “Marine Counter-Terrorism Field Training Exercise, March 17, 2000, Evaluation Report.”

**Electronic Area Contingency Plan:** The development of the Area Contingency Plan (ACP) through the Area Committee was essential in ensuring that all oil spill and hazardous material responses are mitigated in an environmentally-sound manner. The purpose of the plan is to define roles, responsibilities, resources, and procedures necessary to respond to a myriad of spill response evolutions. In keeping with the Coast Guard Commandant’s motto, “Preparation Equals Performance,” the Area Committee seeks to enhance the response community’s ability to successfully mitigate substantial threats or actual incidents through an effective and coordinated planning process. MSO Tampa’s electronic ACP project is a “first of its kind” joint effort on behalf of the State of Florida and the U.S. Coast Guard and has received significant national attention. Florida Marine Research Institute was contracted to develop this first electronic ACP. As a result of going electronic, significant enhancements have been made not only in the plan’s usability but also in dramatically improving the plan’s content and accessibility. It has been adopted as a national model and a prototype for the Seventh Coast Guard District (Florida, Georgia, and South Carolina).

The advantages of going electronic are numerous. In the electronic world, internal links make navigating around the plan much easier. Search engines have also been provided within the plan to help the user locate desired information quickly. External links have been added to provide for an unlimited amount of additional information, right at your fingertips. One of the major goals of this project was to make the plan available to a broad audience. Therefore, the software platform that was selected is independent, meaning that the electronic
ACP can be inserted into any DOS computer and it will run itself. The electronic ACP is now provided on a CD that contains all the software necessary to view the documents. Also this electronic revision marks a significant and dramatic improvement in the availability of NOAA's Environmental Sensitivity Maps. Increased access to these sensitivity maps by the environmental community as well as the commercial maritime industry will serve to increase awareness and assist the development of facility and vessel contingency plans. Through the use of a Geographic Information System (GIS) users may browse extensive layers of data without an advanced computer education. The project files can be used in a simplified version for the unskilled computer user as well as in an enhanced software version for the more skilled GIS specialist. The mapping program is interactive and provides extensive information that can easily be browsed. These maps provide essential information necessary to identify sensitive areas and plan response operations. Because the program is interactive, the user can visually explore, query, and analyze geographically-referenced data. In addition to the GIS mapping, the plan now provides additional static mapping information that was previously difficult to obtain by the maritime and spill response industries. The new electronic plan also provides Tidal Inlet Protection Strategies for 37 inlets from Hillsborough to Collier Counties. Additionally, the new plan launches a previously-developed program, the "Florida Marine Spill Analysis System."

As part of this revision, the ACP has been reformatted into an incident Command System framework. The framework divides the plan into its functional areas of planning, operations, logistics, and finance. It also discusses the unified command concept and provides additional information useful to fulfilling these roles such as job aids, example site safety plans, and ICS forms to be used during an incident. The revised plan also contains an extensive linkage to related information found on the world wide web. By linking to these sites instead of reproducing the information, maintenance of the plan has been dramatically simplified. The new electronic ACP will significantly enhance the level of contingency planning for response to oil spills and hazardous materials releases. It will also, through its increased availability and ease of use, increase the ability to quickly respond and assess potential damage to the marine environment. All Coast Guard ACP's will be revised to this basic format to allow for consistency across the nation while still accounting for geographic differences. This format also allows for easier manipulation in a computer medium. For an electronic version of the MSO Tampa Area Contingency Plan visit the MSO Tampa website at www.uscg.mil/d7/units/msotampa under "Area Contingency Plan." (This will be available in March 2001.)

**Hurricane Preparedness:** Of all the various forms of natural disasters, heavy weather, such as tropical depressions and hurricanes are the most prevalent in MSO Tampa's AOR. The location of Tampa on the west coast of Florida is significant, since the coastline is nearly parallel to normal tropical cyclone tracks as they move more or less northward out of the tropics. Tampa's latitude of about 27 N is within the normal focus of tropical cyclone recurvature, which oscillates between latitude 25 N and 35 N. Tropical cyclones slow down and intensify during the recurvature stage, making forecasting difficult. In terms of vulnerability to the Port of Tampa, wind from a south or southwesterly direction would have the most potential for destruction because Tampa Bay is open in those directions. Although the terrain around the bay is low in elevation, wind speed from directions other than south or southwest would be reduced, if only slightly. Buildings at or near the port would provide more protection from northerly winds than winds from other directions.

The MSO and the port community operate under the Port Heavy Weather Plan in the event a hurricane tracks through the west coast of Florida. The official hurricane season is 1 June through 30 November. Disastrous hurricanes are relatively infrequent occurrences for any particular segment of coastline; however, the destructive potential is so great that adequate planning is essential to prevent loss of life and property. Damage due to hurricanes in the United States averages a half billion dollars annually. Hurricane Gordon was the storm in 2000 that came closest to Tampa Bay. Its impact caused the port to be closed for a brief period of time. Fortunately, the Tampa area only experienced high winds, rain, and higher than normal tides that resulted in minimal damage to the region. It has been a number of years since the Tampa area has experienced a direct hit. The "hurricane of record" for Tampa occurred in 1921 with 105 miles per hour (91 knots) winds, an 11-foot storm surge, and left six people dead. Whenever one of these storms approaches, vigilance and preparation are essential elements to ensure Tampa Bay ports are ready to face the storm to minimize the impact on maritime business and the environment. The Coast Guard, as part of the Department of Transportation, has the primary missions during severe weather for the safety of life and vessels, environmental resource protection, and waterways management that now includes oversight of bridge closures. For access to the MSO Tampa Heavy Weather Plan visit the MSO Tampa website at www.uscg.mil/d7/units/msotampa under "Heavy Weather Plan."

In keeping with the USCG motto of "Semper Paratus", Always Ready; MSO personnel are always ready to respond and take appropriate action to ensure the safety of the maritime community, the protection of natural resources, and to promote economic prosperity. For further
TAMPA BAY PORTS

Tampa Bay PORTS (Physical Oceanographic Real-Time System) is an information acquisition and dissemination technology developed by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) in collaboration with the University of South Florida College of Marine Science. The goals of PORTS are to improve navigational safety and to protect the environment by providing more accurate water level and current data for Tampa Bay. Tampa Bay PORTS is funded by local and state agencies and supported through a cooperative agreement with NOS for technical assistance. PORTS is located in the USF College of Marine Science under a cooperative agreement between PORTS and the University of South Florida. PORTS integrates real-time current, water level, temperature, wave, visibility, and wind measurements collected every six minutes at multiple locations in Tampa Bay. Because the Bay’s tides and currents are influenced strongly by non-tidal forces such as winds and river flow, PORTS provides important real-time information to both recreational boaters and professional pilots navigating in Tampa Bay.

In addition to improving the safety and efficiency of navigation within Tampa Bay, PORTS also provides oceanographic and meteorological data to aid rapid response to hazardous material spills. In this capacity, PORTS is an initial responder to hazardous spills as part of Tampa Bay’s Contingency Plan for Oil and Hazardous Substance Pollution Response, and participates in USCG MSO oil spill drills for Tampa Bay. PORTS also aids in search-and-rescue missions and assists in environmental management of the Bay.

RTS data are archived at USF’s College of Marine Science and represent a significant source of oceanographic and meteorological information for Tampa Bay. The archive, which is within the public domain, contains PORTS data from June 1992 through the present and can be accessed in a variety of ways, including anonymous FTP. The PORTS website (http://ompl.marine.usf.edu/PORTS) contains additional information about PORTS and its associated facilities and projects.

In addition, the U.S. Coast Guard (USCG) is currently implementing VTS 2000, an electronic vessel traffic information and safety system for all major ports and harbors in the United States. VTS 2000 includes PORTS-like technology and electronic distribution of geographical information using wireless, wide-area networks. Tampa Bay is the first harbor to implement a Vessel Traffic Information System (VTIS)/Automatic Identification System (AIS), fulfilling the goals of VTS 2000. USF has worked closely with Ross Engineering, developer of the Tampa Bay AIS, to incorporate the PORTS data stream into the carry-on units used by the harbor pilots.

For more information, contact Dr. Mark E. Luther, 727-553-1528, or see our Web Site: http://ompl.marine.usf.edu/PORTS
CLEANER, CLEARER: FLORIDA POWER & LIGHT COMPANY'S MANATEE POWER PLANT INSTALLS NEW TECHNOLOGY BURNERS

A Florida Power & Light Company (FPL) power plant initiative is contributing to cleaner air and reduced water usage in the Tampa Bay area.

In 1999 FPL faced a decision to either repair existing 20-year-old fuel oil burners or purchase replacements at their oil-fired, twin-unit Manatee Power Plant in Parrish, Manatee County. Aiming for both environmental and reliability improvements, FPL decided to install new technology Low Nitrogen oxides- (NOx) emitting burners. The new burners were installed on Unit 2 in the Spring and are scheduled for installation on Unit 1 by end of December 2000.

The new burners provide a 20-30% reduction in the NOx emission rate. This is achieved by lowering the NOx emission levels during the hours of high load operation. For example, on a typical hot summer day the total accumulative tons of NOx per unit were reduced from 23 to 16—a net reduction of seven tons of NOx per unit per day. Nitrogen oxides are ozone precursors and suspected to be a source of nitrogen deposition to the bay.

Other environmental benefits include reductions in visible emission and carbon monoxide emission rates. Also, the old burners used steam atomization while the new burners are mechanically atomized, resulting in an expected reduction in water use of approximately 30-37 million gallons per year.

THREE-DIMENSIONAL HYDRODYNAMIC CIRCULATION MODEL OF TAMPA BAY

The USF College of Marine Science has developed a three-dimensional, time-dependent model of the hydrodynamics of circulation in Tampa Bay (Galperin et al., 1992a,b; Vincent, et al., 1997, 2000), based upon an advanced version of the Princeton Ocean Model (Blumberg and Mellor, 1987). The governing equations consist of conservation of mass and momentum and conservation equations for thermal energy and salt. Equations are also solved for turbulence kinetic energy and turbulence macroscale. Salient features include a curvilinear orthogonal grid in the horizontal plane and a bed- and free-surface-following sigma coordinate system in the vertical axis. Turbulence closure is provided by an embedded Mellor-Yamada 2.5 level closure submodel (Mellor and Yamada, 1982) as modified by Galperin.

Time-splitting allows for the fast external or barotropic waves to be solved for explicitly, and the slower internal baroclinic waves implicitly. Specified forcing boundary conditions include: the free-surface elevation and temperature/salinity profiles at the open water boundary; the flow rate, temperature, salinity and level of inflows or outflows; surface heat flux; and surface stresses due to wind, precipitation and evaporation. Among the important parameters computed are: free surface height, magnitude and direction of current velocity fields, and temperature and salinity fields.

Various model versions have been deployed and tested at numerous sites, such as the Hudson-Raritan Estuary, Chesapeake Bay, Delaware Bay, Apalachicola Bay, Florida Bay, the lower Mississippi River and adjacent continental shelf, and the New York Bight. The present version of the Tampa Bay model uses a 70-by-100 horizontal curvilinear grid (Figure 1) with 11 sigma levels in the vertical (Figure 2). Boundary conditions for the Tampa Bay model are provided by the PORTS data stream. Under present EPA funding, the model is run on a SGI mini-supercomputer and is automatically updated every 12 minutes to provide a "nowcast" of present conditions in the Bay. Every four hours, a 24-hour forecast is performed using winds from the National Weather Service ETA model and water levels at the mouth of the Bay extrapolated from present observations. Model nowcast and forecast fields are presented in graphical format and can be viewed on the OMPL Web site (http://ompl.marine.usf.edu/TBmodel) and can be provided via ftp.

Spill Trajectory Model

The hydrodynamic model output velocity fields drive a spill trajectory model to predict the movement of hazardous material spills in Tampa Bay. Spills are treated in
two ways: 1) as a passive Eulerian tracer modeled by an advection-diffusion equation on the same grid as the hydrodynamic model, where the advective velocities and eddy diffusivity is taken from the hydrodynamic model; and 2) as a cloud of a large number of Lagrangian particles, each modeled by a first order Markov process using instantaneous velocities from the hydrodynamic model and a Markovian dispersion coefficient calibrated using observed drifter tracks. To date both the passive tracer and surface drifter model show promise in the ability to track both surface-trapped species (external Lagrangian drifter) and plumes that are neutrally buoyant (internal passive tracer). The information on oil distribution from either spill model is injected into the state’s Florida Marine Research Institute’s Marine Spill Assessment and Response System (FMSAS), a GIS-based spill mitigation tool. The predicted distribution of oil from the spill model forms a layer in the MSAS database and can be used as a template to cut through the resources-at-risk data layers to arrive at an inventory of resources exposed.

Wireless Data Delivery

Information from the real-time observations or model output and on the predicted distribution of oil can be delivered in real-time to harbor pilots, shipping agents, resource managers, or others in the field using wireless internet technology. We are using two different wireless technologies in Tampa Bay. The first is Cellular Digital Packet Data (CDPD) or Wireless IP that uses the commercial cellular network to connect to the Internet from a notebook computer wherever the local cellular provider supports this service (usually the wireline cellular provider; see http://www.attws.com/business/gov/explore/wireless_ip/network/ for more information). The second is via a dedicated 900 Mhz spread spectrum radio modem link using Point-to-Point Protocol between the USF St. Petersburg campus and a remote notebook computer. This radio link has a radius of approximately 30 miles, depending on antenna height. The advantage to the spread-spectrum radio link over the CDPD link is that the cellular frequencies often become crowded and throughput is hindered. The spread-spectrum radio link has much faster throughput, even under optimal conditions for CDPD. The disadvantage to the spread-spectrum radio is its range limitation, although multiple radios can be used as repeaters to easily set up a local network. Because they work in the 900 Mhz frequency band, no special licensing is required. Using either wireless communications link, the remote computer can access the predicted spill trajectory or other model or observational products using standard web browsers.

In addition, the wireless delivery technology can be implemented through our collaboration with Ross Engineering, the developer of the Tampa Bay Vessel Information and Positioning System (see http://www.rossdsc.com/ais.htm). Ross provides a wireless wide-area network in the Tampa Bay region and has the capability to transmit real-time data from Tampa Bay PORTS to the pilots’ carry-on units in use in Tampa Bay (Husick, 1999).

References:


HYDROBIOLOGICAL MONITORING FOR NEW WATER SUPPLY DEVELOPMENT IN THE TAMPA BAY REGION, FLORIDA

After decades of increasing groundwater use in the Tampa Bay region, environmental impact (e.g., lowered lake levels and wetland stress) has become a significant concern in some areas. In addition to water conservation measures, new water supply sources must be developed to relieve environmental stress around regional groundwater facilities and meet increasing water demand for an ever-growing population. Tampa Bay Water, the regional water supply authority in the Tampa Bay Region, adopted a Master Water Plan in 1997 that identified surface waters - including the Tampa Bypass Canal, the Hillsborough River, and the Alafia River - as significant sources of additional water supply.

The harvesting of surface waters, however, has raised new concerns regarding potential adverse impacts to aquatic ecosystems and recreational attributes associated with the referenced water bodies. Water Use Permits issued by the Southwest Florida Water Management District for the Tampa Bypass Canal/Hillsborough River and Alafia River Water Supply Projects specify the development of a comprehensive Hydrobiological Monitoring Program (HBMP). Due to similar project development schedules, close proximity, and the integrated nature of the two projects, a single unified HBMP was developed to address permit requirements for both projects simultaneously.

Overall HBMP goals are to ensure that post-implementation flows do not deviate from the normal rate and range of fluctuation to the extent that water quality, vegetation, animal populations, salinity patterns, or recreational/aesthetic qualities are adversely impacted. Specific HBMP objectives are to: document existing conditions; enable the detection of changes; determine if any detected changes are attributable to freshwater flow reduction and permitted surface water withdrawals; determine whether the detected changes constitute, or could result in, unacceptable adverse impacts; and recommend appropriate management actions or operational changes to mitigate unacceptable adverse impacts, if they occur or are expected to occur.

To maximize stakeholder communication and the use of available technical resources, a consensus-based focus group was established to help design the HBMP. This group, consisting of consultant and university experts, representatives of federal, state, and local environmental agencies, and various environmental organizations will also convene annually to evaluate monitoring data. The HBMP defines monitoring program elements including hydrology/water quality, biota, and habitat/vegetation; critical indicators; and associated criteria such as the monitoring parameters, sampling methods, and data analysis. The HBMP also defines a process by which adverse impacts can be determined and includes a hierarchy of management actions for response to any detected hydrobiological changes.

The HBMP was implemented in Spring 2000 so that baseline data could be collected prior to initiation of new surface water withdrawals (expected to begin in late summer 2002). This paper includes a brief overview of HBMP design considerations and implementation status.

Surface Water Supply Sources in the Tampa Bay Region

After decades of increasing groundwater use in the Tampa Bay region, environmental impact (e.g., lowered lake levels and wetland stress) has become a significant concern in some areas. In addition to water conservation measures, new water supply sources must be developed to relieve environmental stress around regional groundwater facilities and meet increasing water demand for an ever-growing population. Tampa Bay Water, the regional water supply authority in the Tampa Bay Region adopted a Master Water Plan in 1997 that identified surface waters - including the Hillsborough River, the Tampa Bypass Canal, and the Alafia River - as significant sources of additional water supply. All three tributaries discharge to Hillsborough Bay, a segment of the Tampa Bay estuarine system (see Figure 1).

Hillsborough River - With a historic mean annual discharge of 1.53 x 10^11 gallons (Lewis and Estevez, 1988), or about 419 million gallons per day (mgd), the Hillsborough River constitutes the greatest single source of freshwater inflow to Tampa Bay. The river is impounded by the Tampa Dam, approximately 17 kilometers upstream of its confluence with Hillsborough Bay. Unlike the majority of municipalities in the Tampa Bay region, the City of Tampa has relied upon surface water withdrawals from the impounded Hillsborough River Reservoir to meet its water supply needs since the...
late 1800s. Therefore, the natural hydrology of the tidal Hillsborough River has been substantially altered for over a century. From 1977-1996, mean annual discharge at the Tampa Dam was approximately 148 mgd. In addition, the lower tidal segment of the Hillsborough River is heavily urbanized, and the vast majority of the shoreline has been hardened.

**Tampa Bypass Canal** - The Palm River once drained lands between the Hillsborough River and Alafia River watersheds, and discharged into McKay Bay, a small embayment in northeast Hillsborough Bay. During the 1960s, however, the Palm River was completely channelized, deepened, and impounded to create the Tampa Bypass Canal (TBC). Completed in 1970, the purpose for this alteration was to control flooding by intercepting and diverting high flows from the upper Hillsborough River around the urban areas of the City of Tampa. Although, the Tampa Bypass Canal still discharges to McKay Bay, the natural hydrology and ecology of the historic Palm River have been substantially altered. Today, the Tampa Bypass Canal is tidally influenced up to structure S-160, the most downstream control structure in the canal system, but virtually no natural riparian wetland communities exist along this segment.

During TBC construction, the confining layer of the artesian Floridan aquifer was breached, and it is estimated that 20 to 40 mgd of groundwater currently discharges to the Tampa Bypass Canal. The Harney Canal, an interconnection between the Hillsborough River Reservoir and the Tampa Bypass Canal, was completed during the late 1970s. The City of Tampa is currently permitted to divert water from the Harney Canal into the reservoir to augment water supplies during low flow periods. From 1977-1996, mean annual TBC discharge at S-160 was 79 mgd.

**Alafia River** - The Alafia River is the second most important tributary to Tampa Bay in terms of freshwater inflow, with a historic mean annual discharge of 1.12 x 10^{11} gallons (Lewis and Estevez, 1988), or about 307 mgd. The river originates in Polk County to the east and discharges into southeastern Hillsborough Bay. The river is tidally influenced approximately 16 kilometers upstream of its mouth. Land uses in the lower Alafia watershed are predominantly rural, and the natural hydrology and ecology of the tidal Alafia River have been largely maintained. The upper watershed, however, has been affected by phosphate mining, and some of the upper branches are partially impounded. From 1977-1996, mean annual discharge at Bell Shoals Road was 214 mgd.

**Tampa Bypass Canal/Hillsborough River Water Supply Project** - The Tampa Bypass Canal/Hillsborough River Water Supply Project involves withdrawals of seasonally available surface water from the Tampa Bypass Canal and the Hillsborough River for public supply use in the region (see Figure 2). The project will involve diversion of a percentage of high flows from the Hillsborough River through an existing flood control structure (S-161 located in the Harney Canal) into the Tampa Bypass Canal. Diversion from the river, as well as flow originating from the Tampa Bypass Canal, will be withdrawn at a single pumping facility to be located on the east side of the Tampa Bypass Canal adjacent to flood control Structure S-162. The pump station will deliver water to the Tampa Bay Regional Water Treatment Plant and a re-pump station, located at the water treatment plant, will deliver excess capacity to the proposed Tampa Bay Regional Reservoir, a part of the Enhanced Surface Water System discussed below.

The permitted withdrawal schedules for both the Tampa Bypass Canal and the Hillsborough River (see Table 1) vary with available flows (i.e., withdrawals increase with increasing flows up to a permitted maximum), however, no water can be withdrawn below an established low flow limit at both points of discharge to tidal waters. The maintenance of a minimum flow in surface waters is required under Florida law to ensure that aquatic ecosystems and recreational uses are not adversely affected by withdrawals. The Hillsborough River withdrawal schedule allows for the harvest of proportionately greater volumes of the high flows that occur during periods of heavy rainfall, between 65 and 647 mgd, but limits or prevents withdrawals from the low flows that occur during periods of drought. The Tampa Bypass Canal withdrawal schedule, however, allows for the harvest of 80% of the flow between 7 and 81 mgd.

**The Alafia River Water Supply Project** - The Alafia River Water Supply Project involves the withdrawal of seasonally available surface water from the Alafia River for public supply use in the region. The withdrawal location is the south side of the Alafia River at Bell Shoals Road, approximately 18 kilometers upstream from the mouth. The withdrawal schedule for the Alafia River project (see Table 2) was developed to minimize hydro-
logic and ecological impacts to the riverine system by not withdrawing water during low flow periods, and to ensure that flows remain within the range of natural variability. The minimum flow of 80 mgd corresponds to the 80th percentile, or the flow level that is exceeded 80 percent of the time during an average year. Proposed withdrawals will only occur when the river flow is at 80 mgd or greater, at which time only 10 percent of the flow will be withdrawn. The proposed maximum withdrawal is 52 mgd. The estimated long-term annual average yield is 17.5 mgd.

### DEVELOPMENT OF A HYDROBIOLOGICAL MONITORING PROGRAM (HBMP)

Permits issued by the Southwest Florida Water Management District (District) for the Tampa Bypass Canal/Hillsborough River Water Supply Projects required the development of a comprehensive Hydrobiological Monitoring Program (HBMP) to detect and assess potential impacts of the projects on the hydrology and ecology of the associated tidal river segments. Due to similar project development schedules, close proximity, and the integrated nature of the two projects, a single unified HBMP was developed to address permit requirements.

Inherent in the District Water Use Permit (WUP) rules is the recognition that surface water withdrawals are linked to potential changes in: 1) salinity patterns; 2) associated water quality constituents; and 3) biological communities. It should be noted, however, that while freshwater withdrawals have some degree of direct and rapid physical effect on salinity patterns, the effects of freshwater withdrawals on other water quality constituents, and biological communities in particular, are typically indirect and complex. Such indirect impacts are mediated by physical and chemical processes, and are typically manifested on slower time scales (e.g., months, seasons, or years).

In addition to the linkage between freshwater withdrawals and biological communities, meeting District performance standards requires demonstrating that withdrawals do not result in: a significant deviation from natural or historic conditions; and a significant degradation of conditions necessary to support economically important activities such sport and commercial fishing, and water-dependent recreation and aesthetics.

### The HBMP Design Process

- Because of the large number of stakeholders involved, a consensus-based process was used for the technical design of the HBMP.
This approach created a coordinated, interactive Focus Group from which critical input was provided by a team of consultant and university experts, as well as representatives of federal, state, and local environmental regulatory and resource management agencies, and various environmental activist organizations.

The consensus-based process allowed for the continuous review and oversight of the emerging HBMP design by all interested parties, resulting in a more robust technical design, and an enhanced level of interagency and intergovernmental communication. Consequently, consensus approval of the HBMP design was achieved in approximately six months, a greatly accelerated time frame compared to the more typical approach whereby a draft monitoring plan is prepared and distributed for review and comment. Because ongoing stakeholder involvement is critical to the success of the HBMP, the Focus Group will meet at least once per year to evaluate monitoring data.

**HBMP Goals and Objectives** - Successful environmental monitoring programs must have clearly defined goals and objectives. A lack of focus often results in less than cost-effective use of available funds as well as data gaps and unanswered questions. Monitoring programs need to be properly designed at the outset if they are to meet the multiple expectations of all those who rely on the information generated (National Research Council, 1990).

The first step in designing a monitoring program is the identification of goals and objectives that are both meaningful to the public and provide the basis for scientific investigation. As defined by the Focus Group, the goal of the HBMP is to ensure that post-implementation flows do not deviate from the normal rate and range of fluctuation to the extent that water quality, vegetation, animal populations, salinity patterns, or recreational/aesthetic qualities are adversely impacted.

Toward this end, the overall HBMP objectives are to:

1. Document existing pre-operative and appropriate baseline conditions;
2. Detect significant post-operative changes in any of the identified indicators;
3. Determine if any detected changes are attributable to freshwater flow reduction and permitted surface water withdrawals;
4. Establish whether any detected changes constitute, or could result in, unacceptable adverse impacts; and
5. Recommend appropriate management actions or operational changes to mitigate unacceptable adverse impacts, if they occur or are expected to occur.

**HBMP Study Area** - The second step for HBMP design was the definition of the spatial and temporal extent of the sampling program. The Focus Group concluded that any potential impacts from the permitted surface water withdrawals would likely be first manifested in the tidal river systems, and possibly in the upper reaches of Hillsborough Bay, specifically McKay Bay. Therefore, the potentially affected water bodies were defined to include: the lower reaches of the Alafia River (below Bell Shoals Road); the Tampa Bypass Canal/Palm River (below structure S-160); McKay Bay; and the lower reaches of the Hillsborough River (below the Tampa Dam). These geographic areas of concern were subsequently termed as reporting units (see Figure 1 above). In addition, the Focus Group concluded that Hillsborough Bay (see Figure 1) could also be affected, but that because Hillsborough County currently monitors the Bay, additional HBMP sampling was not warranted.

**Spatial and Temporal Randomization** - For the HBMP, a stratified-random sampling design was developed whereby the reporting units were divided into segments or spatial strata. Specific sampling locations are then randomly selected from a list of potential sites within that reporting unit, apportioned across each stratum. As opposed to a fixed station design, the stratified-random design allows for the statistical characterization of an entire segment of a river or embayment rather than the characterization of a fixed point. Spatial strata were delineated for each of the reporting units (see example in Figure 4).

The program design also ensures that key within-year sources of variation are accounted for in the temporal sampling strategy. The general temporal sampling strategy for all reporting units is to ensure that an adequate sample size is available for drawing inferences regarding the status of the entire reporting unit on a quarterly basis. Another major source of within-year temporal variation is flow resulting from seasonal differences in rainfall.

Therefore, the temporal sampling strategy also ensures that statistically valid inferences can be made between wet and dry season conditions.
Hydrobiological Indicators - The third step in the HBMP design process was the definition of sampling parameters, or critical indicators of hydrobiological status and change. Indicators are units of measure that describe the status of the statistical populations or subpopulations of interest in response to some environmental stressor. The HBMP defines three monitoring program elements including hydrology/water quality, biota, and habitat/vegetation, and for each element, a list of critical indicators was identified.

It is important to note that response indicators have either a direct relationship to changes in freshwater inflows, or an indirect relationship. Indicators with a direct relationship to freshwater inflows are typically physical or chemical in nature (e.g., salinity), and respond more or less instantaneously to changing inflows. Indicators with an indirect relationship to freshwater inflows are typically biological in nature (e.g., center of fish population distribution), are mediated by physical and chemical changes, and generally respond on a slower time scale (e.g., days, months, seasons).

For example, a reduction in freshwater inflows may result in increased salinities within the geographic range of a population of a particular benthic organism; but if the changed salinity still remains within the salinity tolerance range of the organism, the abundance and distribution of the organism will likely not be affected. However, if that same change in salinity results in increased density stratification, which in turn leads to hypoxic conditions on the bottom, the abundance and distribution of the organism could be affected.

Critical indicators were identified for each HBMP element:

-Hydrology/water quality - flow, water level, salinity, conductivity, dissolved oxygen, temperature, Secchi disk depth, light transmission, chlorophyll-a, color, total and dissolved organic carbon, and total suspended solids.

-Biota - benthic macroinvertebrate infauna and epifauna; ichthyoplankton and zooplankton; adult and juvenile fishes; and water-dependent birds.

-Habitat/vegetation - emergent and submerged aquatic vegetation, sediment grain size, and sediment organic matter.

The HBMP design includes specific indicators and sampling schedules for each reporting unit to account for the unique characteristics and resources associated with these waterbodies.

HBMP Impact Assessment - Perhaps the most challenging aspect of the HBMP will be determining whether a significant detected post-operational change constitutes, or could result in, an unacceptable adverse impact. Unfortunately, District Water Use Permit rules do not define this term, and one of the major HBMP goals is to identify specific criteria to determine unacceptable adverse impacts to resources of concern. The Focus Group identified these criteria, as they specifically relate to the Tampa Bypass Canal/Hillsborough River and Alafia River Water Supply Projects, as follows:

A detected change, supported by statistical inference or a preponderance of evidence, from the pre-operational abundance, distribution, species composition, or species richness of biological communities of concern in the Lower Hillsborough River, Lower Palm River/TBC, McKay Bay, or Lower Alafia River reporting units that can be attributed to reductions in freshwater inflows caused by the permitted surface water withdrawals.

The Focus Group noted that conditions meeting these criteria could be detected, measured and described in many different ways, including: a change in species richness or community balance; a dislocation of an indicator species' distribution; the elimination or reduced abundance of a "desirable" indicator species; or the introduction or increased abundance of an "undesirable" indicator species. The Focus Group also recognized that some changes that meet these criteria would not necessarily be determined to constitute an unacceptable environmental impact. For example, a statistically significant increase in the abundance of a popular gamefish species (e.g., snook) under post-withdrawal conditions would meet the above criteria, but would likely not be considered to be an unacceptable impact.

In addition, a statistically significant difference between pre- and post-operational data could be used to determine adverse impact. This difference could be based on analyses of variance, trend analyses, deviations from baseline cumulative frequency distributions, or BACI (Before/After/Control/Impact) analyses. Given the potentially infinite measures of unacceptable environmental impact, it was the general consensus of the HBMP Focus Group that specific programmatic criteria or thresholds could not be developed for every indicator. Rather, the Focus Group recommended a consensus-based weight-of-evidence approach to evaluate any detected changes.

Finally, it was the consensus of the HBMP Focus Group that a salinity change alone would not necessarily constitute an adverse environmental impact. Rather, the magnitude and duration of the measured salinity change would have to be substantial enough to affect, or potentially affect, biotic indicators. Nonetheless, the Focus Group recommended that substantial salinity changes alone, in advance of any observed effects on biotic indicators, should be used in an early detection mode as a triggering mechanism to initiate appropriate management responses.
HBMP Management Responses - The last step in the HBMP design process was the identification of appropriate management actions or operational changes to mitigate unacceptable adverse impacts, if they occur or are expected to occur. The Focus Group also developed a Hierarchy of Management Actions to guide appropriate responses if an impact is observed or is considered likely:

1. Data QA/QC Audit - This action would involve the performance of an intense QA/QC audit to evaluate laboratory problems, data entry errors, violation of sampling protocols, etc.

2. Data Comparison (Correlates) - This action would involve a review of data correlates (e.g., specific conductance is a correlate to salinity) to determine if there is more than one line of evidence reflecting the detected change.

3. Focus Group Meeting - If Steps 1 through 2 indicate that the detected change is not due to quality control problems and is reflected in multiple lines of evidence, the next step would involve convening a special meeting of the HBMP Focus Group to review the findings of steps 1 through 2, and recommend an appropriate course of action to evaluate the magnitude and extent of the detected change (e.g., additional data analyses or sampling).

4. Redirected Sampling Effort - This action would involve conducting more focused supplemental sampling, or controlled withdrawal/flow experiments, in the affected reporting units to gain a better understanding of the detected change and determine if that change is repeatable under a more focused sampling program.

5. Environmental Impact Evaluation - Based on the findings of Steps 1 through 4, the next step would be to reconvene the HBMP Focus Group to evaluate whether or not the detected change constitutes an unacceptable environmental impact. This step would involve a detailed assessment of the data analyses conducted in Steps 1 through 4 to ascertain whether the above-identified unacceptable environmental impact criteria have been met. The evaluation would require HBMP Focus Group consensus based on technical and scientific factors only. The Tampa Bay Water Board of Directors would then be briefed on the findings and recommendations of the Focus Group.

6. Regulatory Summit Meeting - If after the completion of Step 5, the HBMP Focus Group concludes that an unacceptable environmental impact has occurred, the next step would be to convene a meeting with all applicable state and local regulatory agencies and affected parties to determine the appropriate regulatory course of action.

7. District Governing Board Hearing - This step would involve the presentation of data and other evidence indicating the occurrence of unacceptable environmental impact to the District Goe made by the District Governing Board.

8. Remedial Measures - The requirement of appropriate remedial measures by the District Governing Board could include such actions as the modification of the permitted withdrawal schedules or mitigation. Appropriate remedial actions, if required, will depend on the nature of the adverse impact. WUPs for the surface water projects require that these withdrawals be integrated into Tampa Bay Water's Optimized Regional Operations Plan (OROP). Salinity change may be used as a triggering mechanism to rotate withdrawals to avoid impacts; appropriate salinity thresholds will be determined from pre-operational data. The OROP system facilitates withdrawal schedule modifications to minimize potential withdrawal-related impacts. If warranted, remedial measures could also include impact mitigation such as habitat restoration.

HBMP Implementation Status - HBMP field sampling was initiated in Spring 2000; the first year of baseline data collection is currently being completed. Major mobilization activities during the first year included installation of continuous recorders to monitor water level, conductivity, and dissolved oxygen at multiple locations in each river; these data will be used in conjunction with USGS and SWFWMD data from other locations. Withdrawals are scheduled to begin in August 2002; therefore, approximately two years of baseline data will be collected. The annual implementation cost of the HBMP is about $950,000. Detailed HBMP design and quality control documents are available from the project website linked to http://www.tampabaywater.org; data and reports will be also posted to this site as available.

References


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