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The **West Coast Inland Navigation District** is a special taxing district, comprising Manatee, Sarasota, Charlotte, and Lee counties, serving an estimated 1.1 million citizens. The District helps plan and implement waterway projects that promote safe navigation and the enjoyment of water-based activities, such as boating, fishing, and beach recreation.



Florida Sea Grant provides people, tools, and science to help protect and make wise use of our coastal and marine resources. The primary goal of Florida Sea Grant is a sustainable economy and environment, which it advances through a statewide, university-based research, education, and extension partnership of state and federal agencies, businesses, and citizens.



The **Florida Department of Environmental Protection** is the lead agency in state government for environmental management and stewardship. The department administers regulatory programs and issues permits for air, water, and waste management. It oversees the state's land and water conservation program, Florida Forever, and manages the Florida Park Service.

Lee, Manatee, and Sarasota counties participated in the design and implementation of the Regional Waterway Management System. The West Coast Inland Navigation District can provide contact information for each county.

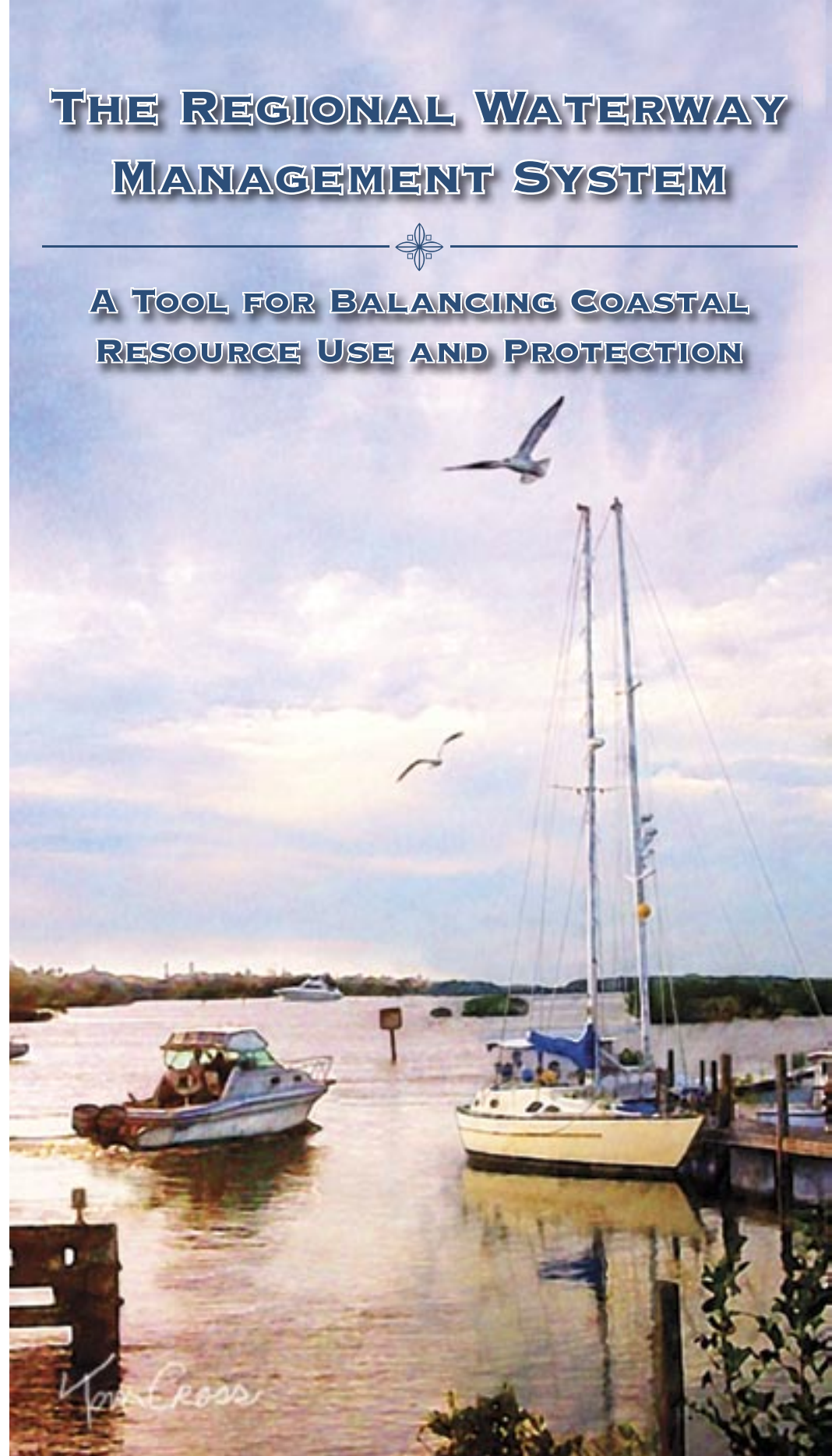


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THE REGIONAL WATERWAY MANAGEMENT SYSTEM



A TOOL FOR BALANCING COASTAL RESOURCE USE AND PROTECTION

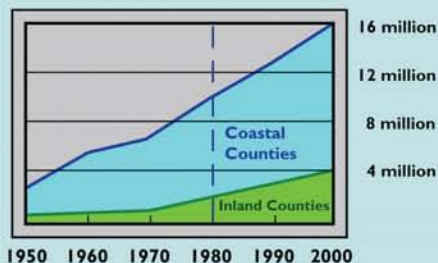


The Regional Waterway Management System

Balancing Coastal Resource Use and Protection

Florida's waters are among our nation's most popular for recreational boating. While the state's population increased by 64% between 1980 and 2000, recreational boat registrations increased by 82% statewide and by 97% in southwest Florida (Collier, Lee, Charlotte, Sarasota,

Florida's Population Growth



Source: U.S. Census

and Manatee counties; quickfacts.census.gov). The population is projected to increase by another 23% over the next 20 years, and boating growth should follow suit. Resource managers and policymakers must balance the phenomenal growth of the boating population with the protection of natural



systems. The West Coast Inland Navigation District, member counties, and Florida Sea Grant together devise and apply science-based tools and procedures to manage and sustain our coastal waterways.

Florida's bays, estuaries, and rivers are vulnerable to pressures, not only from increased boating, but also from the associated spread of commercial and



Boaters crowd Whale Harbor Channel, Florida Keys.

Credit: Florida Fish and Wildlife Conservation Commission

residential developments. Problems include declining water quality, stressed habitat conditions, and on-the-water congestion. Ironically, as waterfront development and the boat population escalate, public access to coastal resources steadily decreases due to changing economic priorities. The challenge to users, resource managers, elected officials, and planners is how to sustain and protect our environment without isolating people from nature. Can we continue to use coastal waters *and* preserve the natural environment as needed to maintain the economic vitality of coastal communities for generations to come? Solving this problem will require effective tools.



Credit: South Florida Water Management District



Credit: South Florida Water Management District



Prop scars damage sea grass beds.

Credit: South Florida Water Management District



Credit: Steve Leukanech

A Tool for Regional Planning

This document describes one such tool, already proven and ready now for further application: the Regional Waterway Management System (RWMS). The RWMS helps planners and policymakers identify, evaluate, and prioritize channel maintenance and improvement needs. A detailed, comparative analysis of water depth and boat draft relations provides a comprehensive, regional overview of channel conditions and the geographic distribution and severity of existing restrictions to safe navigation. This science-based system allows an unbiased, objective approach to waterway management.

Information Products for Citizens, Resource Managers, and Policymakers

The Regional Waterway Management System aggregates data and results at the level of trafficheds (boat source areas from which vessels exit via a common channel to deep, open water). Typically, trafficheds are residential canal systems, marinas, or natural creeks and rivers. This provides direct insight into such issues as “How many boats will be freed up for each cubic yard dredged in Canal System A versus Marina B?” The database and the results of RWMS vessel restriction analyses are available to county resource managers and policymakers—and, therefore, to all citizens—as printed map atlases and digital-

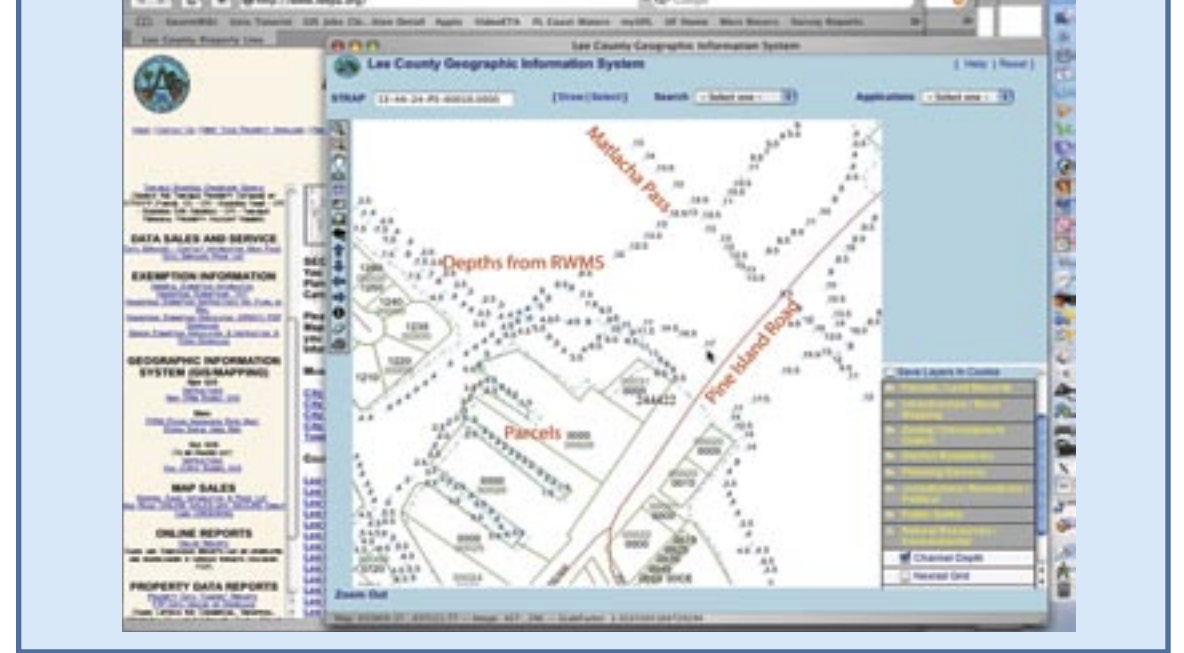
REGIONAL WATERWAY MANAGEMENT SYSTEM PRODUCTS

Information associated with mapped features (such as boats, channel segments, signs) can be analyzed in the GIS, exported to spreadsheet or statistics programs, or printed in tables, charts, reports, or map atlases.

To complete each phase of a Regional Waterway Management System project, Florida Sea Grant prepares a final report of the data, fieldwork, products, GIS files, and study results, including in-depth statistical analyses and preliminary recommendations of where channel maintenance may be most efficiently performed. CD-ROMs provide the complete data set and background imagery, ready for further display, analysis, and distribution. Accompanying metadata—aptly defined as “data about data”—for each layer of mapped features in the GIS describes the source, vintage, processing steps, accuracy, and other characteristics necessary for scientific use of the data.

Florida Sea Grant and the WCIND published the two volumes of *A Historical Geography of Southwest Florida Waterways* (Volume 1: Anna Maria Sound to Lemon Bay, 1999, and Volume 2: Placidia Harbor to Marco Island, 2002). Channel data from the RWMS accurately characterize contemporary waterways, allowing comparison with the pre-development era conditions depicted on historic maps.

Many organizations will find additional applications for RWMS data. For instance, the Lee County Property Appraiser's Office displays the RWMS point depths on its GIS map server (available via the GIS link at www.leepa.org). The computer screen image below shows the depths, along with parcel boundaries, roads, etc., near the bridge at Manatee Bay. Such maps clearly show the environmental access



Waterway Management: A Regional Approach or Case-by-Case?

The scientific approach of the Regional Waterway Management System (RWMS) offers unbiased information for rational, objective, and efficient allocation of waterway management resources over large areas (such as multiple counties). Traditionally, resource managers responded case-by-case to individuals, businesses, or neighborhoods seeking help to deal with restrictions affecting isolated boat populations—or just one boat. The usual solution was to dredge an entire channel to a standard depth, such as minus 5 feet, or to whatever was necessary to free the deepest vessel present at all tide levels. Using the RWMS, managers can determine the least dredging necessary to free the most boats anywhere in their jurisdiction. “Surgical” dredging—deepening only restricting portions of a channel, as needed to accommodate the boats actually using it—becomes possible, minimizing expense and production of dredging by-products. Dredge scenarios at normal tide levels and unusual conditions (for instance, extremely low winter tides) can be readily compared. Importantly, managers can plan maintenance operations while considering the mapped extent of sensitive habitats, such as sea grass beds.

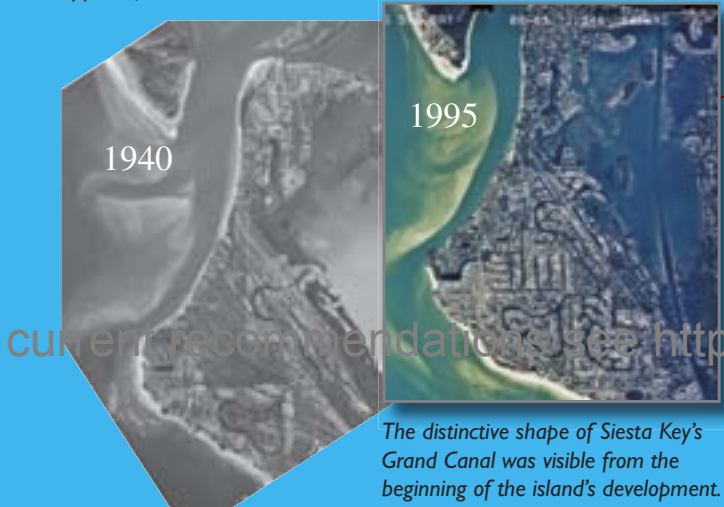
Companion reports present statistical analyses of actual and potential problems and solutions. This information is available to county resource managers, planners, and citizens as they determine waterway maintenance policy and priorities.

Gustavo Antonini, Florida Sea Grant professor emeritus at the University of Florida, inspired creation of the Regional Waterway Management System before his untimely death in 2004.

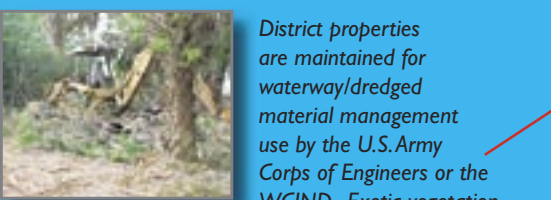
COUNTIES OF THE WEST COAST INLAND NAVIGATION DISTRICT



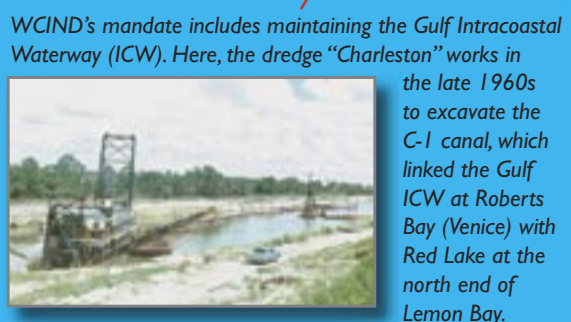
The popular anchorage near Longboat Pass, Beercan Island, one of many busy boater destinations in the District, is at upper left.



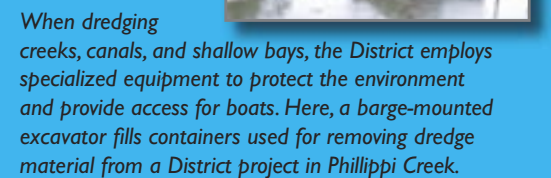
The distinctive shape of Siesta Key's Grand Canal was visible from the beginning of the island's development.



District properties are maintained for waterway/dredged material management use by the U.S. Army Corps of Engineers or the WCIND. Exotic vegetation removal, security fence installation, berm creation/enhancement, and the like, complement natural resources on the sites.

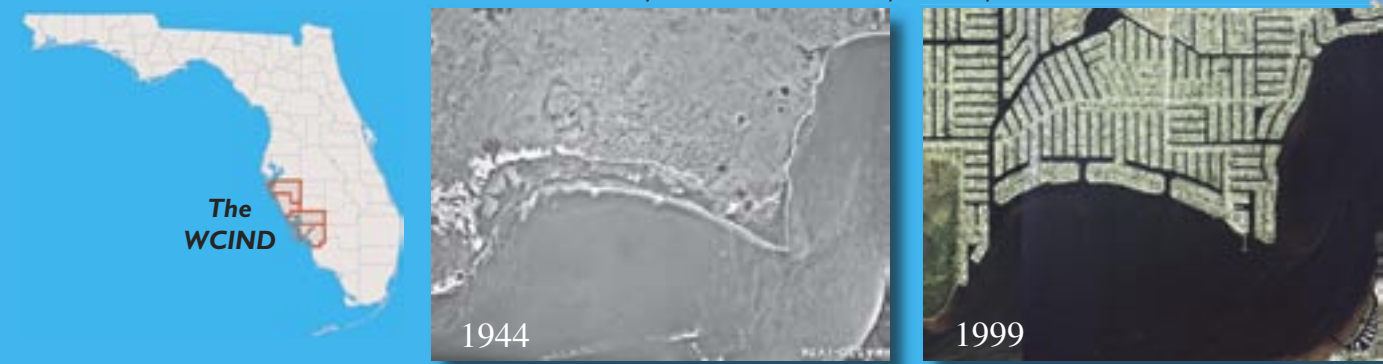


WCIND's mandate includes maintaining the Gulf Intracoastal Waterway (ICW). Here, the dredge “Charleston” works in the late 1960s to excavate the C-1 canal, which linked the Gulf ICW at Roberts Bay (Venice) with Red Lake at the north end of Lemon Bay.



When dredging creeks, canals, and shallow bays, the District employs specialized equipment to protect the environment and provide access for boats. Here, a barge-mounted excavator fills containers used for removing dredge material from a District project in Phillippi Creek.

Redfish Point, in the city of Cape Coral, on the Caloosahatchee River. These images illustrate the sweeping transformation of southwest Florida's natural waterways into a water-based transportation system.

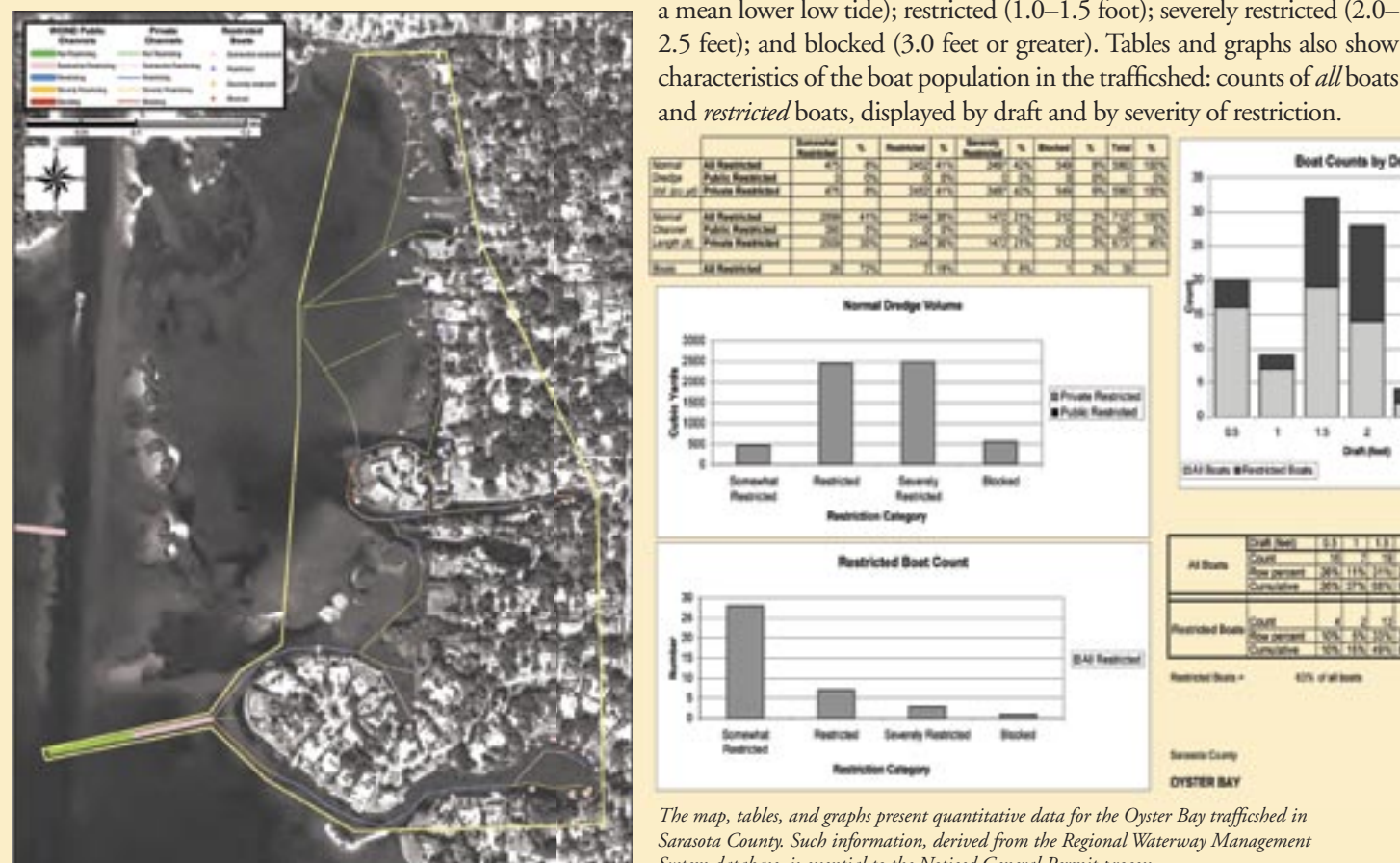


General Permitting: Good for the Environment and the Taxpayer

The scientific integrity and demonstrated utility of the Regional Waterway Management System led to the statewide Inland Waterway Management Law (CS/HB 3369), which institutionalizes goals of Florida Sea Grant's Boating and Waterway Management Program and broadens the mandate of Florida's inland navigation districts. The RWMS is also the basis for a new State administrative code, “Chapter 62-341.490 Noticed General Permit for Dredging by the West Coast Inland Navigation District (WCIND),” effective August 2002. *Noticed general permits* (NGPs) provide: (1) greater efficiency and effectiveness stemming from regional waterway maintenance priorities; (2) significant savings in taxpayer dollars and staff time; (3) better public policy through a holistic, environmentally based decision-making process; and (4) Florida state policy based on the “best available science.” A significant benefit of the general permit is minimizing that portion of public funds—often the majority on individual waterway maintenance projects—spent for regulatory permissions to commence fieldwork. The NGP spreads these administrative, overhead costs over several maintenance projects, thus substantially lowering overall costs, to the benefit of the public.

The first general permit covers 51 trafficheds (boat source areas from which vessels exit via a common channel to deep, open water) in Manatee and Sarasota counties, and the second addresses priority Lee County trafficheds and “secondary channels” (waterways that serve several trafficheds and through which many boats must travel to reach deep, open water). Each NGP defines total dredge volume for its region, to be allocated using priorities based on RWMS analyses.

Below are examples of RWMS information used to prioritize and allocate channel maintenance resources. Data include dredge length and volume in traffiched channels, shown by level of vessel restriction to be corrected: somewhat restricted (0.0–0.5 foot interference at a mean lower low tide); restricted (1.0–1.5 foot); severely restricted (2.0–2.5 feet); and blocked (3.0 feet or greater). Tables and graphs also show characteristics of the boat population in the traffiched: counts of *all* boats and *restricted* boats, displayed by draft and by severity of restriction.



The map, tables, and graphs present quantitative data for the Oyster Bay traffiched in Sarasota County. Such information, derived from the Regional Waterway Management System database, is essential to the Noticed General Permit process.

62-341.490 Noticed General Permit for Dredging by the West Coast Inland Navigation District.

(1) A general permit is hereby granted to the West Coast Inland Navigation District (“WCIND”) to dredge public navigation channels and canals within the trafficheds listed in Table 1 and Figure 1, and as described in the following reports:
 (a) Antonini, Gustavo A., and Paul Box, 1996. *A Regional Waterway Systems Management Strategy for Southwest Florida*, TP-83, Florida Sea Grant College Program, Gainesville, Florida;
 (b) Swett, Robert A., Gustavo A. Antonini and Sharon Schulte, 2000. *Regional Waterway Management System for North Manatee County*, TD-2, Florida Sea Grant College Program, Gainesville, Florida;
 (c) Antonini, Gustavo A., David Fann, and Robert A. Swett, 2000, Miguel Bay, Florida: Inventory of Boats, Depths and Signs; and a Waterway Restriction Analysis, TP-2A, Florida Sea Grant College Program, Gainesville, Florida;
 (d) Antonini, Gustavo A., Robert Swett, Sharon Schulte and David Fann, 2000. *Regional Waterway Management System for South Sarasota County*, TD-1, Florida Sea Grant College Program, Gainesville, Florida.
 Copies of the above reports may be obtained by contacting environmental resource permit program staff in the Southwest District Office (Tampa) of the Department and from the Department's Web site: <http://www.dep.state.fl.us/water/wetlands/>.
 (2) This general permit is further limited as follows:
 (a) The area to be dredged shall not contain any live seagrass beds, oyster beds or bars, coral communities, or attached macro-marine algae communities. However, this shall not prevent dredging of incidental individual specimens or scattered (less than one percent coverage within the area to be dredged) occurrences of seagrasses, oysters, or attached macro-algae. To the extent individual or clumped oysters are to be dredged, they shall be relocated to the maximum extent practicable to locations previously approved by the Department.
 (b) Channel alignments shall follow existing channels and previously dredged areas to the maximum extent practicable.
 (c) Dredging shall not exceed the maximum depths shown in Table 1.
 (d) No more than 6,500 cubic yards of dredged material shall be removed over a five-year period within each traffiched, beginning with the first project authorized under this general permit within the traffiched. Within 30 days following the completion of each dredging event, a report shall be submitted to the Department that includes the volume of material removed, the location of material removed within the traffiched, and the exact location of material removed from the traffiched under this general permit. Notices to dredge shall be posted in the traffiched.
 (e) The dredging shall be completed by the date specified in the general permit.

Maintaining the Data

To maximize efficient use of the Regional Waterway Management System and enable resource management personnel to maintain up-to-date databases of waterways, boats, and signs, WCIND and Florida Sea Grant facilitate training workshops and provide a manual that details system methods. The workshops give RWMS users insights into the data extent and structure, as well as skills in basic GIS operation, queries, and analyses necessary for planners to produce meaningful data and responses to questions from citizens and policymakers. The comprehensive manual describes the equipment, procedures, and software components of the RWMS. Topics include requirements for personnel, equipment, hardware, and software; project planning; field procedures (tide and depth data collection, mission planning, and boat/mooring/sign surveys); data processing, including quality control; channel and boat restriction analyses; and output products.

FURTHER INFORMATION

Regional Waterway Management System Project Reports

Antonini, G.A. and P. Box. 1996. *A Regional Waterway Systems Management Strategy for Southwest Florida*. TP-83. Gainesville, FL: Florida Sea Grant College Program.

Antonini, G.A., R.A. Swett, S. Schulte, and D.A. Fann. 2000. *Regional Waterway Management System for South Sarasota County*. TD-1. Gainesville, FL: Florida Sea Grant College Program.

Swett, R.A., G.A. Antonini, and S. Schulte. 2000. *Regional Waterway Management System for North Manatee County*. TD-2. Gainesville, FL: Florida Sea Grant College Program.

Swett, R.A., D.A. Fann, G.A. Antonini, and L. Carlin Alexander. 2000. *Regional Waterway Management System for Lee County, Phase 1*. TD-3. Gainesville, FL: Florida Sea Grant College Program.

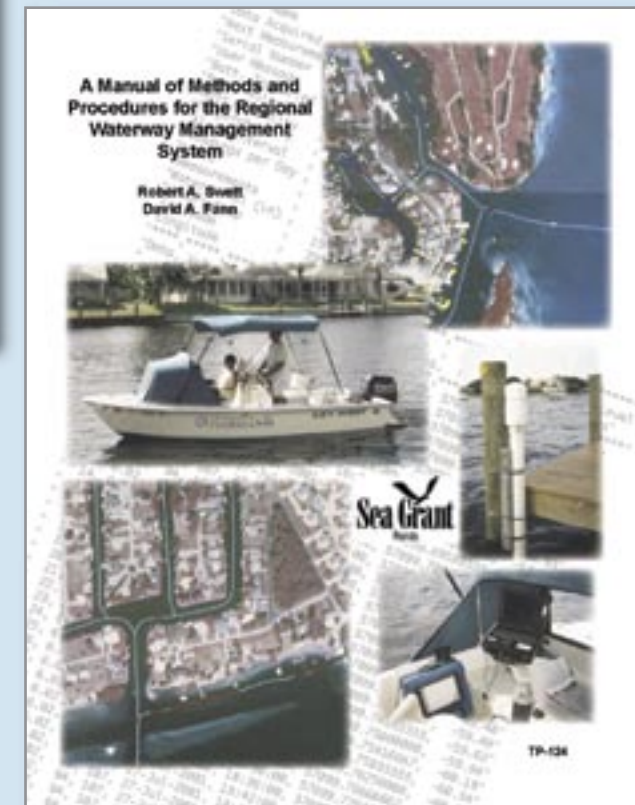
Swett, R.A., D.A. Fann, G.A. Antonini, and L. Carlin Alexander. 2001. *Regional Waterway Management System for Lee County, Phase 2*. TD-4. Gainesville, FL: Florida Sea Grant College Program.

Fann, D.A., R.A. Swett, L. Carlin Alexander, and G.A. Antonini. 2002. *Regional Waterway Management System for Lee County, Phase 3*. TD-5. Gainesville, FL: Florida Sea Grant College Program.

Swett, R.A., D.A. Fann, and G.A. Antonini. 2002. *Regional Waterway Management System for Manatee County: Bishop Harbor, Tidal Braden River, and Lower Reaches of the Upper Manatee River*. TD-6. Gainesville, FL: Florida Sea Grant College Program

Technical Manual

Swett, R.A. and D.A. Fann. 2001. *A Manual of Methods and Procedures for the Regional Waterway Management System*. TP-124. Gainesville, FL: Florida Sea Grant College Program.



These documents may be downloaded as Portable Document Format (PDF) files from the National Sea Grant Library (<http://nsgl.gso.uri.edu>).