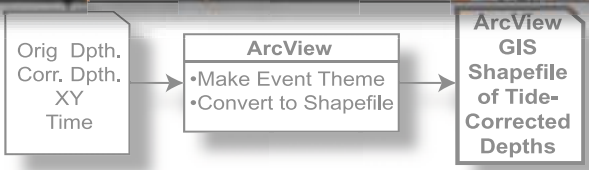
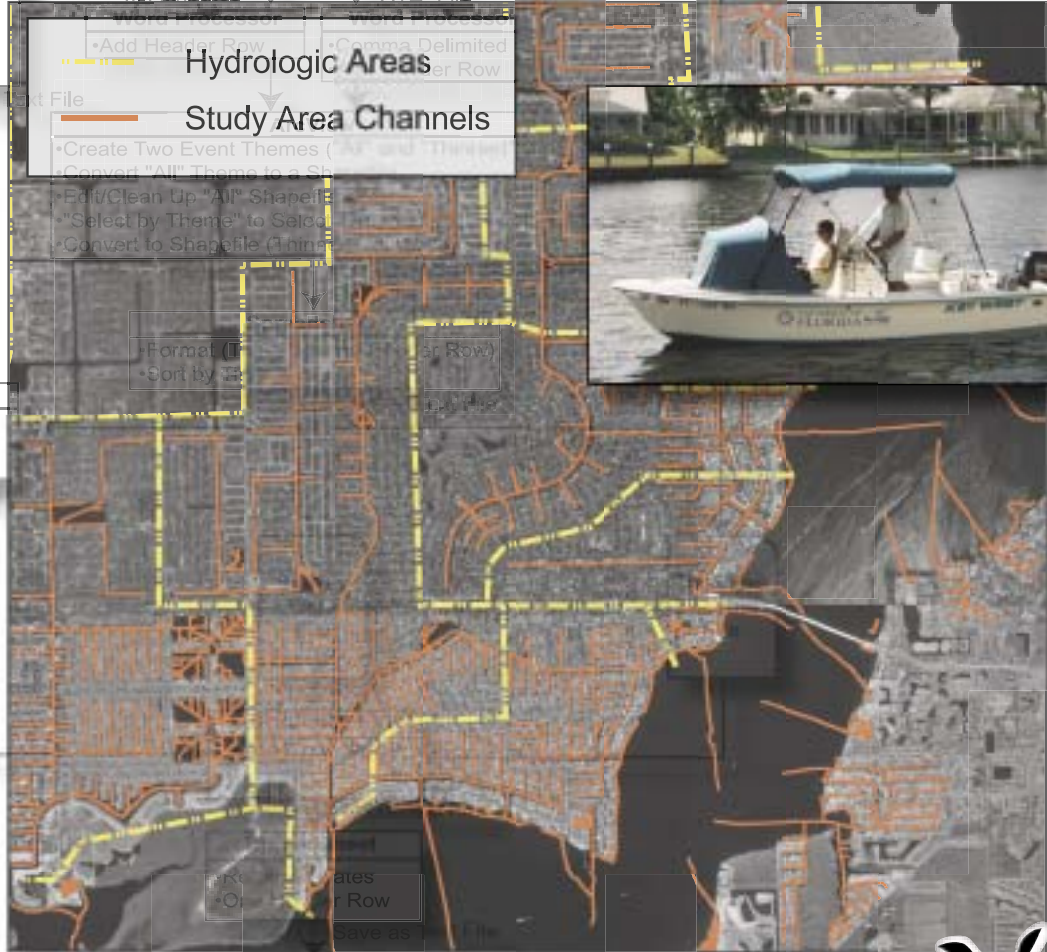
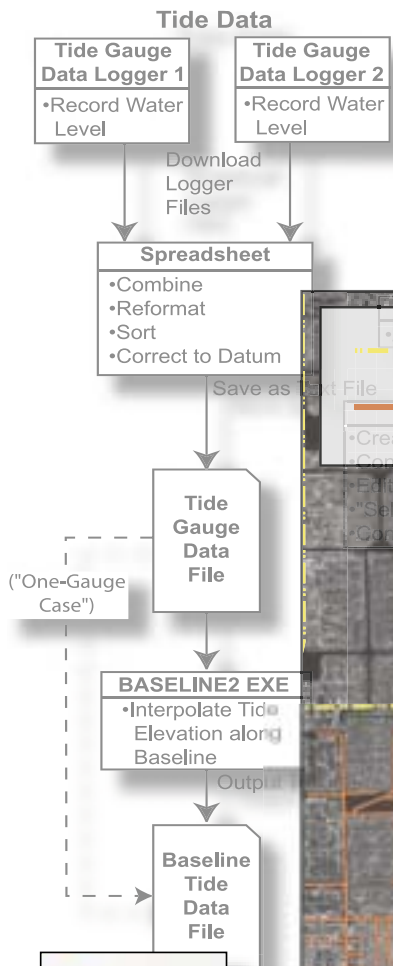
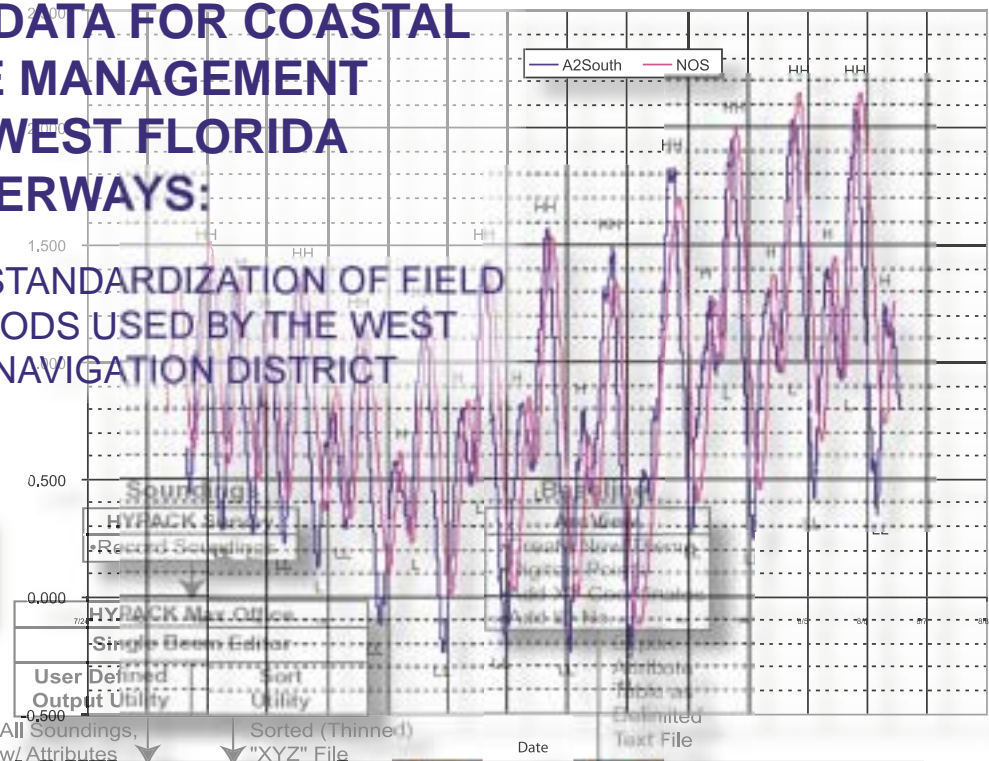


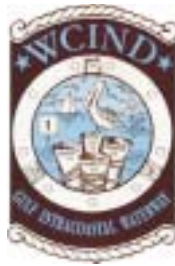
BATHYMETRIC DATA FOR COASTAL RESOURCE MANAGEMENT IN SOUTHWEST FLORIDA WATERWAYS:

ENHANCEMENT AND STANDARDIZATION OF FIELD COLLECTION METHODS USED BY THE WEST COAST INLAND NAVIGATION DISTRICT



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Prepared for the:

NOAA COASTAL SERVICES CENTER

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On behalf of the West Coast Inland Navigation District

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Abbreviations and Acronyms

AML	Arc Macro Language
DGPS	Differential Global Positioning System
DOQQ	Digital Orthophoto Quarter Quadrangle
ESRI	Environmental Systems Research Institute
FDEP	Florida Department of Environmental Protection
FSG	Florida Sea Grant
GIS	Geographic Information System
GPS	Global Positioning System
JPEG	Joint Photographic Experts Group
MHHW	Mean Higher High Water
MHW	Mean High Water
MLW	Mean Low Water
MLLW	Mean Lower Low Water
MSK	Minimum Shift Keying
MTL	Mean Tide Level
NAVD88	North American Vertical Datum of 1988
NGVD29	National Geodetic Vertical Datum of 1929
NMEA	National Marine Electronics Association
NOS	National Ocean Service
PDOP	Positional Dilution of Precision
PRC	Pseudorange Corrector
RTCM	Radio Technical Commission for Maritime Services
SNR	Signal-to-Noise Ratio
TSIP	Trimble Standard Interface Protocol
WCIND	West Coast Inland Navigation District
UF	University of Florida
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USGS	U.S. Geological Survey
UTC	Coordinated Universal Time

Introduction

Pressures from a coastal population explosion and unprecedented waterway boating intensities are stressing many of our nation's water bodies (Nordheimer 1993). Fifty-four percent of the U.S. population (135.1 million in 1991) lives in the coastal zone (U.S. Bureau of Census 1994). While population growth along our coasts has increased slightly above the overall U.S. growth rate since 1960, regions such as the Gulf Coast have experienced double the national rate of change. Florida's coastal population has increased 242 percent, from 4.9 to 16.4 million, four times the national rate. As a result, many inland bay waters in Florida have been transformed into "urban seas."

Recreational boaters and eco-tourists now use thousands of miles of channels and basins that were originally dredged as by-products of coastal development. These waterways were never designed as a transportation system and since many postdate the latest NOS hydrographic surveys, they do not even appear on NOAA small-craft charts (Antonini, Fann, and Roat 1999). State and local governments in Florida recognize the need to retrofit the thousands-of-miles of dredged channels into an integrated waterway transportation system consisting of arterial, secondary, and feeder canals, and basins. This approach is necessary to address boat traffic management issues and to reduce stress on surrounding natural habitats and waterfront communities (Fann, Antonini, Doubeck-Racine, Grella, and Listowski 1999).

The West Coast Inland Navigation District (WCIND) commissioned Florida Sea Grant (FSG), in May 1995, to design a management system for southwest Florida waterways consistent with municipal, county, Florida Department of Environmental Protection (FDEP), and Federal goals of facilitating safe boating and reducing boating impacts on natural resources. The design criteria were: (a) fit channel maintenance to boat draft needs; (b) minimize impacts on bay habitats; (c) prioritize and evaluate management alternatives on a regional scale; and (d) identify information products for boaters and shore residents to encourage environmental awareness by users of the neighborhood waterways and boat access channels.

The WCIND and FSG have completed fieldwork for seven applications of this system, covering over 1000 miles of channels (Antonini and Box 1996; Antonini, Swett, Schulte, and Fann 1998; Swett, Antonini, and Schulte 1999; Swett, Fann, Antonini, and Alexander 2000, 2001). These studies include large-scale (1:4,800, 1:2,400) mapping of water depth, boat and facility characteristics, signage, and habitat. Detailed analyses delineate and quantify (a) levels of boat accessibility to the open bay, and (b) location and extent of channel depth restrictions within boat access channels. Results of these applications are providing the WCIND and the coastal counties with a rationale and method to implement waterway improvements and restoration using a Waterway Management System with the following elements: (a) dredging to maintain channel depth at user draft specifications; (b) locating signs by boat density and traffic patterns; (c) managing traffic, using boat distributions and travel routes; (d) siting habitat restoration to protect waterways; (e) permitting on a regional scale to accommodate water-dependent uses and to minimize environmental impacts; and (f) educating the public, using waterway maps and guide materials, to instill stewardship and best boating practices.

Current users of the Waterway Management System include Lee, Sarasota, and Manatee counties, the City of Sarasota, and the Town of Longboat Key. User organizations include natural resources, planning, public works, parks and recreation, and county extension service departments; neighborhood associations; and local boat owners. Waterway improvements are being undertaken at Shakett, Phillippi, and Gottfried Creeks (Sarasota County), based on the management criteria and project databases. A General Permit rule will be adopted by the FDEP on 4 August 2002 to provide for maintenance dredging of restricted access channels in a two county region, with significantly reduced administrative costs.

A number of events have occurred at the state and national level that highlight the success and the acceptance of the Waterway Management System. The FDEP agreed to utilize this methodology to implement a standardized regional approach to waterway planning and as a basis to review permit applications for maintenance dredging (MOA 1997). The 1998 Florida State Legislature enacted General Law CS/HB 3369, which broadened the mandate of the WCIND to engage in inland waterway management. Recognizing the value of the waterway management approach, the NOAA Coastal Services Center provided FSG with seed money to develop and implement this waterway management strategy.

WCIND and Florida Sea Grant also are committed to collect soundings in 47 popular anchorages within a five-county area in southwest Florida. This work stems from a 1995 Memorandum of Agreement among the FDEP, FSG College Program, the Southwest Florida Regional Planning Council, and the Boaters' Action and Information League. The Memorandum established a pilot 5-year self-regulatory anchorage management program. The bathymetry collected at anchorages, in conjunction with other data sources, is being used to produce large-scale, detailed photomaps for anchorage users and for resource managers (Boaters' Action and Information League 1999).



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