

Florida's Inshore Marine Monitoring and Assessment Program (IMAP)

Annual Report, Year Five

By Gil McRae, Marc Julian and Howard Brown

Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute
St. Petersburg, Florida 33701

EPA Assistance ID NO. C R 827240-01-0

Project Officer:

Virginia Engle
United States Environmental Protection Agency
National Health and Environmental Health Research Lab
Gulf Ecology Division
Gulf Breeze, FL 32561

**ENVIRONMENTAL RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
GULF BREEZE, FLORIDA 32561**

DISCLAIMER

This report represents data and activities from the fourth year of sampling for the Florida Inshore Marine Monitoring and Assessment Program (IMAP). IMAP is a collaborative project between the U.S. Environmental Protection Agency and the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) designed to assess the ecological condition of Florida's inshore waters using a set of ecological indicators. IMAP began full-scale field sampling in summer of 2000. This report was submitted in fulfillment of EPA Assistance ID NO. CR 827240-01-0 by the Florida Fish and Wildlife Conservation Commission under the partial sponsorship of the United States Environmental Protection Agency. This report covers a period from 1/10/2003 to 1/10/2004.

Florida's Inshore Marine Monitoring and Assessment Program (IMAP)

Annual Report, Year Five

Table of Contents

DISCLAIMER	II
TABLE OF CONTENTS	III
1 INTRODUCTION	1
1.1 Program Framework	2
1.2 Resource Definition and Classification	2
1.3 Spatial Framework	3
1.4 Temporal Framework	4
1.5 IMAP Indicators	5
1.6 IMAP Sampling Schedule	6
2 FIELD SAMPLING: 2003	8
2.1 Field Sampling Logistics	8
2.2 Water Quality and Physical Indicators	15
2.3 Sediment Quality Indicators	17
2.3 Biological Indicators	20
2.3.1 Fish and Selected Invertebrates	20
2.3.1 Benthic Macroinvertebrates	26
2.3.2 Submerged Aquatic Vegetation	26
3 DATA MANAGEMENT AND INFORMATION SYSTEMS	31
3.1 IMAP Database	31
LITERATURE CITED	32
LITERATURE CITED	33

APPENDIX A.	35
Table A-1. Water quality data from Hydrolab sampling IMAP Summer, 2003.	35
Table A-2. Total Organic Carbon in Sediment Samples (mg/kg DW) IMAP sampling Summer, 2003.	42
Table A-3. Sediment silt-clay results, IMAP sampling Summer, 2003.	46
Table A-3. Sediment silt-clay results, IMAP sampling Summer, 2003.	46
Table A-4. Sediment chemistry analytes, IMAP sampling Summer, 2003.	50
Table A-5. Metals in sediment, IMAP Sampling summer 2003.	53
Table A-6. Summary of IMAP fish sampling (seines and trawls combined) summer 2003.	60
Table A-7. Qualitative submerged aquatic vegetation data from IMAP 2003 sampling. (Abundance codes appear at the bottom of the table)	62
APPENDIX B	75
IMAP Metadata from the Fish and Wildlife Research Institute's Metadata Management System	75
IMAP_INSHORE MARINE MONITORING AND ASSESSMENT PROGRAM DATABASE	75
Identification Information	75
Data Quality Information	77
Entity and Attribute Information	78
Distribution Information	90
Metadata Reference Information	91
<u>METAWEB</u> METADATA REPORT GENERATED WEDNESDAY, 08/OCTOBER/2003 APPENDIX C:	91
APPENDIX C:	92
Generalized Station Description and Sampling protocol for IMAP.	92

1 INTRODUCTION

Florida's inshore marine systems are a diverse and unique resource. Forming the transition zone between upland drainage basins and the deep sea, these areas are noted for their high biological productivity. The majority of commercially valuable fish and shellfish species on both coasts are dependent on estuaries during some portion of their life. Florida's estuaries are also heavily impacted by point and non-point pollutant loads from an ever-increasing coastal population. From several perspectives; economic, social, demographic, and particularly ecological, Florida's inshore marine resources are one of the state's most valuable assets.

Florida's inshore resources range from major embayments and lagoons, to smaller estuaries at river mouths, to tidal marshes and mangrove forests which merge directly with the sea (Figure 1-1).

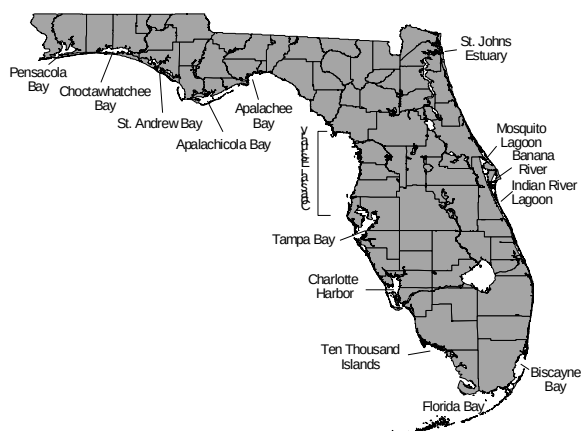


Figure 1-1. Major Estuaries in Florida

The Gulf coast consists of several well-defined estuaries in the northwest and southwest sections of the state, with a large intermediary coastal estuarine area in the big-bend region. Estuaries on the Gulf coast are often located behind low-energy barrier islands or at the mouths of rivers and typically receive high freshwater inflow. In contrast, relatively few rivers drain directly to Florida's Atlantic coast with the exception of the St. Marys and St. Johns Rivers in the northeast (Figure 1-1).

The Atlantic coast is characterized by high-energy shoreline bordered by long stretches of continuous barrier islands, which form high-salinity lagoons. The Mosquito Lagoon/Banana River/Indian River Lagoon complex is a long, narrow system with only a few isolated connections to the ocean along its length. The intracoastal waterway, sheltered by continuous barrier islands, forms the connection between the Indian River Lagoon and Biscayne Bay near Miami. Numerous mangrove islands dominate Florida Bay and the 10,000 Islands area. Freshwater inflow to this area is via sheet flow from the Everglades and from many relatively small tributaries.

Florida's inshore marine systems have been the subject of countless academic, private and government-led research studies. Volumes of data have been collected in the larger systems, particularly Tampa Bay, Florida Bay and the Indian River Lagoon. IMAP is the first program capable of reporting on the status of Florida's nearshore marine systems on a statewide basis. This report summarizes results from the first of five years of sampling in IMAP. When fully implemented, IMAP will play a large role in filling the information gap on the health of Florida's estuaries.

An improved estuarine monitoring and assessment capability will enhance the quality and quantity of information provided to EPA for water quality reporting (i.e. 305(b) and related programs). Current 305(b) reporting for estuarine resources in Florida is accomplished through a compilation of disparate data collected at different spatial and temporal scales. The ability of IMAP to provide annual area-based estimates of estuarine water quality with known levels of confidence will result in more accurate and timely information transfer to EPA as mandated by the Clean Water Act.

Two initiatives currently being developed at the state level augment and enhance the results from marine inshore monitoring. First, the marine inshore component is part of a larger initiative in Florida termed the Integrated Water Resource Monitoring Network (IWRMN). IWRMN forms an

umbrella under which marine, freshwater and groundwater monitoring are all conducted within a probabilistic sampling framework. This commonality of design greatly facilitates the synthesis and comparison of environmental data, with a view toward linking upland freshwater rivers, lakes and groundwater resources to marine inshore waters. Secondly, the Department of Environmental Protection's (DEP) Division of Water Facilities, in cooperation with the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI) and EPA, is developing methodologies for biological assessment in estuaries. A series of workshops is planned which will bring together technical experts in corals, submerged aquatic vegetation, macrobenthos, phyto- and zooplankton, and fish to develop sampling techniques and analytical capabilities for implementing estuarine bioassessment. There is great potential for collaborative work as the marine inshore monitoring and the estuarine bioassessment activities progress in the next few years.

1.1 Program Framework

IMAP is coordinated by staff of the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWRI), headquartered in St. Petersburg, FL. FWRI operates field labs in Melbourne, Marathon, Charlotte Harbor, Tampa Bay, Cedar Key, Tequesta and East Point (Apalachicola). These field labs will be used as bases of operation for implementing IMAP statewide.

FWRI has the expertise, experience, and facilities to conduct thorough assessments of the status of inshore resources. This includes extensive field collection, specimen identification, and ecological systems analysis training and experience. Long-term monitoring programs have been established for inshore fishes in which standardized sampling protocols are used within a probabilistic sampling design. Programs in-place at FWRI currently operate boats designed to sample shallow estuarine areas, and a large percentage of the gear necessary for conducting physical, chemical and biological sampling is already available. In addition, research efforts currently underway at

FWRI provide valuable guidance in the use of submerged aquatic vegetation, benthos, harmful algal blooms, aquatic health, and estuarine fishes in an ecological indicator context. FWRI also is fortunate to have on staff nationally-recognized experts in taxonomy of both invertebrates and fish of the southeastern United States and the Gulf of Mexico, especially the unique species inhabiting Florida's waters. A major reference collection of fish and invertebrates is curated at FWRI.

FWRI also has one of the best remote sensing and GIS groups in the country. Their skills are applied to a wide variety of problems concerning Florida's marine and estuarine systems. All data collected under FWRI monitoring programs are spatially referenced to ensure their suitability for future analyses.

1.2 Resource Definition and Classification

Although it is planned that IMAP will eventually incorporate monitoring related to all coastal resources within state waters, the initial strategy focuses on estuaries. IMAP bases its estuarine sampling population on estuaries delineated as part of the EPA's EMAP-Estuaries work in the Louisianian, West Indian, and Carolinian Provinces. This geographic coverage includes 477 named estuaries obtained from USGS 1:100,000-scale Digital maps (Digital Line Graphs or DLGs). EMAP used the DLGs in conjunction with NOAA navigational charts to define and delineate estuaries. A total of 477 estuaries were identified in Florida, ranging in size from 0.04 km² to 3,097 km² (Florida Bay). An example of the estuaries delineated by EMAP for the Tampa Bay area is presented in 1-2.

In order to distribute sampling throughout the state, the five DEP Water Management Districts (WMDs) are used to regionalize inshore monitoring efforts. This regionalization forms part of an overall spatial framework (see next section). The use of WMDs as regions is consistent with other monitoring strategies within IWRMN. In addition, the use of WMD as regions will reduce large-scale sampling variability (i.e. Atlantic vs. Gulf coasts).

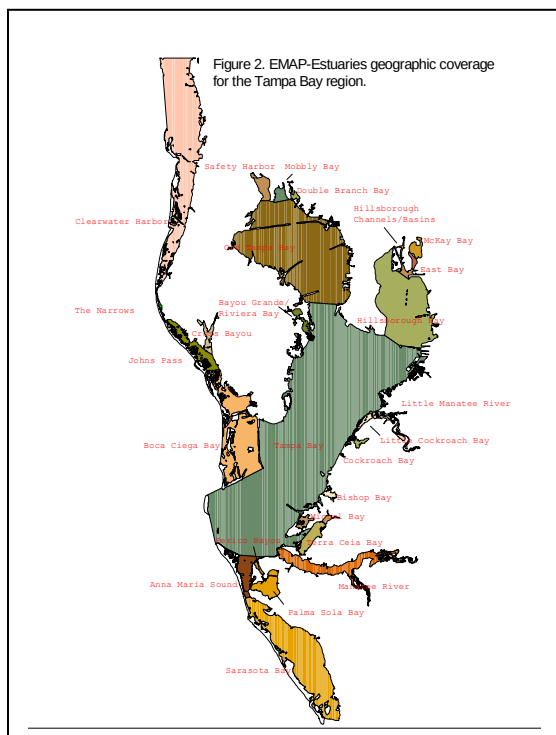


Figure 1-2. EMAP-Estuarine Geographic Coverage for the Tampa Bay Region

Head-of-tide will be used to define the upstream extent of estuarine resources. Since the freshwater component of IWRMN is using head-of-tide as their downstream boundary, this will ensure that no areas are not included in the integrated design. The seaward boundaries of estuaries were defined by EMAP to coincide with natural physical boundaries (e.g., barrier islands). These seaward boundaries will be evaluated and modified, if necessary, to ensure safe vessel operation at all stations.

1.3 Spatial Framework

One of the issues that must be dealt with in conceptualizing an inshore monitoring initiative is the development of an appropriate spatial framework. Establishing a spatial framework for monitoring enhances the ability of a program to deal with physical, chemical and biological variability at multiple scales. In addition, the spatial structure creates an organizational system which

facilitates the communication of results to managers.

Establishing a spatial framework for estuarine monitoring is more difficult than in the freshwater case because there are few consistent physical boundaries linked to the biology. NOAA has developed a nationwide coastal assessment framework based on hydrologic units (i.e. HUCs) to provide a nationally-consistent mechanism around which environmental information related to coastal areas can be gathered. These spatial units typically represent estuaries and their watersheds, but also can be coastal watersheds that are not considered to be estuaries. Estuarine Drainage Areas (EDAs) are that component of an estuary's watershed that empties directly into the estuary and is affected by tides. EDAs may be composed of a portion of a single hydrologic unit, or several complete hydrologic units and portions of several adjacent hydrologic units. Coastal Drainage Areas (CDAs) are defined as that portion of a watershed that 1) is not part of any EDA; 2) drains directly into an ocean or an estuary; and 3) is composed only of the downstream-most hydrologic unit in which the head-of-tide is found.

The NOAA EDA/CDA framework was used as a basis to establish sampling units for marine inshore monitoring throughout Florida (Figure 1-3). In most cases, these sampling units are combinations of coastal HUCs. Due to the lack of large rivers on the east coast, determination of the sampling units for the St. Johns WMD using HUC-based EDA/CDAs was problematical. The four sampling units in the St. Johns were established based on the natural boundaries of the major estuaries, rather than on EDA/CDAs. The HUC-based definition of sampling units facilitates integrated monitoring and reporting with the freshwater and groundwater components of IWRMN, since their monitoring is also HUC-based.

Thus, a two-tiered, hierarchical spatial framework is established, consisting of sampling units within Water Management Districts. Each year, one sampling unit in each of the five regions will be chosen for sampling. The schedule of activity within sampling units will be chosen to correspond as closely as possible with the freshwater and groundwater component of IWRMN. This will result

in synoptic sampling of all types of water resources, from headwaters to estuary in most cases, within a sampling unit. Within each sampling unit a triangular grid (resulting in hexagonal cells) is randomly placed over the estuarine resources. Cell sizes within each grid are iteratively determined in order to achieve a total of 30 stations per sampling unit. In addition, a broad-scale statewide set of samples (30 each year statewide) is randomly selected from a triangular grid covering the coastline. Thus, a total of 180 stations will be visited each year, 50 in each of five sampling units, plus 30 at the broad (statewide) scale. This sampling design results in the ability to make inferences regarding estuarine condition statewide on an annual basis, and inferences related to WMD on a 4-5 year cycle.

Since there are four sampling units in all WMD but the Suwannee, area-based estimates of estuarine condition within each WMD will be available after five years (all sampling units sampled after four years, plus a resampling of one of the sampling units in year five to generate a variance estimate). Since the Suwannee district has only three sampling units, this WMD will be sampled on a four-year cycle, rather than five, with two of the sampling units resampled in years 4 and 5.

The entire spatial framework will be evaluated as part of year-two activities. The NOAA EDA/CDA

classification will be examined more closely and changes to sampling unit boundaries, if necessary, will be negotiated with EPA. As mentioned above, the estuarine delineations established by EMAP-Estuarines will be examined in the context of field logistics. Both minimum samplable depths and the seaward extent of estuaries will be established based on safety concerns.

1.4 Temporal Framework

Conditions in estuaries vary over multiple time scales and no program can simultaneously characterize a large number of ecosystem indicators at very fine time scales. Monitoring programs typically have to make a choice between adequate spatial characterization (large geographic coverage at coarse time scales) or fine-scale temporal resolution (small geographic coverage at fine time scales) based on resource constraints and program objectives. In order to provide annual statewide estimates of estuarine condition, large-scale spatial coverage takes precedence over fine-scale temporal resolution. Therefore, IMAP operates within an index sampling period temporal framework.

Sampling during an index period identifies a confined portion of the year (i.e., an index period) in which sampling will take place. The concept of an index period is rooted in two main tenets. First, the period should be selected such that measured parameters are expected to show the greatest

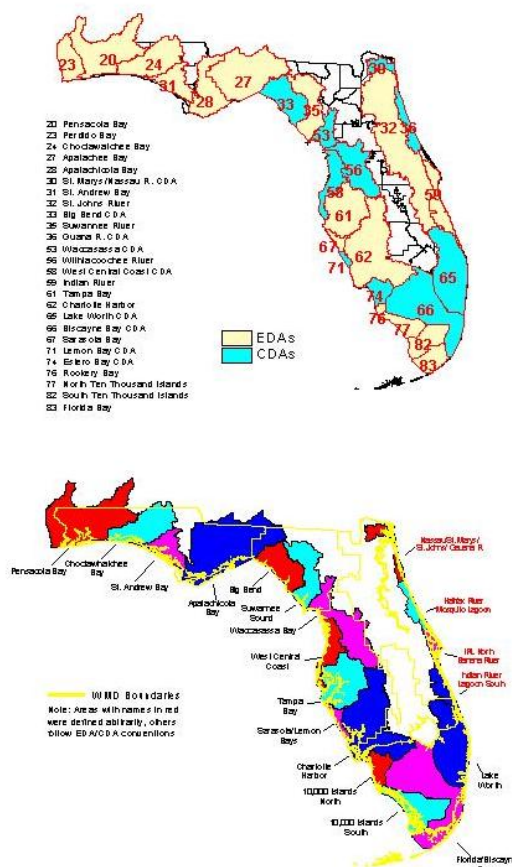


Figure 1-3. Florida Estuarine and Coastal Drainage Areas (top) and IMAP Sampling Units (bottom).

response to anthropogenic stress. Secondly, within-season variability in the measured parameters should be low during the index period. The EMAP-Estuaries program used a late-summer index period.

In general, Florida experiences a dry season from about October-May and a wet season from June-September. The Panhandle often experiences a secondary wet period in March. To evaluate the suitability of a late-summer index period for Florida, intra- and interannual trends in physical data collected by the FWC/FWRI Fisheries Independent Monitoring (FIM) program were examined. These data were collected under a stratified random sampling design, so sampling bias (e.g. due to fixed stations near river mouths) should be minimal. Figure 1-4 presents smoothed surfaces by month and year for bottom dissolved oxygen, surface temperature, surface salinity and monthly surface salinity standard deviation (SD) from the Tampa Bay FIM data. These surfaces were based on over 3500 stations sampled from 1987-96. Bottom dissolved oxygen values show a consistent seasonal pattern of summer minima between June-August. Likewise, the seasonal warming pattern in Tampa Bay surface waters changed little from 1987-1996 (Figure 1-4). Annual surface temperature maxima occurred in July each year, although June-August temperatures generally differed by less than 3-4°C. The plot of surface salinity reveals little in terms of seasonal pattern (Figure 1-4). Salinity appears to vary across multiple time scales from daily to annually, making generalizations difficult.

Based on the analysis of physical data from Tampa Bay, a summer index period (July-August) seems appropriate for this region since dissolved oxygen levels are typically at their lowest, and thermal stress most pronounced, during this time. Due to the range of latitudes in Florida, it is likely that sampling within a year will progress in a sequential manner within approximately a two-month window. This will allow for the possibility that the index period may occur earlier in northern areas and later in southern areas.

Results from index-period monitoring are inherently spatially-oriented. That is, environmental assessments from this type of data usually are

phrased in the following manner : "8% of estuarine area in Florida experienced dissolved oxygen concentrations < 5 mg/L". As additional sampling occurs each year, IMAP's capability to address interannual changes will develop. However, IMAP is primarily designed to address spatial (i.e. provide area-based estimates of condition) trends. Interannual (seasonal) estuarine condition will be addressed using environmental data collected by existing programs. FWRI's Fisheries Independent Monitoring (FIM) program currently samples over 250 sites in Tampa Bay, Charlotte Harbor, Indian River Lagoon and Cedar Key on a monthly basis. Although these samples are fisheries-oriented, the accompanying environmental data (e.g. temperature, dissolved oxygen, secchi depth, salinity, turbidity, bottom type) is useful in a broader estuarine assessment context. The FIM stations, in combination with other programs both within (e.g. shellfish monitoring) and external to FWC, will in effect provide an ad hoc temporal variability (TV) network to assess changes over multiple time scales. Identification of existing sampling programs which can expand the spatial coverage of the TV network will be a focus of year one activities. In addition, the possible supplementation of existing programs to further their effectiveness within the TV network (e.g. adding additional parameters or expanding spatial coverage) will be considered.

1.5 IMAP Indicators

Two levels of estuarine indicators have been identified for IMAP (Table 1-1). Base-level indicators are relatively cost-effective, and expected to be responsive to anthropogenic stress over short time scales. Samples associated with these indicators will be collected at all 180 stations per year. Supplemental indicators are either relatively expensive (in terms of sampling time or analytical costs), responsive over longer time scales, or experimental in nature. Some supplemental indicators will either be sampled only at the statewide scale (i.e., 30 stations per year), or only during only 2-3 years of a five year cycle (Table 1-1). For supplemental indicators which are sampled only at the statewide scale, no WMD-specific inferences will be possible.

BASE INDICATORS

Parameter	Sampling Device
Water Quality	
Temperature	Hydrolab Surveyor
Dissolved Oxygen	Hydrolab Surveyor
Depth	Hydrolab Surveyor
Salinity	Hydrolab Surveyor
pH	Hydrolab Surveyor
Nutrients	Water Bottle
(NH ₄ , Nox, DIN, TDN, TP, TN, TDP, FRP)	
Chlorophyll a	Water Bottle (depth integrated)
Bottom Type	Visual Inspection
Macrobenthos	Benthic Grab**
Sediment Grain Size	Benthic Grab
Total Organic Carbon, Percent Silt-Clay	Benthic Grab
Submerged Aquatic Vegetation (SAV)	
Species Composition	Visual Inspection
Braun-Blanquet Cover/Abundance	Visual Inspection
Disease	Visual Inspection
Shoot density (live and dead)	Benthic core**
Biomass (above and below-ground)	Benthic core
Leaf blade length/width/shoot-specific leaf area	Benthic core
# leaf scars on lateral shoots	Benthic core
# rhizome apices	Benthic core
Fish	
Relative Abundance	Trawls/Seines
Gross External Pathology	Trawls/Seines

SUPPLEMENTAL INDICATORS

Sediment Contaminants	Benthic Grab
Contaminant residues in fish	Trawls/Seines
Stable isotopes of nitrogen in fish	Trawls/Seines
Presence of <i>Pfiesteria</i> -like organisms in sediments	Benthic Grab

1.6 IMAP Sampling Schedule

IMAP samples one sampling unit within each Water Management District each year in addition to 30 sites at the statewide scale. The five year sampling sequence is detailed in Table 1-2 and displayed graphically in Figure 1-5. The remainder of this report summarizes results, to date, from 2003 sampling.



Figure 1-5: Sampling stations for IMAP, 2003.

Table 1-1: Estuarine Indicators proposed for Florida's inshore marine monitoring program (IMAP).

Year				
2000	2001	2002	2003	2004
Nassau/St. Johns/St. Marys	St. Andrew Bay	Choctawhatchee Bay	West Central Coast	Lake Worth
Apalachicola Bay	Halifax/Mosquito Lagoon	Big Bend	Pensacola Bay	Halifax/Mosquito Lagoon
Suwannee Sound	Wacassassa Bay	IRL North/Banana River	Florida/Biscayne Bays	Choctawhatchee Bay
Tampa Bay	Sarasota/Lemon Bays	Charlotte Harbor	IRL South	Big Bend
Lake Worth	North 10K Islands	South 10K Islands	Suwannee Sound	West Central Coast

Table 1-2 Sampling schedule for IMAP sampling units, 2000-2004. Bolded locations are repeat visits.

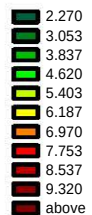
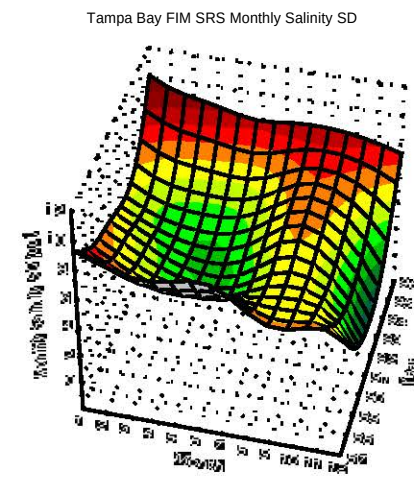
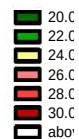
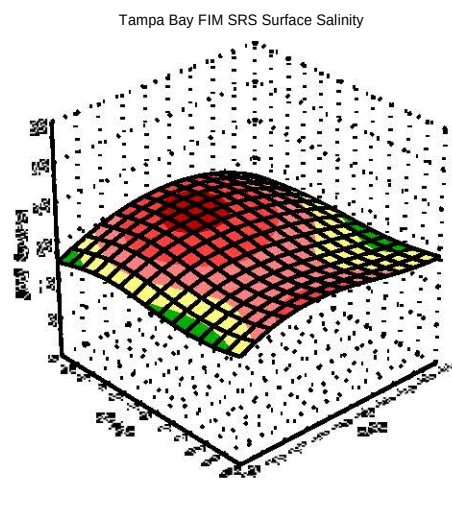
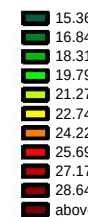
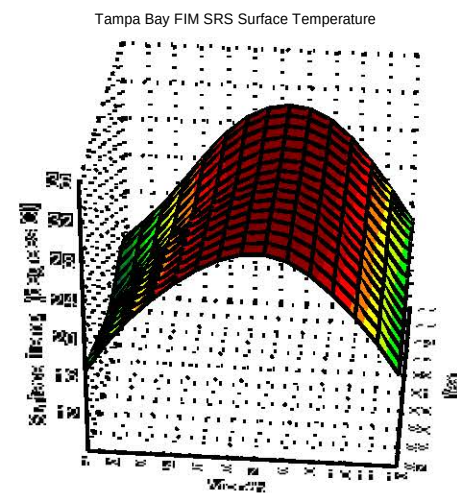
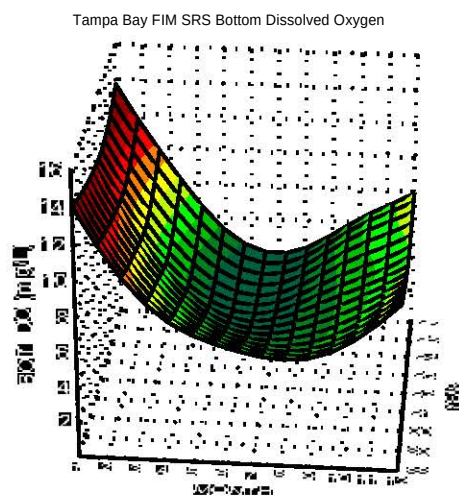


Figure 4. Bottom dissolved oxygen, sea surface temperature, surface salinity, and month standard deviation of surface salinity for the Tampa Bay FIM program 1987-1996.

2 FIELD SAMPLING: 2003

2.1 Field Sampling Logistics

The index period for IMAP sampling in summer 2003 was defined as July-August. All of the base sampling was conducted within the index period. The number of sites visited by day in 2003 is presented in Figure 2-1. Only one site, in a crocodile sanctuary in Joe Bay (FLO200305) was not visited due to access restrictions. Most of sites were sampled in July (156 sites), and the remainder of the sites (23) were sampled in August.

Field crews located stations using either GPS or differential GPS. In general, field crews were extremely accurate in locating target coordinates for field stations (Table 2-1). Over 94 percent of stations were located within 0.03 nm of the target coordinates, while over 96% of stations were located within 0.06 nm of the target. Only 5 sites were sampled > .06 nm from the target locations.

Sampling responsibilities were distributed as evenly as possible among FWRI field Labs (Figure 2-2). In 2003, the Marathon field lab had the highest load at 45 sites, while the Charlotte Harbor lab had the lowest load at 4 sites. The Tequesta lab did not sample IMAP sites in summer, 2003. A complete station summary is provided in Table 2-2.

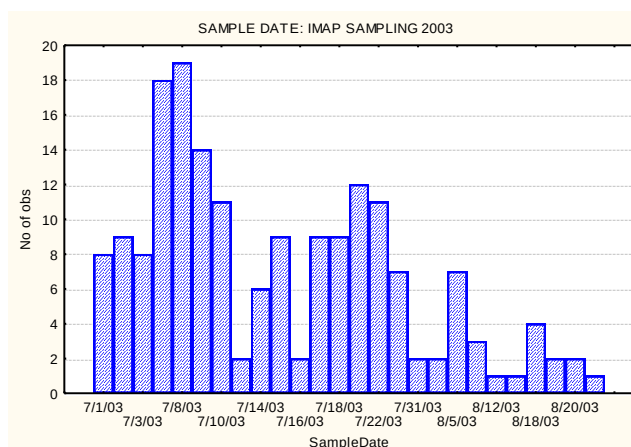


Figure 2-1: Number of stations sampled by date, IMAP Sampling 2003.

2003		Cumul.		Cumul.
Target vs. Actual (nm)	Count	Count	Percent	Percent
.00<=x<.010	133	133	73.5	73.5
.010<=x<.020	31	164	17.1	90.6
.020<=x<.030	6	170	3.3	93.9
.030<=x<.040	3	173	1.7	95.6
.040<=x<.050	1	174	0.6	96.1
.050<=x<.060	0	174	0.0	96.1
.060<=x<.070	1	175	0.6	96.7
.070<=x<.080	1	176	0.6	97.2
.080<=x<.090	0	176	0.0	97.2
.090<=x<.100	1	177	0.6	97.8
.100<=x<.110	0	177	0.0	97.8
.110<=x<.120	0	177	0.0	97.8
.120<=x<.130	1	178	0.6	98.3
.130<=x<.140	0	178	0.0	98.3
.140<=x<.150	0	178	0.0	98.3
.150<=x<.160	0	178	0.0	98.3
.160<=x<.170	0	178	0.0	98.3
.170<=x<.180	1	179	0.6	98.9
.180<=x<.190	0	179	0.0	98.9

Table 2-1: Frequency table of distances between actual and target sampling locations (nm) in IMAP summer 2003 sampling,

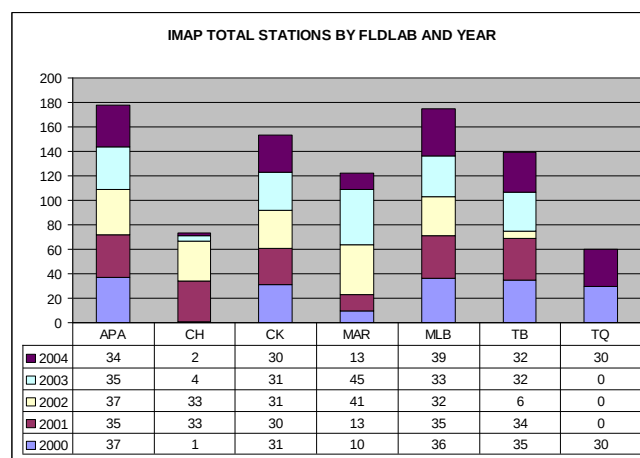


Figure 2-2: IMAP sampling responsibilities by year and FWRI field lab (APA=Apalachicola, CH=Charlotte Harbor, CK=Cedar Key, MAR=Marathon, MLB=Melbourne, TB=Tampa Bay, TQ=Tequesta)

Table 2-2: IMAP station summary for summer 2003 sampling. Fish Gear 20, 23=seine; Fish Gear 300,301=trawl.

Water Management District Scale Stations								
Station	Sampling Unit	Depth (m)	Sample Date	Fish Sample	Fish Gear	Infaunal Sample	DEP Site	Comment
FLO200301	Florida Bay	1.9	8/7/2003	Y	300	Y	N	
FLO200302	Florida Bay	2.7	8/5/2003	Y	300	Y	N	
FLO200303	Florida Bay	2.0	8/5/2003	N		Y	N	could not trawl due to the presence of hardbottom , corals, and sponges.
FLO200304	Florida Bay	3.5	8/5/2003	Y	300	Y	N	
FLO200305	Florida Bay			N		N	N	this site was located in Joe Bay, part of the Everglades National Park (ENP). FIM does not have the necessary permits to sample in the ENP, so this site was not visited.
FLO200306	Florida Bay	3.9	7/22/2003	Y	300	Y	N	
FLO200307	Florida Bay	0.7	7/22/2003	Y	20	Y	N	
FLO200308	Florida Bay	0.8	7/8/2003	Y	20	Y	N	
FLO200309	Florida Bay	1.4	7/10/2003	Y	300	Y	N	
FLO200310	Florida Bay	3.5	7/9/2003	Y	300	Y	N	
FLO200311	Florida Bay	1.9	7/9/2003	Y	300	Y	N	
FLO200312	Florida Bay	2.2	7/10/2003	Y	300	Y	N	
FLO200313	Florida Bay	4.2	7/21/2003	Y	300	Y	N	
FLO200314	Florida Bay	3.3	7/9/2003	Y	300	Y	N	
FLO200315	Florida Bay	0.4	8/14/2003	Y	20	Y	N	
FLO200316	Florida Bay	1.9	7/10/2003	Y	300	Y	N	
FLO200317	Florida Bay	4.0	7/21/2003	Y	300	Y	N	
FLO200318	Florida Bay	2.4	7/9/2003	Y	300	Y	N	
FLO200319	Florida Bay	2.1	7/8/2003	Y	300	Y	N	
FLO200320	Florida Bay	4.4	7/23/2003	Y	300	Y	N	
FLO200321	Florida Bay	3.9	7/21/2003	Y	300	Y	N	
FLO200322	Florida Bay	2.0	7/22/2003	Y	300	Y	N	
FLO200323	Florida Bay	1.0	7/23/2003	Y	20	Y	N	
FLO200324	Florida Bay	2.4	7/7/2003	Y	300	Y	N	
FLO200325	Florida Bay	3.3	7/7/2003	Y	300	Y	N	
FLO200326	Florida Bay	1.4	7/15/2003	Y	300	Y	N	
FLO200327	Florida Bay	5.2	7/23/2003	Y	300	N	N	rocky hard bottom. could not trawl.
FLO200328	Florida Bay	2.9	7/15/2003	N		N	Y	dep gap station. freshwater canal - no fish or sediment samples taken.
FLO200329	Florida Bay	4.6	7/15/2003	N		N	Y	dep gap station. freshwater canal - no sediments or fish collected.

FLO200330	Florida Bay	1.6	7/15/2003	N		N	Y	dep gap station. freshwater canal - no fish or sediment samples taken.
IRS200301	Indian River Lagoon South	3.6	7/1/2003	Y	300	Y		
IRS200302	Indian River Lagoon South	1.4	7/9/2003	Y	20	Y	Y	
IRS200303	Indian River Lagoon South	3.1	7/1/2003	Y	300	Y	N	
IRS200304	Indian River Lagoon South	1.3	7/1/2003	Y	301	Y	N	
IRS200305	Indian River Lagoon South	1.7	7/3/2003	Y	301	Y	N	3 min. tow abort - algae no sample taken
IRS200306	Indian River Lagoon South	2.2	7/3/2003	Y	300	Y	N	
IRS200307	Indian River Lagoon South	2.0	7/3/2003	Y	300	Y	N	abort 10 min. tow abort 3 min. tow no sample collected
IRS200308	Indian River Lagoon South	1.7	7/3/2003	Y	301	Y	N	
IRS200309	Indian River Lagoon South	0.5	7/3/2003	Y	20	Y	N	long point
IRS200310	Indian River Lagoon South	0.3	7/3/2003	Y	20	Y	N	
IRS200311	Indian River Lagoon South	0.6	7/3/2003	Y	20	Y	N	
IRS200312	Indian River Lagoon South	1.6	7/2/2003	Y	301	Y	N	distance from selected site is >0.1nm. set up so that the selected site was as close as possible to the center of the trawl transect.
IRS200313	Indian River Lagoon South	0.5	7/2/2003	Y	20	Y	N	
IRS200314	Indian River Lagoon South	2.7	7/2/2003	Y	300	Y	N	distance from selected site is >0.1nm. set up so that the selected site was as close as possible to the center of the trawl transect.
IRS200315	Indian River Lagoon South	1.0	7/7/2003	Y	20	Y	N	
IRS200316	Indian River Lagoon South	2.2	7/7/2003	Y	300	Y	N	
IRS200317	Indian River Lagoon South	1.7	7/7/2003	Y	301	Y	N	
IRS200318	Indian River Lagoon South	1.1	7/8/2003	Y	20	Y	N	
IRS200319	Indian River Lagoon South	0.9	7/8/2003	Y	20	Y	N	
IRS200320	Indian River Lagoon South	1.5	7/8/2003	Y	300	Y	N	abort 5 min. tow save - attached "bal" caulerpa
IRS200321	Indian River Lagoon South	1.6	7/8/2003	N		Y	N	abort 10 min. tow abort 3 min. in tow no sample taken, greater than 100 gal of drift algae.
IRS200322	Indian River Lagoon South	2.0	7/8/2003	Y	300	Y	N	
IRS200323	Indian River Lagoon South	2.2	7/9/2003	Y	300	Y	N	
IRS200324	Indian River Lagoon South	1.7	7/8/2003	Y	301	Y	N	
IRS200325	Indian River Lagoon South	0.9	7/9/2003	Y	20	Y	N	
IRS200326	Indian River Lagoon South	1.8	7/8/2003	Y	300	Y	N	
IRS200327	Indian River Lagoon South	3.0	7/9/2003	Y	300	Y	N	
IRS200328	Indian River Lagoon South	2.5	7/2/2003	Y	300	Y	Y	in grand harbor marina 5-min only

IRS200329	Indian River Lagoon South	1.4	7/2/2003	Y	300	Y	Y	incomplete 5 min. tow max possible dep site
IRS200330	Indian River Lagoon South	2.1	7/7/2003	Y	300	Y	Y	5 min. tow in canal
PEN200301	Pensacola Bay	2.5	8/19/2003	Y	300	Y	N	
PEN200302	Pensacola Bay	2.9	7/15/2003	Y	300	Y	N	actual site is under bridge on i-10
PEN200303	Pensacola Bay	2.7	7/15/2003	Y	300	Y	N	
PEN200304	Pensacola Bay	2.5	8/5/2003	Y	300	Y	N	hydrolab broke
PEN200305	Pensacola Bay	4.1	7/8/2003	Y	300	Y	N	very low dissolved oxygen
PEN200306	Pensacola Bay	2.9	8/5/2003	Y	300	Y	N	
PEN200307	Pensacola Bay	0.8	8/18/2003	Y	20	Y	N	
PEN200308	Pensacola Bay	2.6	7/8/2003	Y	300	Y	N	
PEN200309	Pensacola Bay	3.6	7/17/2003	Y	300	Y	N	
PEN200310	Pensacola Bay	2.2	8/18/2003	Y	300	Y	N	
PEN200311	Pensacola Bay	6.0	7/8/2003	Y	300	Y	N	
PEN200312	Pensacola Bay	3.1	7/8/2003	Y	300	Y	N	bycatch: worm tubes
PEN200313	Pensacola Bay	3.5	7/17/2003	Y	300	Y	N	grab motor problems.
PEN200314	Pensacola Bay	1.4	8/5/2003	Y	20	Y	N	
PEN200315	Pensacola Bay	7.9	7/7/2003	N		Y	N	too deep to trawl
PEN200316	Pensacola Bay	3.3	7/8/2003	Y	300	Y	N	
PEN200317	Pensacola Bay	3.7	8/5/2003	Y	300	Y	N	
PEN200318	Pensacola Bay	8.5	7/7/2003	N		Y	N	too deep to trawl
PEN200319	Pensacola Bay	5.8	7/14/2003	Y	300	Y	N	
PEN200320	Pensacola Bay	3.2	7/14/2003	Y	300	Y	N	
PEN200321	Pensacola Bay	1.2	8/20/2003	Y	20	Y	N	
PEN200322	Pensacola Bay	3.1	8/18/2003	Y	300	Y	N	
PEN200323	Pensacola Bay	0.9	7/7/2003	Y	20	Y	N	bycatch: sh=hermit crabs
PEN200324	Pensacola Bay	2.3	7/14/2003	Y	300	Y	N	
PEN200325	Pensacola Bay	9.7	7/7/2003	N		Y	N	too deep to trawl; in channel
PEN200326	Pensacola Bay	1.2	8/18/2003	Y	20	Y	N	
PEN200327	Pensacola Bay	8.1	7/7/2003	N		Y	N	too deep to trawl
PEN200328	Pensacola Bay	0.7	7/9/2003	Y	20	Y	Y	imap site was on land, sampled as close to coordinates as possible. on 7/16/03 when returning to site for dep water sample, hit submerged piling - no major damage to boat.
PEN200329	Pensacola Bay	0.9	7/16/2003	N		N	Y	dep site - exact site coordinates not reachable. small creek sampled from bridge.
PEN200330	Pensacola Bay			N		N	Y	Data sheet lost in field
SUW200301	Suwannee	4.2	7/23/2003	N		Y	N	could not get fish sample too many snags!

SUW200302	Suwannee	1.2	7/22/2003	Y	20	Y	N	
SUW200303	Suwannee	1.3	7/22/2003	Y	20	Y	N	
SUW200304	Suwannee	6.2	7/23/2003	Y	300	Y	N	
SUW200305	Suwannee	1.0	7/22/2003	Y	20	Y	N	
SUW200306	Suwannee	1.1	7/18/2003	Y	20	Y	N	
SUW200307	Suwannee	1.1	7/18/2003	Y	20	Y	N	
SUW200308	Suwannee	0.7	7/18/2003	Y	20	Y	N	
SUW200309	Suwannee	1.8	7/18/2003	Y	300	Y	N	
SUW200310	Suwannee	1.7	7/18/2003	Y	300	Y	N	
SUW200311	Suwannee	1.5	7/18/2003	Y	20	Y	N	
SUW200312	Suwannee	2.7	7/18/2003	Y	300	Y	N	
SUW200313	Suwannee	1.5	7/21/2003	Y	300	Y	N	
SUW200314	Suwannee	2.9	7/18/2003	Y	300	Y	N	
SUW200315	Suwannee	3.0	7/18/2003	Y	300	Y	N	
SUW200316	Suwannee	1.5	7/21/2003	Y	300	Y	N	
SUW200317	Suwannee	1.9	7/21/2003	Y	300	Y	N	
SUW200318	Suwannee	1.2	7/21/2003	Y	20	Y	N	
SUW200319	Suwannee	0.5	7/17/2003	N		Y	N	no gear set due to deep mud!
SUW200320	Suwannee	1.0	7/21/2003	Y	20	Y	N	
SUW200321	Suwannee	0.8	7/17/2003	Y	20	Y	N	split done due to large bycatch
SUW200322	Suwannee	1.7	7/21/2003	Y	300	Y	N	
SUW200323	Suwannee	0.6	7/17/2003	Y	20	Y	N	
SUW200324	Suwannee	0.9	7/17/2003	Y	20	Y	N	
SUW200325	Suwannee	1.2	7/17/2003	Y	20	Y	N	
SUW200326	Suwannee	2.3	7/17/2003	Y	300	Y	N	
SUW200327	Suwannee	0.8	7/17/2003	Y	20	Y	N	
SUW200328	Suwannee	2.5	7/23/2003	N		Y	Y	could not take fish sample water overflowing banks. no place to set
SUW200329	Suwannee	1.1	7/22/2003	N		Y	Y	no gear set due to narrow creek.
SUW200330	Suwannee	1.3	7/22/2003	Y	23	Y	Y	
WCC200301	West Central Coast	2.0	7/8/2003	N		Y	N	aborted trawl way too much algae
WCC200302	West Central Coast	2.9	7/8/2003	Y	301	N	N	
WCC200303	West Central Coast	3.0	7/8/2003	N		Y	N	abort 1st snag abort 2nd snag too much algae no set
WCC200304	West Central Coast	2.0	7/9/2003	N		Y	N	abort trawl too much algae
WCC200305	West Central Coast	0.9	7/9/2003	Y	20	Y	N	
WCC200306	West Central Coast	1.4	7/9/2003	N		Y	N	no set abort trawl too much algae
WCC200307	West Central Coast	1.0	7/9/2003	Y	20	Y	N	
WCC200308	West Central Coast	1.2	7/9/2003	Y	20	Y	N	
WCC200309	West Central Coast	1.2	7/10/2003	Y	20	Y	N	
WCC200310	West Central Coast	1.5	7/11/2003	N		Y	N	no set- too much algae
WCC200311	West Central Coast	2.6	7/10/2003	Y	301	Y	N	

WCC200312	West Central Coast	1.6	7/11/2003	N		Y	N	way too much algae- no set
WCC200313	West Central Coast	0.5	7/10/2003	Y	20	Y	N	
WCC200314	West Central Coast	1.6	7/10/2003	N		N	N	abort- too much algae no set
WCC200315	West Central Coast	0.7	7/10/2003	Y	20	Y	N	
WCC200316	West Central Coast	0.7	7/7/2003	Y	20	Y	N	
WCC200317	West Central Coast	1.0	7/7/2003	Y	20	Y	N	
WCC200318	West Central Coast	0.8	7/7/2003	Y	20	Y	N	
WCC200319	West Central Coast	3.5	7/1/2003	Y	300	Y	N	
WCC200320	West Central Coast	2.4	7/1/2003	Y	300	Y	N	
WCC200321	West Central Coast	1.1	7/1/2003	Y	300	Y	N	strong winds made collecting a grab difficult
WCC200322	West Central Coast	2.5	7/1/2003	Y	300	Y	N	strong winds made getting a grab difficult aborted trawl because of too much algae.
WCC200323	West Central Coast	1.4	7/2/2003	Y	301	Y	N	
WCC200324	West Central Coast	1.4	7/22/2003	Y	20	Y	N	channel near flat
WCC200325	West Central Coast	3.0	7/2/2003	Y	300	Y	N	
WCC200326	West Central Coast	1.6	7/2/2003	Y	301	Y	N	
WCC200327	West Central Coast	2.5	7/2/2003	Y	301	Y	N	
WCC200328	West Central Coast	0.4	7/7/2003	Y	20	Y	Y	
WCC200329	West Central Coast	0.7	7/7/2003	Y	20	Y	Y	
WCC200330	West Central Coast	3.3	7/1/2003	Y	300	Y	Y	dep site moved to do trawl

State Scale Stations								
Station	Trend Site	Depth (m)	Sample Date	Fish Sample	Fish Gear	Infaunal Sample	DEP Site	Comment
STR200301	N	2.4	8/19/2003	Y	300		Y	N
STR200302	N	9.8	8/20/2003	N		N	N	too deep for trawling, ysi cord not long enough to reach the bottom.
STR200303	N	6.1	7/14/2003	Y	300	Y	N	squal building
STR200307	N	6.4	8/12/2003	Y	300	Y	N	
STR200308	N	0.8	7/21/2003	Y	20	Y	N	
STR200309	N	2.2	7/14/2003	Y	300	Y	N	abort 8 min. tow - storm approaching
STR200312	N	5.4	7/3/2003	Y	300	Y	N	batteries died
STR200313	N	5.1	7/31/2003	Y	300	Y	N	distance from selected site is >0.1nm. trawl transect couldn't be done within 0.1nm of selected site.
STR200314	N	2.0	8/1/2003	Y	300	Y	N	
STR200315	N	0.7	8/1/2003	Y	20	Y	N	sav present thalassia 100% coverage
STR200316	N	1.3	7/31/2003	Y	300	Y	N	red tide dead fish 5 gallons of pinfish

STR200317	N	1.8	8/7/2003	Y	300	Y	N
STR200318	N	1.1	8/7/2003	Y	20	Y	N
STR200319	N	3.5	7/21/2003	Y	300	Y	N
STR200320	N	2.1	7/8/2003	Y	300	Y	N
STR200321	N	3.0	7/22/2003	Y	300	Y	N
STR200322	N	1.8	7/10/2003	Y	300	Y	N
STR200323	N	2.9	7/21/2003	Y	300	Y	N
STR200324	N	1.4	7/8/2003	Y	300	Y	N
STR200325	N	1.4	7/23/2003	Y	20	Y	N
STR200326	N	2.7	7/7/2003	Y	300	Y	N
STR200327	N	1.3	7/15/2003	Y	300	Y	N
STR200328	N	2.4	7/7/2003	Y	300	Y	N
STR200329	N	1.2	7/16/2003	Y	301	Y	N
STR200330	N	0.7	7/15/2003	Y	20	Y	N
STT200304	Y	1.9	7/14/2003	Y	300	Y	N
STT200305	Y	1.1	7/15/2003	Y	23	Y	N
STT200306	Y	0.8	7/22/2003	Y	20	Y	N
STT200310	Y	1.4	7/10/2003	Y	300	Y	N
STT200311	Y	3.8	8/28/2003	Y	300	Y	N

Successful fish samples were obtained at 86% of the sites (155 of 180). Various conditions and situations resulted in a given site being unsamplable for fish including, high algal bycatch, bottom obstructions, unsafe seining or trawling conditions, or unsuitable depths (too deep or too shallow). Per IMAP protocol (Appendix C), fish samples were not taken at sites with salinity=0 ppt (n=4 sites).

The IMAP sampling protocol defines a successful benthic grab, in part, based on a sediment depth in the sampler of at least 10 cm. Successful benthic grabs were obtained at 94% of the sites (169 of 180). Various conditions and situations resulted in a given site being unsamplable for benthos including hardbottom, inaccessibility, or high currents. Per IMAP protocol, benthos samples were not taken at sites with salinity=0 ppt (n=4 sites).

Water quality samples with automated monitoring equipment were obtained at 179 of the 180 sites in 2003.

Sediment chemistry samples were successfully taken at all statewide scale sites.

2.2 Water Quality and Physical Indicators

Water quality parameters in IMAP sampling are taken using automated water quality instruments (depth, temperature, pH, conductivity, salinity, dissolved oxygen), and through laboratory measurements on water samples (chl_a, turbidity, color and nutrients). Figure 2-3 summarizes water quality data by each sampling unit and scale for depth, temperature, salinity, and dissolved oxygen. The mean station depth across all stations was 2.3 m. The Pensacola Bay stations were, on average, the deepest with a mean depth of 3.5 m. Indian River South had the shallowest sites, with a mean depth of 1.7 m. Among the six geographic groupings used in Figure 2-3, depth differences were significant (ANOVA, F=6.54, 5 df, p<0.001) State scale stations averaged a starting depth of 2.6 m.

ANOVA results for three additional water quality parameters are listed in Table 2-3. Dissolved

oxygen, temperature, and salinity were all significantly different among sampling units. Surface vs. Bottom differences were only significant for dissolved oxygen (Table 2-3). Varying degrees of stratification were evident in 2003 sampling, as indicated by the nonsignificant differences in

Temperature	df	MS		
	Effect	Error	F	p
SAMPUNIT	5	23.4	15.20	0.00
SAMPDEP	1	11.3	7.36	0.01
SAMPUNIT*SAMPDEP	5	1.6	1.07	0.38
Salinity	df	MS		
	Effect	Error	F	p
SAMPUNIT	5	5737.0	86.58	0.00
SAMPDEP	1	382.4	5.77	0.02
SAMPUNIT*SAMPDEP	5	96.5	1.46	0.20
		66.3		
Dissolved Oxygen	df	MS		
	Effect	Error	F	p
SAMPUNIT	5	12.3	4.95	0.00
SAMPDEP	1	66.9	26.98	0.00
SAMPUNIT*SAMPDEP	5	11.4	4.58	0.00

Table 2-3: Results of two way Analysis of Variance for dissolved oxygen, temperature, and salinity IMAP sampling summer, 2003. Analyses are on raw station data across all scales. SAMPUNIT = sampling units as depicted in Figure 2-3. SAMPDEP= sample depth (surface or bottom).

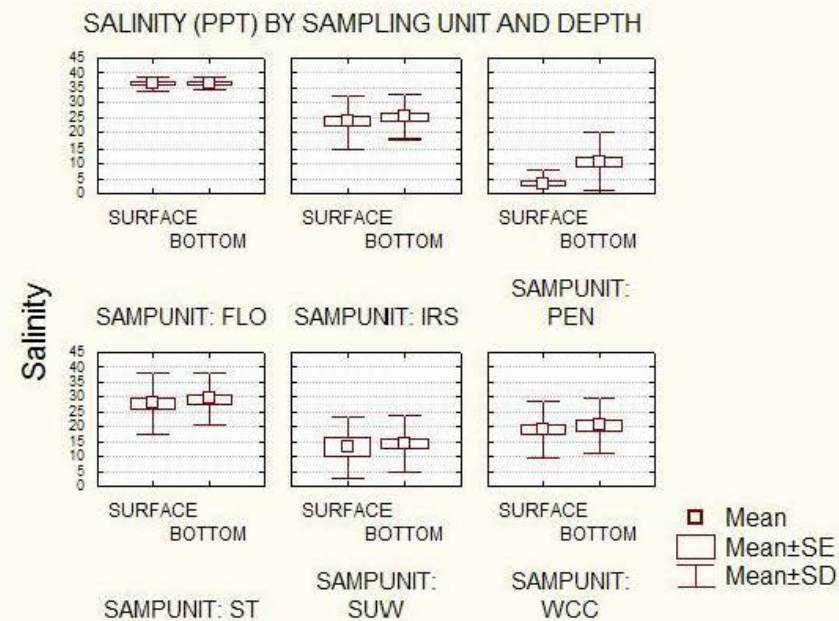
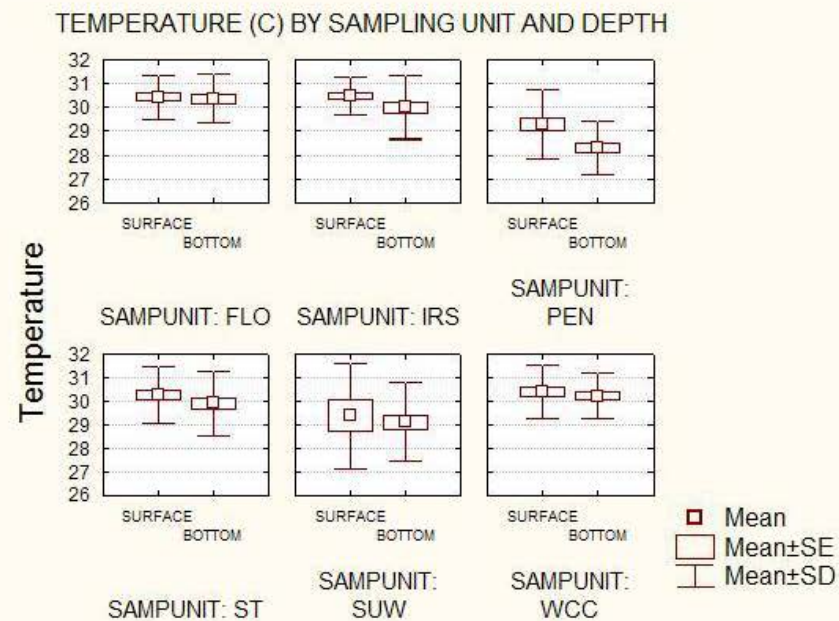
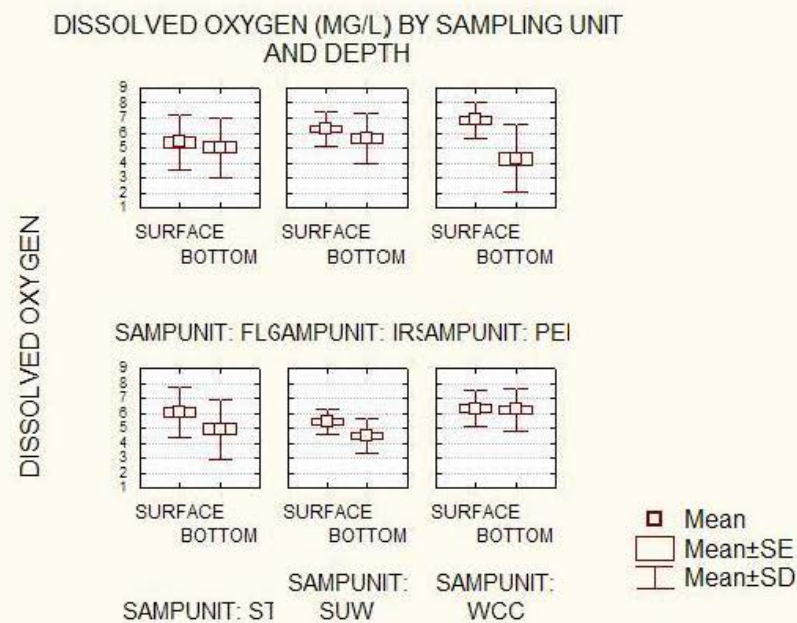
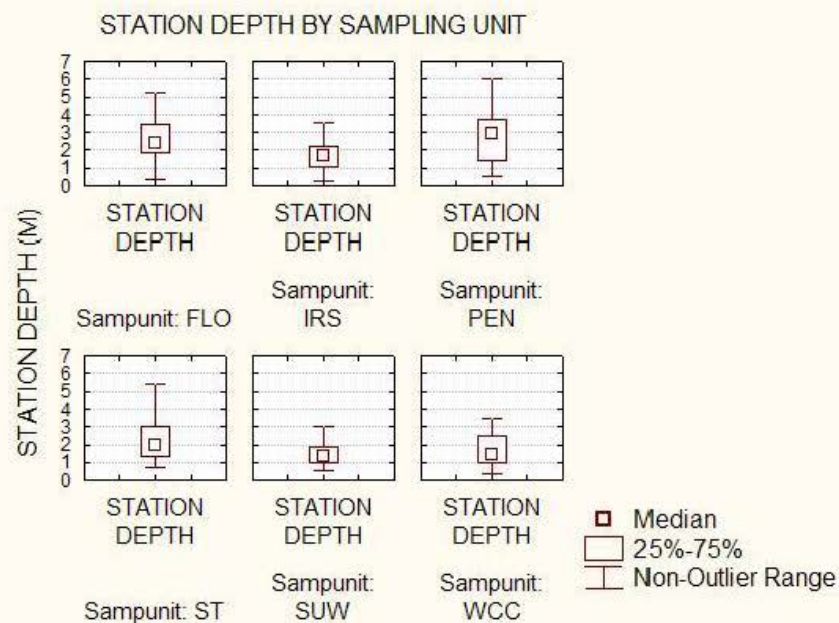


Figure 2-3. Water Quality results from IMAP sampling Summer, 2003 (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

temperature and salinity by sample depth and the significant interaction between SAMPUNIT and SAMPDEP. These statistics were driven by the PEN and ST sampling units which were deeper on average than other sampling units and had a higher tendency to stratify. Complete water quality data from Hydrolab sampling is presented in Appendix A, Table A-1.

Chlorophyll a data are available for 176 sites for 2003. A summary of select nutrients and chlorophyll a is presented in figure 2-4. The Suwannee River sites, on average had the highest concentration of chlorophyll a, while the Florida Bay sites, on average, had the lowest. The Indian River South and Pensacola Bay stations were, on average, relatively high in Chlorophyll a, while the state scale sites and Florida Bay sites, were, on average relatively low.

2.3 Sediment Quality Indicators

In IMAP, sediment quality is assessed using the variables total organic carbon (TOC) in sediment, sediment grain size, and sediment chemistry (contaminants). TOC and grain size were measured at all samplable sites, while sediment chemistry was measured only at the state scale stations. There was a substantial degree of variation in the mean TOC of sediments (n=170 stations) among sampling units (Figure 2-5).

Highest mean TOC values were observed within the SUW sampling unit, and lowest mean TOC values were observed in the IRS sampling unit. There was no significant difference in TOC concentrations among sampling units (ANOVA, $F=1.07$, 5 d.f., $p<0.38$). High variability within sampling units likely contributed to the lack of significant difference in TOC. Complete TOC results to date are tabled in Appendix A, Table A-2.

Sediment grain size data are available from 171 sites from 2003 sampling. Figure 2-6 summarizes the percent silt-clay content of sediments by sampling unit.

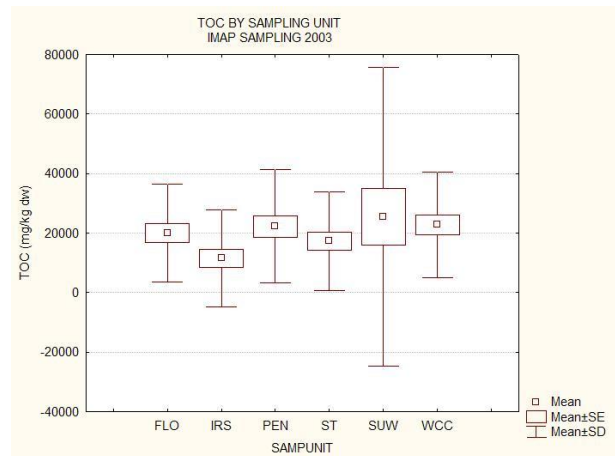


Figure 2-5: Total Organic Carbon in sediment. IMAP sampling Summer, 2003 (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

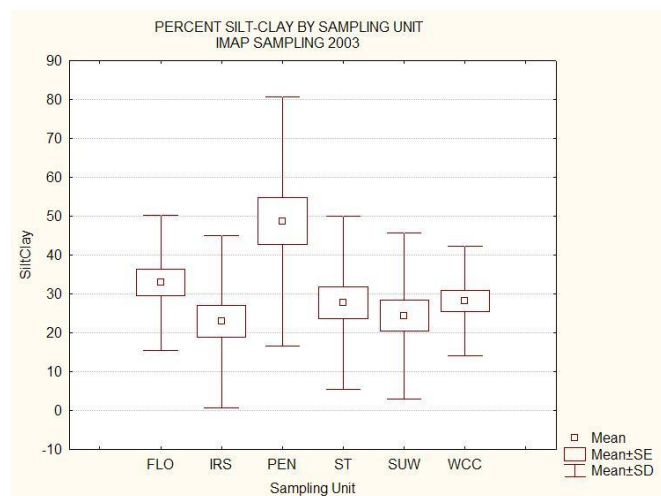


Figure 2-6: Percent Silt-Clay in sediment. IMAP sampling Summer, 2003 (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

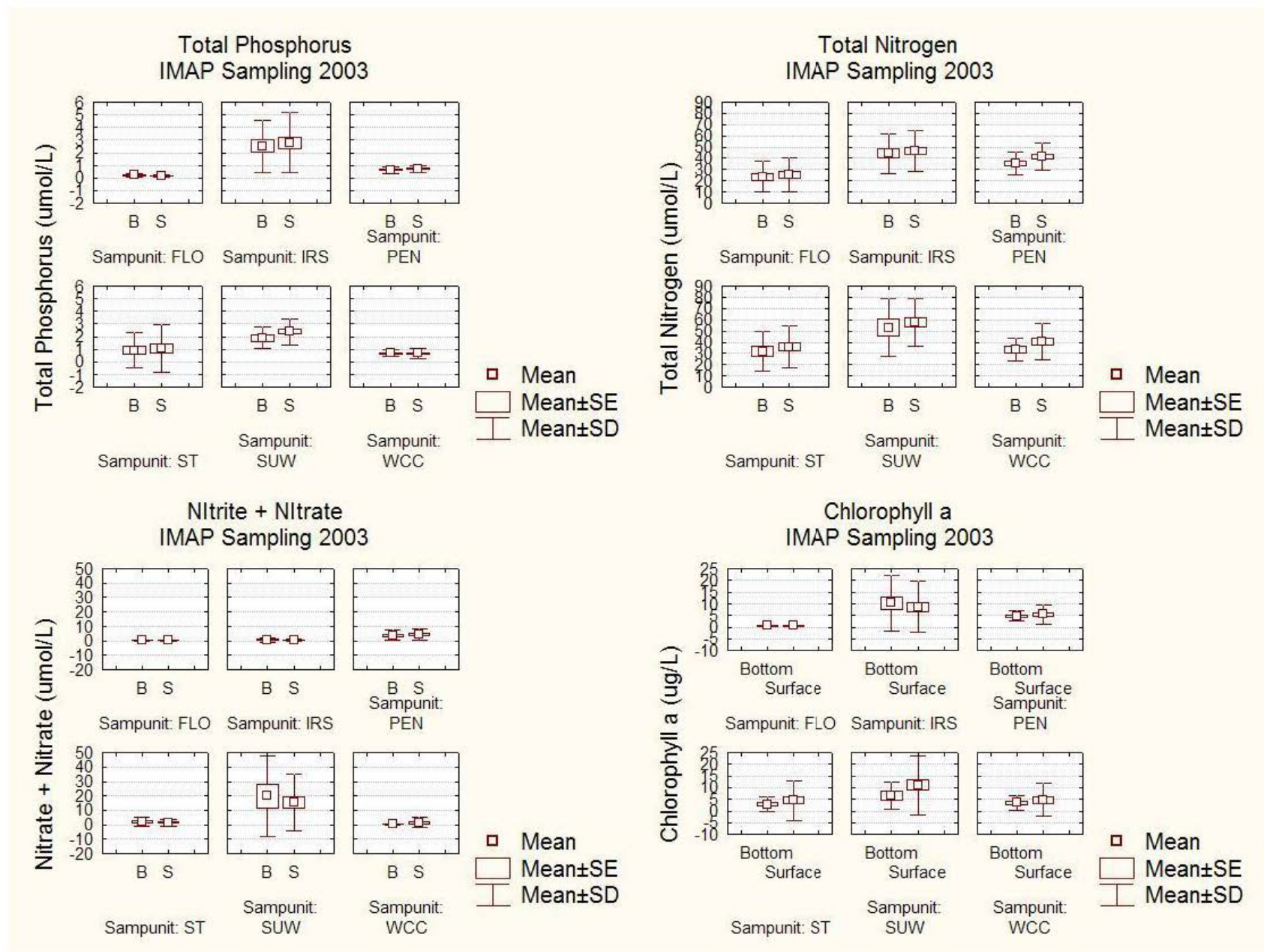


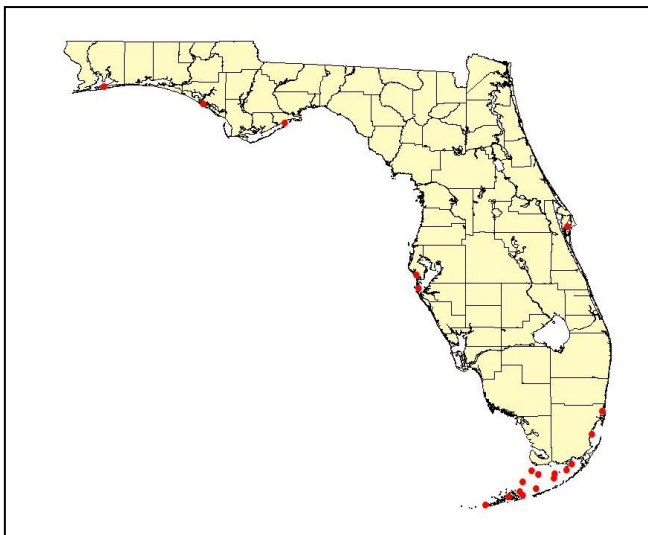
Figure 2-4. Select nutrients and chlorophyll a results from IMAP sampling Summer, 2003 (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC-West Central Coast; B= Bottom; S=Surface)

Mean percent silt-clay levels were highest in the Pensacola Bay sampling region, and lowest in the Indian River South sampling region. There was no significant difference in levels of silt-clay in sediments among the sampling units (Kruskal Wallance ANOVA, $p=0.682$). Complete grain size data for the silt-clay portion is presented in detail in Appendix A, Table A-3.

As noted above, in the IMAP sampling design, sediment chemistry samples are taken only at the statewide sampling scale. Sediment samples were examined for over 150 metal and organic contaminants (Appendix A, Table A-4).

For mercury, only 1 station (STR200303) in Pensacola Bay had concentrations above minimum laboratory practical quantitation levels.

Detectable levels of the remaining metals were documented at 19 of the 30 stations (Table 2-4). Nineteen sites had one or more metals exceed TEL concentrations. Some of the results for certain metals are suspect given results from previous years. A total of 19 sites exceeded the



TEL for Cadmium; 16 sites exceeded the TEL for silver; and 12 sites exceeded the TEL for

Figure 2-7: State scale stations with one or more metals exceeding TEL limits, IMAP Sampling summer 2003.

selenium. These high concentrations are inconsistent with previous years of sampling. In three years of sampling (2000-2002) no sites exceeded the TEL for selenium or silver. Also

during this period, there were no more than 5 sites at which metal concentrations exceeded the TEL. Despite this incongruity, results of sediment toxicity testing using *Ampelisca abdita* indicate that potential for biological impairment existed at 12 sites (Table 2-4). Of particular concern are sites STR200323, STR200325, STR200326, STR200327, STR200328, and STR200329 all in the Florida Bay sampling unit in the lower Keys. These six sites all exhibited control-corrected survival rates less than 30% in toxicity testing. While the toxicity at these sites may have arisen from other pollutants (see below), the fact that high levels of certain metals and toxicity exists at this sites bears further investigation.

Station	Mean Survival	Control-corrected survival
STR200312	67	74.4444
STR200317	66	71.7391
STR200320	27	30
STR200323	26	27.3684
STR200325	16	16.8421
STR200326	7	7.7778
STR200327	10	10.5263
STR200328	19	21.1111
STR200329	25	26.3158
STR200330	55	57.8947
STT200306	79	84.0426
STT200311	85	87.6289

Two sites in Table 2-4 are trend sites and were sampled in previous years. STT200311 did not

Table 2-4: Sediment toxicity results for IMAP sampling 2003. Mean survival and control corrected survival apply to an assay with *Ampelisca abdita*. Only sites where survival differed significantly from the control are listed.

have any metal concentrations in excess of the TEL in 2003. STT200306 in Tampa Bay, which exceeded the TEL for cadmium in 2003 and also exceeded the TELs for cadmium and/or copper in 2001 and 2002.

In terms of organic contaminants, the vast majority of analytes did not occur in any sample above practical quantitation limits. However, concentrations of dieldrin were above detection limits at 7 sites (Table 2.5). These sites were located in Apalachicola Bay, Biscayne Bay, and

St. Andrew's Bay (one each), and Florida Bay (4 sites). Four of the seven sites (STR200317, STR200325, STR200329, and STT200311 exhi STR200325, STR200329, and STT200311) exhibited significant toxicity in the *Ampelisca* test (Table 2-4).

Station	Component	Result (mg/kg)
STR200307	Dieldrin	20.51
STR200317	Dieldrin	30.28
STR200319	Dieldrin	20.22
STR200321	Dieldrin	29.35
STR200325	Dieldrin	76.29
STR200329	Dieldrin	31.8
STT200311	Dieldrin	2

Table 2-5: Stations with organochlorine contaminants above practical quantitation limits, IMAP Sampling 2003.

2.3 Biological Indicators

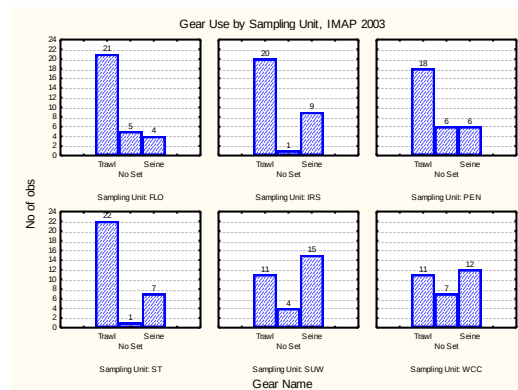
Several biologically-based indicators were sampled in summer 2003 including fish and selected macroinvertebrates, benthic infauna, and submerged aquatic vegetation. As of this writing, all of the biological data are complete.

2.3.1 Fish and Selected Invertebrates

IMAP successfully sampled fish at 155 out of 180 stations in 2003. A total of 140 species, and 26,256 fish were identified and enumerated statewide. Depending on the depth (1.2 m cutoff), fish were sampled with either seines or trawls (Figure 2-8).

Out of a total of 155 successful sets, 47 were with seines (30%), while 103 (70%) were with trawls.

A-6 in Appendix A summarizes the composition of IMAP fish samples. Table 2-6 lists the most commonly caught species by sampling unit. Pinfish, *Lagodon rhomboides* (n=78), species of



mojarra, *Eucinostomus spp.* (n=73), bay anchovy, *Anchoa mitchilli* (58), shrimp, *Farfantepenaeus*

Figure 2-8: Distribution of fish sampling gear type by sampling unit, IMAP sampling summer 2003. (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

duorarum. (n=37), silver perch, *Bairdiella chrysoura* (n=36), and pigfish, *Orthopristis chrysoptera* (31) were among the most common species caught.

Number of species caught by gear and sampling unit is depicted in Figure 2-9.

On average across gear type, samples from the WCC sampling unit contained significantly more species than the FLO, IRS, PEN or ST sampling units (Tukey's HSD, p<.05).

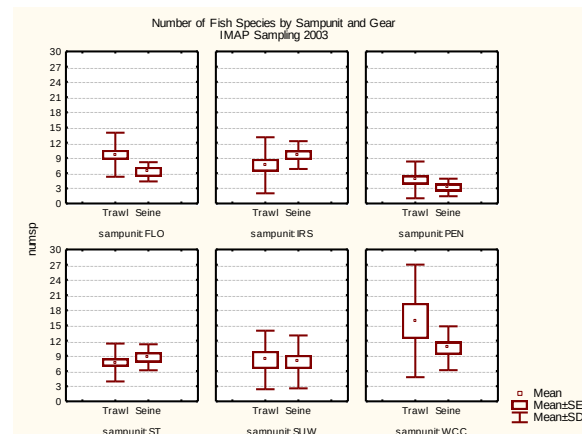


Figure 2-9: Number of species per set by gear and sampling unit, IMAP sampling summer 2003. (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

Table 2-6: Metals in sediments (mg/kg) from IMAP sampling Summer, 2003. Only observations above the laboratory practical quantitation limit are listed. TEL = Threshold Effects Level; PEL = Probable Effects Level as defined in MacDonald, 1994. The USEPA has not established a TEL or PEL for selenium. Concentrations ≥ 4 mg/kg in sediment are a concern because of the potential for bioaccumulation in fish and wildlife (Lemly and Smith, 1987).

Station	Component	Value (mg/kg)	TEL (mg/kg)	PEL (mg/kg)	>detect?	>TEL?	>PEL?
STR200303	ARSENIC	13	7.24	41.6	Y	Y	N
STR200303	CADMIUM	2.4	0.676	4.21	Y	Y	N
STR200303	CHROMIUM	63.2	52.3	160	Y	Y	N
STR200303	COPPER	19.5	18.7	108	Y	Y	N
STR200303	LEAD	26	30.2	112	Y	N	N
STR200303	NICKEL	18.3	15.9	42.8	Y	Y	N
STR200303	SELENIUM	0.5	4		Y	N	
STR200303	SILVER	1.2	0.733	1.77	Y	Y	N
STR200303	ZINC	83.3	124	271	Y	N	N
STR200307	ARSENIC	2.4	7.24	41.6	Y	N	N
STR200307	CADMIUM	0.8	0.676	4.21	Y	Y	N
STR200307	LEAD	1.1	30.2	112	Y	N	N
STR200307	SELENIUM	2.6	4		Y	N	
STR200307	SILVER	0.4	0.733	1.77	Y	N	N
STR200307	ZINC	2.1	124	271	Y	N	N
STR200312	CADMIUM	1	0.676	4.21	Y	Y	N
STR200312	SELENIUM	1.9	4		Y	N	
STR200312	SILVER	0.5	0.733	1.77	Y	N	N
STR200317	ARSENIC	16.1	7.24	41.6	Y	Y	N
STR200317	CADMIUM	2	0.676	4.21	Y	Y	N
STR200317	COPPER	7	18.7	108	Y	N	N
STR200317	LEAD	5.2	30.2	112	Y	N	N
STR200317	NICKEL	1.1	15.9	42.8	Y	N	N
STR200317	SELENIUM	1.4	4		Y	N	
STR200317	SILVER	2.4	0.733	1.77	Y	Y	Y
STR200317	ZINC	11.9	124	271	Y	N	N
STR200318	ARSENIC	8.7	7.24	41.6	Y	Y	N
STR200318	CADMIUM	1	0.676	4.21	Y	Y	N
STR200318	CHROMIUM	6.5	52.3	160	Y	N	N
STR200318	NICKEL	1.1	15.9	42.8	Y	N	N
STR200318	SELENIUM	9	4		Y	Y	
STR200318	SILVER	5.8	0.733	1.77	Y	Y	Y
STR200318	ZINC	6.5	124	271	Y	N	N
STR200319	CADMIUM	2.9	0.676	4.21	Y	Y	N
STR200319	CHROMIUM	7	52.3	160	Y	N	N
STR200319	CHROMIUM	7.8	52.3	160	Y	N	N
STR200319	COPPER	5.1	18.7	108	Y	N	N
STR200319	COPPER	5	18.7	108	Y	N	N
STR200319	LEAD	0.5	30.2	112	Y	N	N
STR200319	SELENIUM	4.4	4		Y	Y	
STR200319	SILVER	3.5	0.733	1.77	Y	Y	Y
STR200319	SILVER	3.6	0.733	1.77	Y	Y	Y
STR200319	ZINC	1.8	124	271	Y	N	N
STR200320	ARSENIC	4.2	7.24	41.6	Y	N	N
STR200320	CADMIUM	1	0.676	4.21	Y	Y	N
STR200320	SELENIUM	5	4		Y	Y	

STR200320	SILVER	3.8	0.733	1.77	Y	Y	Y
STR200321	ARSENIC	2.3	7.24	41.6	Y	N	N
STR200321	CADMIUM	3	0.676	4.21	Y	Y	N
STR200321	CHROMIUM	6	52.3	160	Y	N	N
STR200321	COPPER	6	18.7	108	Y	N	N
STR200321	SELENIUM	5.1	4		Y	Y	
STR200321	SILVER	4.3	0.733	1.77	Y	Y	Y
STR200322	ARSENIC	2.1	7.24	41.6	Y	N	N
STR200322	CADMIUM	1	0.676	4.21	Y	Y	N
STR200322	CHROMIUM	5.8	52.3	160	Y	N	N
STR200322	NICKEL	1.1	15.9	42.8	Y	N	N
STR200322	SELENIUM	4.7	4		Y	Y	
STR200322	SILVER	3	0.733	1.77	Y	Y	Y
STR200322	ZINC	3.2	124	271	Y	N	N
STR200323	ARSENIC	3.5	7.24	41.6	Y	N	N
STR200323	CADMIUM	3.1	0.676	4.21	Y	Y	N
STR200323	SELENIUM	6.9	4		Y	Y	
STR200323	SILVER	3.7	0.733	1.77	Y	Y	Y
STR200324	ARSENIC	5.7	7.24	41.6	Y	N	N
STR200324	CADMIUM	1	0.676	4.21	Y	Y	N
STR200324	CHROMIUM	5.2	52.3	160	Y	N	N
STR200324	NICKEL	1.4	15.9	42.8	Y	N	N
STR200324	SELENIUM	7.6	4		Y	Y	
STR200324	SILVER	3.8	0.733	1.77	Y	Y	Y
STR200325	ARSENIC	17.4	7.24	41.6	Y	Y	N
STR200325	CADMIUM	3.2	0.676	4.21	Y	Y	N
STR200325	COPPER	7.3	18.7	108	Y	N	N
STR200325	NICKEL	3.2	15.9	42.8	Y	N	N
STR200325	SELENIUM	15.1	4		Y	Y	
STR200325	SILVER	3.2	0.733	1.77	Y	Y	Y
STR200325	ZINC	4.1	124	271	Y	N	N
STR200326	ARSENIC	2.3	7.24	41.6	Y	N	N
STR200326	CADMIUM	1	0.676	4.21	Y	Y	N
STR200326	SELENIUM	3.9	4		Y	N	
STR200326	SILVER	2.7	0.733	1.77	Y	Y	Y
STR200327	Arsenic	1	7.24	41.6	Y	N	N
STR200327	Cadmium	0.1	0.676	4.21	Y	Y	N
STR200327	Chromium	3.4	52.3	160	Y	N	N
STR200327	Copper	6.9	18.7	108	Y	Y	N
STR200327	Selenium	7.4	4		Y	Y	
STR200327	Silver	3.9	0.733	1.77	Y	Y	N
STR200327	Zinc	2	124	271	Y	N	N
STR200328	ARSENIC	3.7	7.24	41.6	Y	N	N
STR200328	CADMIUM	1	0.676	4.21	Y	Y	N
STR200328	SELENIUM	5.2	4		Y	Y	
STR200328	SILVER	3.9	0.733	1.77	Y	Y	Y
STR200328	ZINC	3.3	124	271	Y	N	N
STR200329	ARSENIC	18.8	7.24	41.6	Y	Y	N
STR200329	ARSENIC	21.8	7.24	41.6	Y	Y	N

STR200329	CADMIUM	3.9	0.676	4.21	Y	Y	N
STR200329	CADMIUM	3.6	0.676	4.21	Y	Y	N
STR200329	CHROMIUM	5.1	52.3	160	Y	N	N
STR200329	CHROMIUM	6.5	52.3	160	Y	N	N
STR200329	COPPER	31.8	18.7	108	Y	Y	N
STR200329	COPPER	40.4	18.7	108	Y	Y	N
STR200329	LEAD	17.7	30.2	112	Y	N	N
STR200329	LEAD	21.4	30.2	112	Y	N	N
STR200329	NICKEL	2.7	15.9	42.8	Y	N	N
STR200329	NICKEL	3.2	15.9	42.8	Y	N	N
STR200329	SELENIUM	13	4		Y	Y	
STR200329	SELENIUM	14.1	4		Y	Y	
STR200329	SILVER	1.2	0.733	1.77	Y	Y	N
STR200329	SILVER	3.6	0.733	1.77	Y	Y	Y
STR200329	ZINC	50.6	124	271	Y	N	N
STR200329	ZINC	60.6	124	271	Y	N	N
STR200330	ARSENIC	5	7.24	41.6	Y	N	N
STR200330	CADMIUM	2.8	0.676	4.21	Y	Y	N
STR200330	COPPER	5.7	18.7	108	Y	N	N
STR200330	SELENIUM	8.5	4		Y	Y	
STR200330	SILVER	3.4	0.733	1.77	Y	Y	Y
STT200304	CADMIUM	1	0.676	4.21	Y	Y	N
STT200304	CHROMIUM	8.8	52.3	160	Y	N	N
STT200304	LEAD	3.1	30.2	112	Y	N	N
STT200304	NICKEL	2.2	15.9	42.8	Y	N	N
STT200304	SELENIUM	1.1	4		Y	N	
STT200304	SILVER	1.1	0.733	1.77	Y	Y	N
STT200304	ZINC	10.2	124	271	Y	N	N
STT200306	ARSENIC	1.6	7.24	41.6	Y	N	N
STT200306	CADMIUM	1	0.676	4.21	Y	Y	N
STT200306	CHROMIUM	6	52.3	160	Y	N	N
STT200306	COPPER	16.7	18.7	108	Y	N	N
STT200306	LEAD	4.9	30.2	112	Y	N	N
STT200306	NICKEL	1.2	15.9	42.8	Y	N	N
STT200306	SELENIUM	1.6	4		Y	N	
STT200306	SILVER	0.5	0.733	1.77	Y	N	N
STT200306	ZINC	17.6	124	271	Y	N	N
STT200310	ARSENIC	2.2	7.24	41.6	Y	N	N
STT200310	CADMIUM	1	0.676	4.21	Y	Y	N
STT200310	SELENIUM	4.8	4		Y	Y	
STT200310	SILVER	3.3	0.733	1.77	Y	Y	Y
STT200311	CADMIUM	0.1	0.676	4.21	Y	N	N
STT200311	SELENIUM	1.9	4		Y	N	
STT200311	SILVER	0.1	0.733	1.77	Y	N	N

Table 2-6: Top Ten Most Frequently Caught Fish and selected invertebrate species by sampling unit in IMAP sampling summer 2003. NUMSETS=number of sets by sampling unit in which the listed species was caught; MNABUN=mean abundance per set; PCTSETS=percent of total sets by sampling unit containing the listed species; TOTALAB=total number of individuals caught by species and sampling unit. SAMPUNIT = Sampling Unit (ST=State Scale Stations; HAL=Halifax R., Mosquito Lagoon; NTK=N. 10,000 Islands; SAR=Sarasota/Lemon Bays; STA=St. Andrews Bay; WAC=Wacassassa Bay)

SAMPUNIT	SCIENTIFIC NAME	NUMSETS	MNABUN	PCTSETS	TOTNUM
FLO	Lagodon rhomboides	17	19	56.67%	329
FLO	Haemulon plumieri	15	13	50.00%	201
FLO	Eucinostomus spp.	13	26	43.33%	342
FLO	Eucinostomus gula	13	9	43.33%	117
FLO	Monacanthus ciliatus	13	4	43.33%	57
FLO	Opsanus beta	13	2	43.33%	25
FLO	Nicholsina usta	10	2	33.33%	22
FLO	Calamus arctifrons	9	5	30.00%	46
FLO	Monacanthus hispidus	9	2	30.00%	22
FLO	Lactophrys quadricornis	8	3	26.67%	20
IRS	Eucinostomus spp.	23	25	76.67%	576
IRS	Anchoa mitchilli	15	81	50.00%	1222
IRS	Lagodon rhomboides	14	38	46.67%	528
IRS	Farfantepenaeus spp.	12	4	40.00%	43
IRS	Syngnathus scovelli	11	2	36.67%	27
IRS	Gobiosoma robustum	10	9	33.33%	85
IRS	Bairdiella chrysoura	10	8	33.33%	83
IRS	Eucinostomus gula	10	2	33.33%	24
IRS	Gobiosoma spp.	9	6	30.00%	51
IRS	Eucinostomus harengulus	9	3	30.00%	31
PEN	Anchoa mitchilli	14	86	46.67%	1198
PEN	Leiostomus xanthurus	13	120	43.33%	1557
PEN	Micropogonias undulatus	9	12	30.00%	109
PEN	Farfantepenaeus aztecus	5	2	16.67%	11
PEN	No gear set	5	0	16.67%	0
PEN	Lagodon rhomboides	4	9	13.33%	35
PEN	Brevoortia spp.	3	30	10.00%	91
PEN	Litopenaeus setiferus	3	13	10.00%	39
PEN	Bagre marinus	3	8	10.00%	23
PEN	Menidia spp.	2	8	6.67%	15
ST	Lagodon rhomboides	15	17	50.00%	252
ST	Eucinostomus spp.	14	27	46.67%	383
ST	Eucinostomus gula	13	12	43.33%	159
ST	Chilomycterus schoepfi	8	4	26.67%	29
ST	Callinectes sapidus	8	2	26.67%	13
ST	Anchoa mitchilli	7	101	23.33%	705
ST	Haemulon plumieri	7	6	23.33%	43
ST	Farfantepenaeus duorarum	7	4	23.33%	30
ST	Syngnathus scovelli	6	4	20.00%	26
ST	Synodus foetens	6	4	20.00%	23
SUW	Anchoa mitchilli	16	177	53.33%	2837
SUW	Bairdiella chrysoura	12	37	40.00%	445
SUW	Menticirrhus americanus	12	28	40.00%	334

SUW	Cynoscion arenarius	11	133	36.67%	1459
SUW	Farfantepenaeus				
SUW	duorarum	11	4	36.67%	40
SUW	Etropus crossotus	10	19	33.33%	186
SUW	Lagodon rhomboides	8	6	26.67%	46
SUW	Bagre marinus	7	39	23.33%	271
SUW	Leiostomus xanthurus	7	21	23.33%	147
SUW	Chaetodipterus faber	7	4	23.33%	29
WCC	Lagodon rhomboides	20	138	66.67%	2755
WCC	Eucinostomus spp.	19	101	63.33%	1924
WCC	Synodus foetens	13	3	43.33%	38
WCC	Eucinostomus gula	11	8	36.67%	91
WCC	Farfantepenaeus				
WCC	duorarum	11	7	36.67%	77
WCC	Lucania parva	10	60	33.33%	597
WCC	Orthopristis chrysoptera	10	30	33.33%	296
WCC	Bairdiella chrysoura	9	15	30.00%	136
WCC	Sphoeroides nephelus	9	2	30.00%	21
WCC	Syngnathus scovelli	8	6	26.67%	46

2.3.1 Benthic Macroinvertebrates

In 2003, successful grabs were obtained at 170 of 180 stations. A total of 47,324 individuals in 834 unique taxa were identified statewide. Figure 2-10 summarizes the 2003 benthic infauna data in terms of several community parameters.

The highest average diversity was seen at the state scale stations and within the FLO sampling unit. Stations within the PEN sampling unit has the lowest average diversity, while the remaining sampling units displayed similar diversity distributions. Patterns in species evenness were slightly different with sites in the IRS sampling unit displaying the lowest and most variable species evenness values.

Average number of individuals per grab varied widely among stations in 2003 ranging from 1 to 2718. Stations in the IRS sampling unit (the sites with the lowest evenness values) tended to have higher numbers of individuals per grab. Six sites in the IRS sampling unit had more than 1000 individuals per grab. The overall average number of individuals per grab statewide was 278.

The average number of taxa per grab also varied substantially among sampling units. PEN stations contained fewer species, on average, than did those in other sampling units. The remaining sampling units showed similar variability in number of species per grab. The highest number of taxa per grab enumerated was 118 (site WCC200303 near Homosassa). The lowest number of taxa per grab was 1 (sites IRS200328, STR200301, and STR200303).

Tubificid oligochaetes were the most frequently caught taxa in grabs statewide. This taxon was found in over 74% (125 out of 170) samples. Tubificid oligochaetes were also among the top 3 most frequently caught taxa in every sampling unit except PEN where the Capittelid polychaete, *Mediomastus* sp. Was the most frequently caught taxon.

In the Florida/Biscayne Bay the Tanaid crustacean *Leptochelia* and the polychaete *Prionospio* were among the most

macroinvertebrates. The most frequently sampled macroinvertebrates in the FLO unit were *Tubificidae*, the polychaete *Syllis cornuta*, *Prionospio*, and the Proboscoid worm *Rhynchocoela*.

In the Indian River South sampling unit the most frequently sampled macroinvertebrates were members of the *Tubificidae*, *Mediomastus*, and the Gastropods *Acteocina canaliculata* and *Mitrella lunata*. *Mediomastus* was also among the most frequently sampled taxa in the PEN, SUW, WCC and statewide sampling units.

At statewide scale sites, the most frequently caught taxon was *Tubificidae*, followed closely by *Rhynchocoelaeae* worms. Also common in statewide samples were the Sabellid Polychaete *Fabricinuda trilobata* and brittlestars (Ophiuroidea). The gastropod, *Acteocina canaliculata*, occurred in all six sampling units in 2003, but was most frequent in the IRS and WCC sampling units.

2.3.2 Submerged Aquatic Vegetation

Sampling for submerged aquatic vegetation (SAV) during summer 2003 took place in July-September, following identification of SAV presence during base IMAP sampling. Base IMAP sampling identified a total of 59 sites where SAV was present (Figure 2-11). Only the PEN

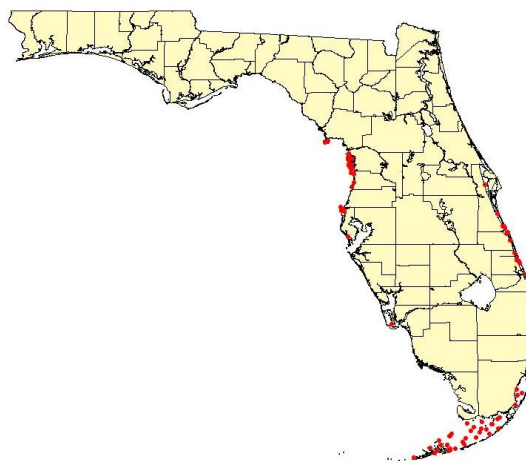


Figure 2-11: IMAP SAV sampling sites summer 2003 (n=76).

sampling unit was without designated SAV sites. SAV was noted through a combination of visual observations and plant material in fish gear and benthic grabs. Figure 2-12 summarizes qualitative (Braun-Blanquet cover/abundance) SAV results from 2003 sampling across all sampling units.

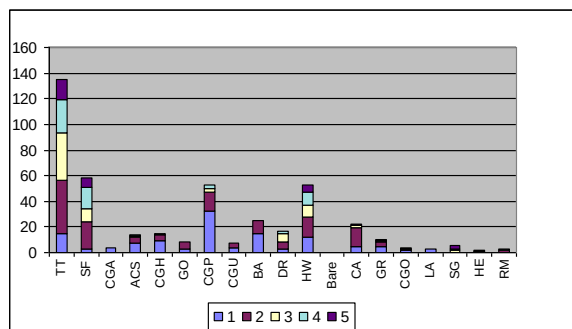


Figure 2-12. Summary of qualitative SAV results (Braun-Blanquet) for IMAP 2003 sampling. Species Codes: CA - Caulerpa; CGH - Halimeda; CGO - Calcareous Green Other; CGP - Penicillus; DR - Drift Reds; GO - Green Other; HE - Halophila engelmannii; HW - Halodule wrightii; OA - Other Algae; RO - Red Other; SF - Syringodium filiforme; SG - Sargassum; TT - Thalassia testudinum. Bare quadrats not included.

Thalassia testudinum was the most common SAV species statewide, appearing in about 24% of all quadrats sampled. *Syringodium filiforme* and *Halodule wrightii* were also fairly common in quadrats statewide (11% and 10%, respectively). The most common non-seagrass SAV taxa was a group of calcareous green algae, *Halimeda* sp. A detailed accounting of qualitative SAV data is presented in Appendix Table A-7.

A further breakdown of qualitative SAV results is presented in Table 2-8. Both the state scale sites and the FLO and WCC regions were dominated by *Thalassia testudinum*, *Syringodium filiforme*, and *Halodule wrightii*, in that particular order of dominance. The Southern Indian River region was dominated by *Halodule wrightii* and *Syringodium filiforme*. The Pensacola Bay region was dominated by *Thalassia testudinum* and *Halodule wrightii*. The Southern Ten Thousand Islands region was dominated by *Syringodium filiforme*. The most diverse sampling unit was the Big Bend region, followed by the collective state scale stations.

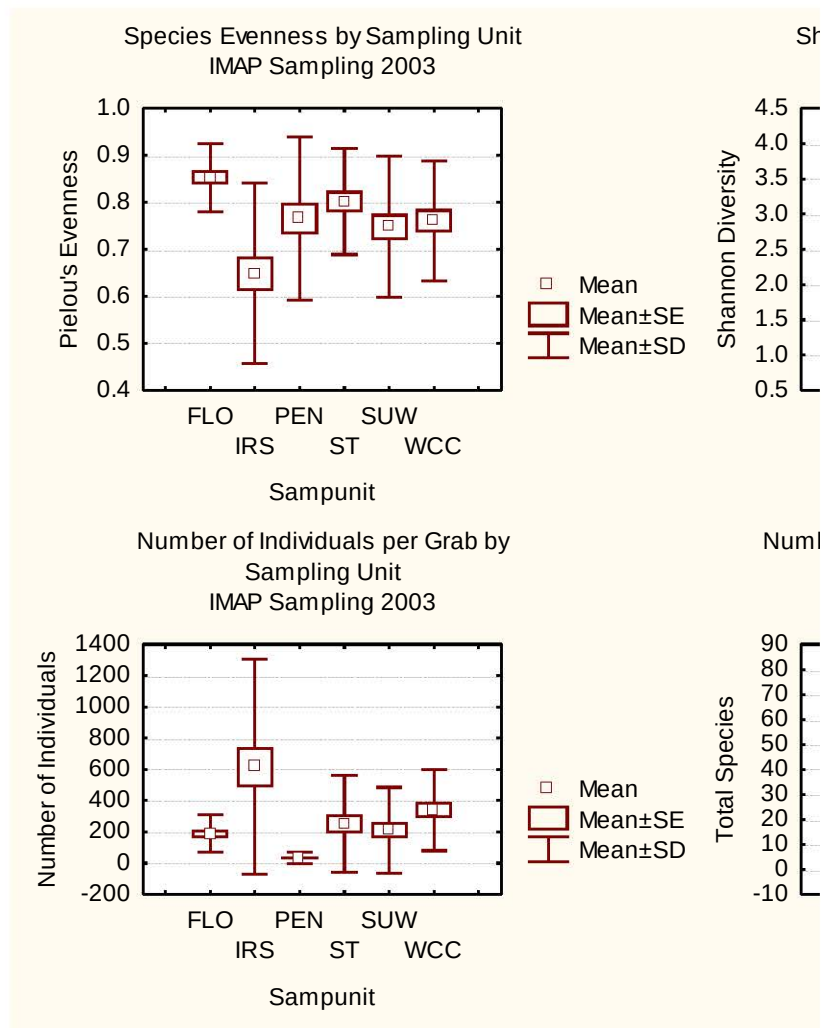


Figure 2-10: Shannon diversity, species richness, number of individuals, and number of species per benthic grab by sampling unit, IMAP sampling summer 2003. (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC-West Central Coast)

Table 2-8. Summary of qualitative SAV results (Braun-Blanquet) for IMAP 2003 sampling by Sampling Unit. Sampling Units: ST=State Scale Stations; BIG= Big Bend, CHA=Charlotte Harbor, CHO=Choctawhatchee Bay, IRN=Indian River Lagoon North, STK = South Ten Thousand Islands
Species Codes: CA - Caulerpa; CGH – Halimeda; CGO - Calcareous Green Other; CGP – Penicillus; DR - Drift Reds; GO - Green Other; HE - Halophila engelmannii; HW - Halodule wrightii; OA - Other Algae; RO - Red Other; SF - Syringodium filiforme; SG - Sargassum
TT - Thalassia testudinum

SampUnit	Species ID	Braun-Blanquet Abundance Category					Totals
		1	2	3	4	5	
FLO	TT	4	19	19	13	7	62
FLO	SF	2	3	3	4	2	14
FLO	CGA	4	0	0	0	0	4
FLO	ACS	1	3	0	0	0	4
FLO	CGH	5	3	0	0	0	8
FLO	GO	2	1	0	0	0	3
FLO	CGP	23	5	2	2	0	32
FLO	CGU	4	0	0	0	0	4
FLO	BA	13	9	0	0	0	22
FLO	DR	2	4	2	0	0	8
FLO	HW	1	2	0	0	0	3
FLO	CA	0	0	0	0	0	0
FLO	GR	0	0	0	0	0	0
FLO	CGO	0	0	0	0	0	0
FLO	LA	0	0	0	0	0	0
FLO	SG	0	0	0	0	0	0
FLO	HE	0	0	0	0	0	0
FLO	RM	0	0	0	0	0	0
	Total	61	49	26	19	9	164
IRS	TT	0	0	0	0	0	0
IRS	SF	0	3	6	3	3	15
IRS	CGA	0	0	0	0	0	0
IRS	ACS	0	0	0	0	0	0
IRS	CGH	0	0	0	0	0	0
IRS	GO	0	0	0	0	0	0
IRS	CGP	0	0	0	0	0	0
IRS	CGU	0	0	0	0	0	0
IRS	BA	0	0	0	0	0	0
IRS	DR	0	0	5	2	0	7
IRS	HW	5	6	1	0	0	12
IRS	CA	0	5	2	0	0	7
IRS	GR	4	3	0	1	1	9
IRS	CGO	0	0	0	0	0	0
IRS	LA	0	0	0	0	0	0
IRS	SG	0	0	0	0	0	0
IRS	HE	0	0	0	0	0	0
IRS	RM	0	0	0	0	0	0
	Total	9	17	14	6	4	50
ST	TT	8	16	11	5	5	45
ST	SF	0	7	0	0	0	7
ST	CGA	0	0	0	0	0	0
ST	ACS	3	1	0	0	0	4
ST	CGH	2	2	1	0	0	5
ST	GO	1	0	0	0	0	1
ST	CGP	7	4	0	0	0	11

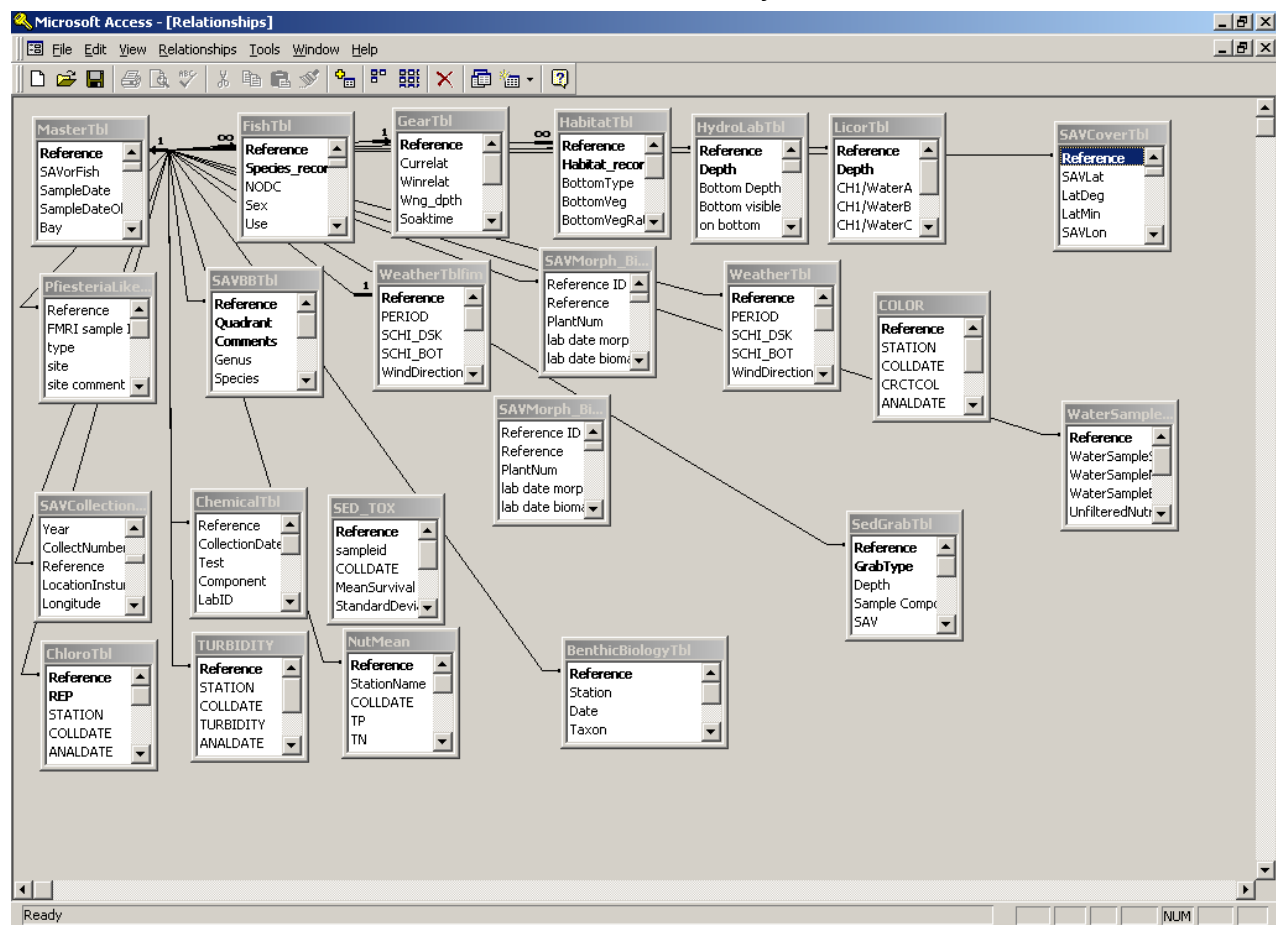
ST	CGU	0	3	0	0	0	3
ST	BA	1	1	0	0	0	2
ST	DR	1	1	0	0	0	2
ST	HW	1	0	2	2	0	5
ST	CA	0	3	0	0	1	4
ST	GR	0	0	0	0	0	0
ST	CGO	1	0	1	0	0	2
ST	LA	0	0	0	0	0	0
ST	SG	0	0	0	0	0	0
ST	HE	0	0	0	0	0	0
ST	RM	0	0	0	0	0	0
	Total	25	38	15	7	6	91
SUW	TT	0	0	1	3	0	4
SUW	SF	0	2	1	0	0	3
SUW	CGA	0	0	0	0	0	0
SUW	ACS	0	0	0	0	0	0
SUW	CGH	0	0	0	0	0	0
SUW	GO	0	0	0	0	0	0
SUW	CGP	0	0	0	0	0	0
SUW	CGU	0	0	0	0	0	0
SUW	BA	0	0	0	0	0	0
SUW	DR	0	0	0	0	0	0
SUW	HW	0	2	2	0	0	4
SUW	CA	1	2	0	0	0	3
SUW	GR	0	0	0	0	0	0
SUW	CGO	0	0	0	0	0	0
SUW	LA	2	0	0	0	0	2
SUW	SG	0	0	0	0	0	0
SUW	HE	0	0	0	0	0	0
SUW	RM	0	0	0	0	0	0
	Total	3	6	4	3	0	16
WCC	TT	3	6	6	5	4	24
WCC	SF	1	6	0	10	2	19
WCC	CGA	0	0	0	0	0	0
WCC	ACS	3	1	1	1	0	6
WCC	CGH	2	0	0	0	0	2
WCC	GO	0	4	0	0	0	4
WCC	CGP	2	6	1	1	0	10
WCC	CGU	0	0	0	0	0	0
WCC	BA	1	0	0	0	0	1
WCC	DR	0	0	0	0	0	0
WCC	HW	5	6	4	8	6	29
WCC	CA	4	4	0	0	0	8
WCC	GR	1	0	0	0	0	1
WCC	CGO	1	1	0	0	0	2
WCC	LA	1	0	0	0	0	1
WCC	SG	0	0	2	1	3	6
WCC	HE	0	1	1	0	0	2
WCC	RM	0	2	0	1	0	3
	Total	24	37	15	27	15	118

3 DATA MANAGEMENT AND INFORMATION SYSTEMS

Data management is a critical component of IMAP. As part of the data management activities within the project, we have developed a customized database in Microsoft Access. Complete metadata documentation of the fields included in the database is provided in Appendix B. Some key features of the database will be briefly described in this section.

3.1 IMAP Database

Figure 2-13: Relationships among tables in the IMAP Access Database.



The IMAP database uses a master key made up of station location and sample date to link a series of tables containing specific types of environmental

observations and measurements. Figure 2-13 lists the relationships among the tables in the IMAP Access Database. More detailed information on fields and functions in the database is available in Appendix B. The master table contains the fields required for all stations. This table is linked through the masterkey to separate table for water samples, sediment grabs, seines, trawls, fish species enumeration and lengths, SAV composition, SAV morphology and demographics, hydrolab parameters, weather parameters, and sediment

chemistry.

All required codes, including scientific names of fish species, are available in pull down lists to minimize

entry errors. A screenshot of the IMAP graphical user interface (GUI) is presented in Figure 2-14. Several features of the database are evident from this screenshot. The information required from every station is presented at the top of the form, while separate tabs for hydrolab, gear, water quality, sediment, SAV, fish, and chemistry data are available through individual cascading forms below. There are fields for actual vs. target latitude and longitudes, with a built-in distance calculator that computes distance from actual vs. target in nautical miles.

in front side of the IMAP field datasheet.

In 2001, the database was enhanced and expanded in several ways. All field and laboratory datasheets were scanned and stored as image files, and these files are now hyperlinked within the database. These links are evident in Figure 2-14

Microsoft Access - [RequiredInfoFrm]

File Edit View Insert Format Records Tools Window Help

SampleDate: 09/08/00 Station: APA200001 Reference: APA200001@9/8/2000B FIMNumber: APM00950151

Bay: AP F.M.G: M Year: 2000 Collection Number: 5015 Project: I Rep: 1

Gear: 0 Start Time: 12:09 Start Depth (m): .8 Strata: /

Primary Investigator: CP Boat: /

Crew1: KG Crew2: / Crew3: / Crew4: /

Base Sampling

Loc. Instrument: G Degrees: 30 Actual Latitude: 30.10600 Actual Longitude: -84.26799 Target Latitude: 30.10669 Target Longitude: -84.26801 Distance from Target (naut. mi): .041401

Front APA200001 Back APA200001

Sediment Chemistry Sediment Toxicology Laboratory Data Benthic Biology Priesteria Like Species

FIM weather data FIM hydrolab data FIM habitat data FIM gear data FIM biology data Water Quality Data Sediment Grab Data SAV Coverage

Reference: APA200001@9/8/2000B **Weather Form**

SE: 5 Direction: Speed (mph): 50 Cloud Cover: N: HR: 2 Period: Wind

Continue

Record Person: CP Entry Person: madley Proof Person: Howard Correct Person: madley

Verified: Next Record: Return to Switchboard Entry Stamp: 2/26/2001 3:43:33 PM Proof Stamp: 3/29/2002 9:45:57 AM Correct Stamp: 4/3/2001 12:01:58 PM

Record: 1 of 381 Date of original site visit: NUM

as "Front APA200001" which refers to the scanned

Figure 2-14: Graphical user interface for the IMAP database.

Literature Cited

- Holland, A.F., ed. 1990. Near Coastal Program Plan for 1990: Estuaries. EPA 600/4-90/033. US Environmental Protection Agency, Environmental Research Laboratory, Office of Research and Development, Narragansett, RI. p. 7-7.
- MacDonald, D.D. 1994. Approach to the Assessment of Sediment Quality in Florida Coastal Waters. Volume 1 – Development and Evaluation of Sediment Quality Assessment Guidelines. Prepared for Florida Dept. of Environmental Protection, Office of Water Policy, Tallahassee, FL, November 1994.
- Powers, C.F., and A. Robertson. 1967. Design and evaluation of an all-purpose benthos sampler. Univ. Mich. Spec. Rept. 30:126-133.
- Summers, J.K., J.M. Macauley, V.D. Engle, G.T. Brooks, P.T. Heitmuller. A.M. Adams. 1993. Louisianian Province Demonstration Report: EMAP – Estuaries – 1991. EPA/600/R-93/xxx. US Environmental Protection Agency, Office of Research and Development, Environmental Research Laboratory, Gulf Breeze, FL. p. 10.

Appendix A.

Table A-1. Water quality data from Hydrolab sampling IMAP Summer, 2003.

Station	SAMPUNIT	SAMPDEP	Temperature	Conductivity	pH	Salinity	DissolvedO2
FLO200301	FLO	SURFACE	31.70	49.70	8.00	32.30	6.10
FLO200301	FLO	BOTTOM	31.80	49.70	8.00	32.30	6.10
FLO200302	FLO	SURFACE	30.30	57.10	8.00	37.80	4.80
FLO200302	FLO	BOTTOM	30.30	57.10	8.00	37.80	4.60
FLO200303	FLO	SURFACE	30.50	56.40	8.10	37.30	5.20
FLO200303	FLO	BOTTOM	30.50	56.40	8.10	37.30	5.10
FLO200304	FLO	SURFACE	31.50	53.70	8.10	35.30	5.00
FLO200304	FLO	BOTTOM	31.00	54.20	8.10	35.60	5.10
FLO200306	FLO	SURFACE	31.10	56.20	8.30	37.10	3.70
FLO200306	FLO	BOTTOM	31.10	56.20	8.30	37.10	2.50
FLO200307	FLO	SURFACE	30.60	57.90	8.50	38.40	2.60
FLO200307	FLO	BOTTOM	30.60	57.90	8.50	38.40	2.60
FLO200308	FLO	SURFACE	30.00	52.70	8.50	34.60	8.80
FLO200308	FLO	BOTTOM	30.00	52.70	8.50	34.60	8.80
FLO200309	FLO	SURFACE	29.90	41.90	8.40	26.80	5.60
FLO200309	FLO	BOTTOM	31.00	44.50	8.40	29.30	5.10
FLO200310	FLO	SURFACE	29.70	55.80	8.20	36.90	6.00
FLO200310	FLO	BOTTOM	29.60	55.90	8.20	36.90	5.60
FLO200311	FLO	SURFACE	31.20	54.80	8.70	36.10	7.10
FLO200311	FLO	BOTTOM	31.20	54.80	8.70	36.10	7.00
FLO200312	FLO	SURFACE	30.60	54.30	8.40	35.80	5.50
FLO200312	FLO	BOTTOM	30.70	54.50	8.50	35.90	5.80
FLO200313	FLO	SURFACE	30.90	56.90	8.30	37.70	2.60
FLO200313	FLO	BOTTOM	30.80	56.80	8.30	37.70	2.10
FLO200314	FLO	SURFACE	29.60	55.20	8.40	36.50	5.90
FLO200314	FLO	BOTTOM	29.60	55.20	8.40	36.50	5.70
FLO200315	FLO	BOTTOM	29.50	57.90	7.90	38.40	7.70
FLO200316	FLO	SURFACE	29.80	55.10	8.40	36.40	5.50
FLO200316	FLO	BOTTOM	29.90	55.20	8.40	36.40	5.40
FLO200317	FLO	SURFACE	31.20	56.50	8.30	37.40	3.50
FLO200317	FLO	BOTTOM	31.20	56.50	8.30	37.40	2.20
FLO200318	FLO	SURFACE	29.10	56.10	8.20	37.20	5.10
FLO200318	FLO	BOTTOM	29.10	56.10	8.20	37.20	5.40
FLO200319	FLO	SURFACE	30.60	56.60	8.20	37.50	7.10
FLO200319	FLO	BOTTOM	30.60	56.60	8.20	37.50	6.60
FLO200320	FLO	SURFACE	30.30	56.70	8.30	37.50	4.50
FLO200320	FLO	BOTTOM	30.30	56.70	8.30	37.50	3.60
FLO200321	FLO	SURFACE	30.70	56.90	8.30	37.70	3.80
FLO200321	FLO	BOTTOM	30.70	56.90	8.30	37.70	2.90
FLO200322	FLO	SURFACE	31.90	56.50	8.40	37.30	5.40
FLO200322	FLO	BOTTOM	32.00	56.50	8.50	37.30	3.90
FLO200323	FLO	SURFACE	29.50	57.50	8.60	38.20	3.00
FLO200323	FLO	BOTTOM	29.40	57.60	8.10	38.20	2.80
FLO200324	FLO	SURFACE	29.10	55.20	8.20	36.50	7.50

FLO200324	FLO	BOTTOM	29.10	55.30	8.20	36.50	6.70
FLO200325	FLO	SURFACE	29.20	55.40	8.20	36.60	6.30
FLO200325	FLO	BOTTOM	29.20	55.50	8.20	36.70	6.40
FLO200326	FLO	SURFACE	30.20	57.10	7.90	37.80	6.60
FLO200326	FLO	BOTTOM	30.20	57.10	7.90	37.80	6.20
FLO200327	FLO	SURFACE	32.00	57.60	8.20	38.20	4.40
FLO200327	FLO	BOTTOM	32.00	57.60	8.20	38.20	3.70
FLO200328	FLO	SURFACE	32.20	0.40	8.40		9.30
FLO200328	FLO	BOTTOM	32.10	0.40	8.60		9.20
FLO200329	FLO	SURFACE	29.10	0.60	7.80		7.80
FLO200329	FLO	BOTTOM	27.80	0.60	7.50		5.60
FLO200330	FLO	SURFACE	29.60	0.30	7.40		1.80
FLO200330	FLO	BOTTOM	29.00	0.40	7.20		1.20
IRS200301	IRS	SURFACE	30.20	34.40	8.20	21.60	6.40
IRS200301	IRS	BOTTOM	29.70	35.00	7.70	22.00	4.10
IRS200302	IRS	SURFACE	30.30	22.60	7.90	13.60	6.80
IRS200302	IRS	BOTTOM	29.50	33.90	7.80	20.60	5.70
IRS200303	IRS	SURFACE	29.90	35.50	8.00	22.40	5.80
IRS200303	IRS	BOTTOM	29.80	35.30	8.00	22.20	5.70
IRS200304	IRS	SURFACE	29.50	36.70	8.10	23.20	5.80
IRS200304	IRS	BOTTOM	29.50	36.70	8.00	23.30	5.60
IRS200305	IRS	SURFACE	29.80	39.90	8.40	25.50	5.90
IRS200305	IRS	BOTTOM	29.80	40.20	8.40	25.70	5.30
IRS200306	IRS	SURFACE	30.10	41.30	8.30	26.50	6.40
IRS200306	IRS	BOTTOM	29.90	41.50	8.30	26.60	5.70
IRS200307	IRS	SURFACE	30.20	41.60	8.30	26.70	5.70
IRS200307	IRS	BOTTOM	29.50	42.00	8.30	27.00	5.40
IRS200308	IRS	SURFACE	30.20	39.50	8.30	25.20	5.60
IRS200308	IRS	BOTTOM	29.60	39.90	8.30	25.50	6.30
IRS200309	IRS	SURFACE	28.90	42.10	8.40	27.00	7.70
IRS200309	IRS	BOTTOM	28.90	42.10	8.40	27.00	7.80
IRS200310	IRS	BOTTOM	28.30	50.10	8.50	32.90	4.00
IRS200311	IRS	SURFACE	29.30	40.90	8.20	26.30	4.00
IRS200311	IRS	BOTTOM	29.20	41.00	8.20	26.30	4.10
IRS200312	IRS	SURFACE	30.50	38.20	8.20	24.30	4.90
IRS200312	IRS	BOTTOM	30.60	38.40	8.10	24.40	4.20
IRS200313	IRS	SURFACE	30.70	36.30	8.20	22.90	5.00
IRS200313	IRS	BOTTOM	30.70	36.30	8.20	22.90	4.90
IRS200314	IRS	SURFACE	31.00	38.30	8.30	24.30	5.80
IRS200314	IRS	BOTTOM	31.00	38.10	8.20	24.20	5.50
IRS200315	IRS	SURFACE	30.70	46.10	8.10	30.00	9.20
IRS200315	IRS	BOTTOM	30.40	47.00	8.20	30.60	9.70
IRS200316	IRS	SURFACE	30.30	47.80	7.90	31.20	6.40
IRS200316	IRS	BOTTOM	30.20	48.50	7.90	31.70	6.20
IRS200317	IRS	SURFACE	31.30	47.10	8.00	30.70	6.80
IRS200317	IRS	BOTTOM	31.20	47.60	8.00	31.00	6.60
IRS200318	IRS	SURFACE	31.10	48.30	8.20	31.60	5.80
IRS200318	IRS	BOTTOM	31.10	48.50	8.20	31.80	5.50
IRS200319	IRS	SURFACE	30.90	47.50	7.70	31.00	4.10
IRS200319	IRS	BOTTOM	30.90	47.60	7.70	31.10	4.00
IRS200320	IRS	SURFACE	30.70	43.80	8.00	28.30	6.10

IRS200320	IRS	BOTTOM	30.60	44.10	7.90	28.60	6.00
IRS200321	IRS	SURFACE	31.30	44.70	8.00	29.00	6.70
IRS200321	IRS	BOTTOM	31.70	45.20	8.10	29.30	7.30
IRS200322	IRS	SURFACE	30.60	42.40	7.90	27.30	6.20
IRS200322	IRS	BOTTOM	30.50	43.00	7.90	27.70	6.30
IRS200323	IRS	SURFACE	30.60	1.20	7.90	0.60	7.00
IRS200323	IRS	BOTTOM	30.20	1.20	7.80	0.60	6.30
IRS200324	IRS	SURFACE	30.30	42.80	7.90	27.60	6.50
IRS200324	IRS	BOTTOM	30.20	43.10	7.90	27.80	6.40
IRS200325	IRS	SURFACE	32.30	3.00	8.20	1.60	8.80
IRS200325	IRS	BOTTOM	32.30	3.00	8.20	1.60	8.70
IRS200326	IRS	SURFACE	30.00	38.10	7.90	24.30	6.60
IRS200326	IRS	BOTTOM	29.90	42.70	7.90	27.50	6.70
IRS200327	IRS	SURFACE	31.80	5.60	8.20	3.10	8.40
IRS200327	IRS	BOTTOM	26.90	39.60	7.80	25.40	4.90
IRS200328	IRS	SURFACE	30.60	35.20	8.30	22.10	6.00
IRS200328	IRS	BOTTOM	30.80	40.80	7.50	26.10	0.40
IRS200329	IRS	SURFACE	31.70	37.90	8.20	24.10	5.50
IRS200329	IRS	BOTTOM	31.10	38.00	8.20	24.20	4.60
IRS200330	IRS	SURFACE	28.80	50.40	7.80	33.10	6.50
IRS200330	IRS	BOTTOM	25.60	54.10	7.80	35.90	5.80
PEN200301	PEN	SURFACE	31.50	0.10	7.30	0.10	7.50
PEN200301	PEN	BOTTOM	27.30	0.80	6.60	0.40	3.40
PEN200302	PEN	SURFACE	27.60	0.20	8.30	0.00	6.30
PEN200302	PEN	BOTTOM	26.80	0.20	8.10	0.00	5.70
PEN200303	PEN	SURFACE	28.50	0.90	8.20	0.40	6.70
PEN200303	PEN	BOTTOM	26.40	0.20	8.20	0.00	5.40
PEN200304	PEN	BOTTOM	29.50			0.00	
PEN200305	PEN	SURFACE	28.40	0.60	8.10	0.30	6.80
PEN200305	PEN	BOTTOM	27.00	25.10	7.60	15.60	0.50
PEN200306	PEN	SURFACE	30.30	3.10	8.90	1.60	7.60
PEN200306	PEN	BOTTOM	28.70	3.20	8.40	1.60	5.60
PEN200307	PEN	SURFACE	31.10	2.30	6.80	1.20	8.40
PEN200307	PEN	BOTTOM	30.60	2.30	6.80	1.20	7.50
PEN200308	PEN	SURFACE	30.30	1.80	8.70	0.90	7.00
PEN200308	PEN	BOTTOM	29.30	5.40	7.90	2.90	4.80
PEN200309	PEN	SURFACE	29.60	4.80	8.40	2.60	7.00
PEN200309	PEN	BOTTOM	28.20	25.50	8.00	15.60	0.20
PEN200310	PEN	SURFACE	30.30	2.60	7.00	1.30	8.70
PEN200310	PEN	BOTTOM	28.80	11.70	6.40	6.70	5.10
PEN200311	PEN	SURFACE	28.50	0.80	8.20	0.40	6.70
PEN200311	PEN	BOTTOM	27.30	31.60	8.20	19.70	2.00
PEN200312	PEN	SURFACE	29.60	4.30	8.30	2.30	7.30
PEN200312	PEN	BOTTOM	27.10	20.40	7.90	13.60	1.70
PEN200313	PEN	SURFACE	30.20	1.60	8.00	0.80	6.80
PEN200313	PEN	BOTTOM	28.80	19.40	7.90	11.70	0.30
PEN200314	PEN	SURFACE	28.70	0.10	5.80	0.00	4.30
PEN200314	PEN	BOTTOM	27.20	0.10	5.80	0.00	4.20
PEN200315	PEN	SURFACE	26.90	1.20	7.30	0.60	6.60
PEN200315	PEN	BOTTOM	27.80	42.20	8.40	27.10	3.60
PEN200316	PEN	SURFACE	29.90	3.40	8.10	1.80	6.90

PEN200316	PEN	BOTTOM	28.20	13.30	8.00	7.30	5.00
PEN200317	PEN	SURFACE	29.10	3.60	8.50	1.90	7.30
PEN200317	PEN	BOTTOM	28.20	19.40	8.30	10.90	0.20
PEN200318	PEN	SURFACE	27.10	3.30	7.50	1.70	7.10
PEN200318	PEN	BOTTOM	27.70	43.70	8.30	28.30	3.50
PEN200319	PEN	SURFACE	29.40	21.90	8.90	13.10	6.90
PEN200319	PEN	BOTTOM	29.80	22.80	8.80	13.70	5.70
PEN200320	PEN	SURFACE	28.50	23.80	8.60	14.40	5.80
PEN200320	PEN	BOTTOM	28.90	24.10	8.80	14.50	6.10
PEN200321	PEN	SURFACE	30.40	13.80	7.50	7.90	6.90
PEN200321	PEN	BOTTOM	30.40	13.80	7.60	7.90	6.90
PEN200322	PEN	SURFACE	31.60	12.60	8.20	7.20	9.00
PEN200322	PEN	BOTTOM	28.40	35.30	7.40	22.20	1.80
PEN200323	PEN	SURFACE	29.60	9.60	8.20	5.40	7.80
PEN200323	PEN	BOTTOM	28.90	9.80	8.30	5.50	7.70
PEN200324	PEN	SURFACE	29.40	23.10	9.00	13.80	6.80
PEN200324	PEN	BOTTOM	29.20	23.20	8.90	14.00	6.40
PEN200325	PEN	SURFACE	28.20	9.20	8.00	5.20	7.50
PEN200325	PEN	BOTTOM	27.70	45.20	8.50	29.20	4.50
PEN200326	PEN	SURFACE	32.60	13.00	7.50	7.40	7.50
PEN200326	PEN	BOTTOM	30.10	14.60	7.30	8.30	7.00
PEN200327	PEN	SURFACE	28.70	10.90	8.30	6.20	7.90
PEN200327	PEN	BOTTOM	27.70	43.30	8.60	27.90	5.80
PEN200328	PEN	SURFACE	29.20	0.10	7.40	0.00	5.40
PEN200328	PEN	BOTTOM	28.20	0.10	7.10	0.00	4.80
PEN200329	PEN	SURFACE	28.00	2.20	7.50	1.10	5.30
PEN200329	PEN	BOTTOM	27.30	2.30	7.40	1.20	4.50
PEN200330	PEN	SURFACE	26.50	0.10	5.60	0.00	3.00
STR200301	ST	SURFACE	29.90	0.10	6.70	0.10	7.60
STR200301	ST	BOTTOM	27.30	1.40	6.50	0.70	3.30
STR200302	ST	SURFACE	30.40	14.90	7.90	8.60	6.60
STR200302	ST	BOTTOM	27.30	46.50	7.50	30.10	3.30
STR200303	ST	SURFACE	29.20	19.30	8.70	11.40	6.60
STR200303	ST	BOTTOM	28.70	33.60	8.60	21.00	2.00
STR200307	ST	SURFACE	30.00	36.60	8.00	23.10	5.70
STR200307	ST	BOTTOM	29.40	46.80	7.90	30.30	4.30
STR200308	ST	BOTTOM	28.60	30.10	7.50	18.60	2.80
STR200309	ST	SURFACE	32.20	34.80	8.40	21.90	6.30
STR200309	ST	BOTTOM	30.60	35.20	8.30	22.20	5.20
STR200312	ST	SURFACE	29.50	46.40	8.10	30.00	6.00
STR200312	ST	BOTTOM	29.80	48.40	8.10	31.40	5.70
STR200313	ST	SURFACE	30.10	27.30	8.20	16.70	7.60
STR200313	ST	BOTTOM	30.30	32.40	7.80	20.10	2.80
STR200314	ST	SURFACE	30.30	25.10	8.00	15.20	5.50
STR200314	ST	BOTTOM	30.10	25.50	8.00	15.40	5.40
STR200315	ST	SURFACE	32.60	36.20	8.40	22.70	10.90
STR200315	ST	BOTTOM	32.60	36.20	8.40	22.70	10.80
STR200316	ST	SURFACE	31.40	50.30	8.10	32.80	7.10
STR200316	ST	BOTTOM	31.40	50.30	8.20	32.80	7.00
STR200317	ST	SURFACE	31.70	47.20	7.90	30.60	5.20
STR200317	ST	BOTTOM	31.50	51.10	7.90	33.40	4.90

STR200318	ST	SURFACE	30.20	40.20	7.90	25.60	4.80
STR200318	ST	BOTTOM	30.20	40.40	7.90	25.60	4.70
STR200319	ST	SURFACE	31.50	56.30	8.20	37.20	1.80
STR200319	ST	BOTTOM	31.40	56.30	8.30	37.20	1.10
STR200320	ST	SURFACE	30.20	54.20	8.60	35.70	7.60
STR200320	ST	BOTTOM	30.10	54.40	8.60	35.90	7.30
STR200321	ST	SURFACE	31.40	56.30	8.30	37.20	3.30
STR200321	ST	BOTTOM	31.40	56.30	8.30	37.20	2.80
STR200322	ST	SURFACE	30.30	54.50	8.40	36.00	7.30
STR200322	ST	BOTTOM	30.30	54.50	8.50	36.00	5.40
STR200323	ST	SURFACE	30.70	56.80	8.30	37.60	4.30
STR200323	ST	BOTTOM	30.70	56.80	8.30	37.60	2.40
STR200324	ST	SURFACE	28.90	54.30	8.40	35.80	6.20
STR200324	ST	BOTTOM	28.90	54.30	8.40	35.80	5.70
STR200325	ST	SURFACE	30.90	57.40	8.30	38.10	5.10
STR200325	ST	BOTTOM	30.90	57.50	8.30	38.10	4.20
STR200326	ST	SURFACE	28.80	55.40	8.30	36.60	6.60
STR200326	ST	BOTTOM	28.80	55.40	8.20	36.60	6.40
STR200327	ST	SURFACE	29.50	57.30	7.90	38.00	6.70
STR200327	ST	BOTTOM	29.50	57.30	7.90	38.00	6.20
STR200328	ST	SURFACE	29.20	55.60	8.30	36.80	8.10
STR200328	ST	BOTTOM	29.30	55.70	8.30	36.80	7.20
STR200329	ST	SURFACE	30.80	57.10	8.20	37.90	5.60
STR200329	ST	BOTTOM	30.80	57.10	8.20	37.90	5.50
STR200330	ST	SURFACE	29.70	59.10	7.80	39.40	7.00
STR200330	ST	BOTTOM	29.70	59.10	7.80	39.40	7.00
STT200304	ST	SURFACE	29.90	34.50	8.40	21.70	5.90
STT200304	ST	BOTTOM	29.50	34.60	8.40	21.70	5.00
STT200305	ST	SURFACE	26.60	37.20	7.80	23.60	5.60
STT200305	ST	BOTTOM	26.40	37.90	7.80	23.90	5.50
STT200306	ST	SURFACE	31.30	45.20	8.10	29.10	3.40
STT200306	ST	BOTTOM	31.30	45.30	8.10	29.10	2.60
STT200310	ST	SURFACE	29.90	41.50	8.40	26.50	4.90
STT200310	ST	BOTTOM	29.90	41.50	8.40	26.50	4.80
STT200311	ST	SURFACE	30.70	34.30	8.10	21.40	6.80
STT200311	ST	BOTTOM	30.40	46.00	8.10	29.60	6.60
SUW200301	SUW	SURFACE	25.90	0.30	7.40	0.10	6.90
SUW200301	SUW	BOTTOM	25.80	0.30	7.20	0.10	6.00
SUW200302	SUW	BOTTOM	28.70	30.10	7.70	18.60	3.20
SUW200303	SUW	BOTTOM	29.10	33.50	7.90	20.90	3.20
SUW200304	SUW	SURFACE	26.10	0.30	7.40	0.10	6.20
SUW200304	SUW	BOTTOM	26.00	0.30	7.10	0.10	5.80
SUW200305	SUW	BOTTOM	28.80	23.20	7.70	13.90	2.70
SUW200306	SUW	BOTTOM	26.70	0.30	7.80	0.10	4.50
SUW200307	SUW	BOTTOM	28.90	5.40	7.60	2.90	4.40
SUW200308	SUW	BOTTOM	28.20	1.20	7.80	0.50	4.50
SUW200309	SUW	SURFACE	30.90	5.90	7.60	3.20	4.30
SUW200309	SUW	BOTTOM	29.10	27.70	7.60	17.80	2.80
SUW200310	SUW	SURFACE	30.40	32.60	8.00	20.30	5.30
SUW200310	SUW	BOTTOM	30.40	32.90	8.00	20.40	5.30
SUW200311	SUW	BOTTOM	28.90	22.00	7.50	13.40	3.00

SUW200312	SUW	SURFACE	31.90	24.50	8.00	14.80	6.30
SUW200312	SUW	BOTTOM	29.40	36.90	7.90	23.20	4.30
SUW200313	SUW	BOTTOM	29.10	11.70	7.80	6.70	5.00
SUW200314	SUW	SURFACE	31.40	34.10	8.10	20.30	5.80
SUW200314	SUW	BOTTOM	30.80	40.10	8.10	25.50	5.30
SUW200315	SUW	SURFACE	30.60	42.90	8.10	27.40	5.10
SUW200315	SUW	BOTTOM	30.10	43.50	8.10	27.90	4.80
SUW200316	SUW	BOTTOM	29.00	13.50	7.90	7.80	5.30
SUW200317	SUW	SURFACE	29.70	24.20	7.90	14.60	4.60
SUW200317	SUW	BOTTOM	29.40	26.70	7.90	16.30	4.30
SUW200318	SUW	BOTTOM	30.40	28.10	8.00	17.20	5.90
SUW200319	SUW	BOTTOM	33.80	33.20	7.90	20.60	4.60
SUW200320	SUW	BOTTOM	31.20	30.20	8.20	18.60	6.40
SUW200321	SUW	BOTTOM	28.60	32.20	7.90	20.00	3.50
SUW200322	SUW	SURFACE	30.70	33.40	8.10	20.80	5.40
SUW200322	SUW	BOTTOM	30.00	33.90	8.00	21.10	4.30
SUW200323	SUW	BOTTOM	29.20	29.60	8.20	18.20	5.10
SUW200324	SUW	BOTTOM	30.10	41.80	8.10	26.70	4.70
SUW200325	SUW	BOTTOM	28.20	32.10	8.20	20.60	4.50
SUW200326	SUW	SURFACE	29.50	36.40	8.20	22.90	4.30
SUW200326	SUW	BOTTOM	29.30	36.60	8.20	23.10	4.30
SUW200327	SUW	BOTTOM	31.50	38.50	8.30	24.30	5.90
SUW200328	SUW	SURFACE	26.20	0.30	7.20	0.10	5.70
SUW200328	SUW	BOTTOM	26.10	0.30	7.20	0.10	5.70
SUW200329	SUW	BOTTOM	28.00	0.30	7.30	0.20	2.40
SUW200330	SUW	BOTTOM	28.90	1.50	7.70	0.70	2.70
WCC200301	WCC	SURFACE	30.80	32.20	8.10	19.90	6.50
WCC200301	WCC	BOTTOM	30.60	33.20	8.10	20.60	6.60
WCC200302	WCC	SURFACE	30.90	34.60	8.20	21.60	7.10
WCC200302	WCC	BOTTOM	30.50	36.80	8.20	23.10	6.90
WCC200303	WCC	SURFACE	31.40	31.80	8.20	19.60	7.10
WCC200303	WCC	BOTTOM	31.00	35.60	8.20	22.40	7.30
WCC200304	WCC	SURFACE	31.70	32.60	8.30	20.20	7.90
WCC200304	WCC	BOTTOM	31.40	34.80	8.40	21.80	8.60
WCC200305	WCC	SURFACE	30.60	18.00	7.80	10.50	4.70
WCC200306	WCC	SURFACE	31.10	23.20	8.00	13.90	6.10
WCC200306	WCC	BOTTOM	31.10	23.30	8.10	14.00	6.10
WCC200307	WCC	SURFACE	30.10	12.80	7.80	7.30	4.80
WCC200307	WCC	BOTTOM	30.10	12.80	7.70	7.30	4.70
WCC200308	WCC	SURFACE	31.50	27.30	8.20	16.60	8.00
WCC200308	WCC	BOTTOM	31.50	27.40	8.30	16.70	8.00
WCC200309	WCC	SURFACE	31.70	33.80	7.60	21.00	5.80
WCC200309	WCC	BOTTOM	31.30	34.40	7.80	21.50	6.00
WCC200310	WCC	SURFACE	31.80	32.40	8.10	20.10	6.40
WCC200310	WCC	BOTTOM	31.80	32.70	8.20	20.30	6.30
WCC200311	WCC	SURFACE	31.80	17.60	7.70	10.30	6.00
WCC200311	WCC	BOTTOM	30.90	24.00	7.90	14.40	4.90
WCC200312	WCC	SURFACE	31.10	33.10	8.10	20.60	4.70
WCC200312	WCC	BOTTOM	31.10	33.10	8.10	20.60	4.60
WCC200313	WCC	SURFACE	30.50	13.90	8.00	8.00	5.60
WCC200313	WCC	BOTTOM	30.50	14.00	8.00	8.00	5.60

WCC200314	WCC	SURFACE	31.10	17.30	7.90	10.10	6.40
WCC200314	WCC	BOTTOM	31.10	17.40	7.90	10.20	6.20
WCC200315	WCC	SURFACE	29.70	18.40	8.20	10.80	5.20
WCC200315	WCC	BOTTOM	29.70	18.40	8.20	10.80	5.00
WCC200316	WCC	SURFACE	30.70	12.70	7.90	7.30	6.00
WCC200316	WCC	BOTTOM	30.70	12.70	7.90	7.30	5.90
WCC200317	WCC	SURFACE	30.50	16.80	8.20	9.80	7.30
WCC200317	WCC	BOTTOM	30.50	16.80	8.20	9.80	7.20
WCC200318	WCC	SURFACE	31.30	9.60	8.10	5.40	9.60
WCC200318	WCC	BOTTOM	31.40	9.70	8.20	5.40	10.00
WCC200319	WCC	SURFACE	28.90	48.40	8.10	31.40	6.90
WCC200319	WCC	BOTTOM	28.90	48.80	8.10	31.70	6.50
WCC200320	WCC	SURFACE	29.20	50.40	8.10	32.90	6.70
WCC200320	WCC	BOTTOM	29.20	50.40	8.10	32.90	6.50
WCC200321	WCC	SURFACE	29.40	48.60	8.20	31.60	7.90
WCC200321	WCC	BOTTOM	29.50	48.50	8.20	31.50	8.20
WCC200322	WCC	SURFACE	29.50	49.90	8.20	32.50	7.30
WCC200322	WCC	BOTTOM	29.50	49.90	8.20	32.50	7.20
WCC200323	WCC	SURFACE	29.40	44.20	8.10	28.40	6.30
WCC200323	WCC	BOTTOM	29.40	44.20	8.20	28.40	6.30
WCC200324	WCC	SURFACE	29.80	49.10	8.30	31.90	5.00
WCC200324	WCC	BOTTOM	29.80	49.20	8.30	32.00	5.00
WCC200325	WCC	SURFACE	29.30	47.40	8.20	30.70	6.80
WCC200325	WCC	BOTTOM	29.30	47.50	8.20	30.80	6.60
WCC200326	WCC	SURFACE	29.10	47.20	8.20	30.60	6.20
WCC200326	WCC	BOTTOM	29.20	47.40	8.20	30.80	6.20
WCC200327	WCC	SURFACE	29.30	48.90	8.10	31.80	6.00
WCC200327	WCC	BOTTOM	29.20	48.90	8.10	31.80	5.80
WCC200328	WCC	SURFACE	32.90	10.90	7.60	6.10	4.80
WCC200329	WCC	SURFACE	28.50	22.90	7.80	13.80	4.10
WCC200329	WCC	BOTTOM	28.50	23.00	7.80	13.80	4.00
WCC200330	WCC	SURFACE	28.80	31.10	7.90	19.20	6.60
WCC200330	WCC	BOTTOM	28.70	37.80	7.70	23.90	3.30

Table A-2. Total Organic Carbon in Sediment Samples (mg/kg DW) IMAP sampling Summer, 2003.

Results Codes: J= Estimated Value Q= Sample held beyond normal holding time.

Reference	StoretCode	Result
FLO200301		46000
FLO200302		12000
FLO200303		11000
FLO200304		18000
FLO200306		14000
FLO200307		33000
FLO200308	JQ	39000
FLO200309	J	5600
FLO200310	J	6700
FLO200311	J	38000
FLO200312	J	16000
FLO200313		8300
FLO200314	JQ	10000
FLO200315		37000
FLO200316	J	11000
FLO200317		5800
FLO200318	J	8500
FLO200319	JQ	8800
FLO200320		14000
FLO200321		14000
FLO200322		47000
FLO200323		66000
FLO200324	JQ	7100
FLO200325	JQ	12000
FLO200326		11000
IRS200301		8000
IRS200302		3600
IRS200303		12000
IRS200304		2400
IRS200305		3300
IRS200306		9900
IRS200307		5100
IRS200308		2800
IRS200309		3400
IRS200310		4400
IRS200311		1700
IRS200312		5000
IRS200313		2100
IRS200314		43000
IRS200315		3600
IRS200316		6400
IRS200317		1200
IRS200318		5800
IRS200319		4700

IRS200320	3800
IRS200321	2300
IRS200322	7100
IRS200323	64000
IRS200324	4800
IRS200325	8700
IRS200326	3400
IRS200327	4700
IRS200328	54000
IRS200329	33000
IRS200330	33000
PEN200301	11000
PEN200302	17000
PEN200303	23000
PEN200304 Q	58000
PEN200305 Q	33000
PEN200306 Q	19000
PEN200307	2900
PEN200308 Q	2800
PEN200309	16000
PEN200310	13000
PEN200311 Q	34000
PEN200312 Q	13000
PEN200313	27000
PEN200314 Q	65000
PEN200315 Q	39000
PEN200315 Q	41000
PEN200316 Q	8900
PEN200317 Q	42000
PEN200318 Q	49000
PEN200319	6200
PEN200320	11000
PEN200321	920
PEN200322	30000
PEN200323 Q	690
PEN200324	1300
PEN200325 Q	51000
PEN200326	2300
PEN200328 Q	5800
STR200304	2400
STR200301	30000
STR200302	37000
STR200303	58000
STR200307 Q	2700
STR200308	15000
STR200309	5900
STR200312 Q	2600
STR200313	9300
STR200314	3900
STR200315	14000
STR200316	4000

STR200317		9100
STR200318		12000
STR200319	J	7200
STR200320	JQ	9900
STR200321	J	6500
STR200322	J	14000
STR200323	J	11000
STR200324	JQ	31000
STR200325		40000
STR200326	JQ	13000
STR200327		23000
STR200328	JQ	9300
STR200329		41000
STR200330		22000
STT200304		9500
STT200305		68000
STT200306		11000
STT200310	J	12000
STT200311		1600
SUW200301		2100
SUW200302		35000
SUW200305		18000
SUW200306		30000
SUW200307		10000
SUW200308		8500
SUW200309		6800
SUW200310		3700
SUW200311		20000
SUW200312		20000
SUW200313		7900
SUW200314		4300
SUW200315		3800
SUW200316		35000
SUW200317		3200
SUW200318		1200
SUW200319		90000
SUW200320		11000
SUW200321		19000
SUW200322		3000
SUW200323		5300
SUW200324		1500
SUW200325		3700
SUW200326		5400
SUW200327		14000
SUW200328		250000
SUW200329		740
SUW200330		100000
WCC200301		22000
WCC200303		3400
WCC200304		25000
WCC200305		9900

WCC200306		24000
WCC200307		18000
WCC200308		15000
WCC200309		24000
WCC200310		23000
WCC200311		13000
WCC200312		21000
WCC200313		13000
WCC200315		22000
WCC200316		4800
WCC200317		9600
WCC200318		28000
WCC200319	Q	15000
WCC200320	Q	16000
WCC200321	Q	38000
WCC200322	Q	12000
WCC200323	Q	14000
WCC200324		6800
WCC200325	Q	15000
WCC200326	Q	6700
WCC200327	Q	74000
WCC200328		60000
WCC200329		66000
WCC200330	Q	39000

Table A-3. Sediment silt-clay results, IMAP sampling Summer, 2003.

Station	Sampling Unit	SiltClay (%)
FLO200301	FLO	23
FLO200302	FLO	28.9
FLO200303	FLO	20.1
FLO200304	FLO	13.1
FLO200306	FLO	38.5
FLO200307	FLO	64.2
FLO200308	FLO	66.5
FLO200309	FLO	22.9
FLO200310	FLO	21.6
FLO200311	FLO	44.3
FLO200312	FLO	52.3
FLO200313	FLO	16.2
FLO200314	FLO	58.5
FLO200315	FLO	35.9
FLO200316	FLO	39.7
FLO200317	FLO	11.7
FLO200318	FLO	32.5
FLO200319	FLO	8.98
FLO200320	FLO	27.7
FLO200321	FLO	34.5
FLO200322	FLO	59.5
FLO200323	FLO	22.2
FLO200324	FLO	15.3
FLO200325	FLO	16.6
FLO200326	FLO	48.5
IRS200301	IRS	26.6
IRS200302	IRS	0.96
IRS200303	IRS	28
IRS200304	IRS	3.21
IRS200305	IRS	4.88
IRS200306	IRS	33.6
IRS200307	IRS	19.4
IRS200308	IRS	14.4
IRS200309	IRS	24.8
IRS200310	IRS	26.2
IRS200311	IRS	5.95
IRS200312	IRS	14.4
IRS200313	IRS	21.4
IRS200314	IRS	68.8
IRS200315	IRS	13.2
IRS200316	IRS	12
IRS200317	IRS	7.3
IRS200318	IRS	16.3
IRS200319	IRS	11.7
IRS200320	IRS	8.01
IRS200321	IRS	10.7
IRS200322	IRS	13.6
IRS200323	IRS	65.9

IRS200324	IRS	13.1
IRS200325	IRS	16.3
IRS200326	IRS	10.2
IRS200327	IRS	15.8
IRS200328	IRS	80.7
IRS200329	IRS	16.9
IRS200330	IRS	83.3
PEN200301	PEN	68.9
PEN200302	PEN	63
PEN200303	PEN	72.4
PEN200304	PEN	71.5
PEN200305	PEN	82.6
PEN200306	PEN	71
PEN200307	PEN	2.86
PEN200308	PEN	4.15
PEN200309	PEN	81.8
PEN200310	PEN	35
PEN200311	PEN	78.6
PEN200312	PEN	56.6
PEN200313	PEN	84.2
PEN200314	PEN	57
PEN200315	PEN	77.7
PEN200316	PEN	24.6
PEN200317	PEN	83
PEN200318	PEN	83.5
PEN200319	PEN	27.6
PEN200320	PEN	17.5
PEN200321	PEN	1.64
PEN200322	PEN	74.4
PEN200323	PEN	1.1
PEN200324	PEN	4.05
PEN200325	PEN	74.2
PEN200326	PEN	2.74
PEN200327	PEN	54.3
PEN200328	PEN	8.44
STR200301	ST	69.7
STR200302	ST	81.3
STR200303	ST	76.4
STR200304	ST	0.35
STR200307	ST	5.11
STR200308	ST	16.3
STR200309	ST	6.65
STR200312	ST	7.18
STR200313	ST	23.8
STR200314	ST	9.8
STR200315	ST	37.5
STR200316	ST	17.3
STR200317	ST	28.4
STR200318	ST	8.5
STR200319	ST	25.5
STR200320	ST	9.49

STR200321	ST	6.75
STR200322	ST	48.9
STR200323	ST	22.3
STR200324	ST	20.5
STR200325	ST	41.3
STR200326	ST	5.56
STR200327	ST	43.1
STR200328	ST	11.4
STR200329	ST	32.1
STR200330	ST	57
STT200304	ST	24.6
STT200305	ST	53.1
STT200306	ST	30.9
STT200310	ST	36.5
STT200311	ST	2.31
SUW200301	SUW	6.23
SUW200302	SUW	35.6
SUW200303	SUW	35.4
SUW200305	SUW	33.6
SUW200306	SUW	2.17
SUW200307	SUW	30.2
SUW200308	SUW	19.8
SUW200309	SUW	40.9
SUW200310	SUW	2.4
SUW200311	SUW	31.5
SUW200312	SUW	40
SUW200313	SUW	20.2
SUW200314	SUW	22.1
SUW200315	SUW	2.38
SUW200316	SUW	28.6
SUW200317	SUW	6.54
SUW200318	SUW	2.24
SUW200319	SUW	85.1
SUW200320	SUW	9.73
SUW200321	SUW	25.5
SUW200322	SUW	6.34
SUW200323	SUW	13.5
SUW200324	SUW	6.04
SUW200325	SUW	11.5
SUW200326	SUW	82.6
SUW200327	SUW	32.9
SUW200328	SUW	24
SUW200329	SUW	4.18
SUW200330	SUW	45.6
WCC200301	WCC	47.4
WCC200303	WCC	6.85
WCC200304	WCC	31.8
WCC200305	WCC	15.2
WCC200306	WCC	32.5
WCC200307	WCC	35.2
WCC200308	WCC	24.6

WCC200309	WCC	26.9
WCC200310	WCC	31
WCC200311	WCC	38.3
WCC200312	WCC	13.9
WCC200313	WCC	41.7
WCC200315	WCC	51
WCC200316	WCC	4.65
WCC200317	WCC	6.64
WCC200318	WCC	30.2
WCC200319	WCC	31.5
WCC200320	WCC	
WCC200321	WCC	33
WCC200322	WCC	22.5
WCC200323	WCC	17.2
WCC200324	WCC	20.7
WCC200325	WCC	21.3
WCC200326	WCC	19
WCC200327	WCC	65.2
WCC200328	WCC	25
WCC200329	WCC	25.7
WCC200330	WCC	42.4

Table A-4. Sediment chemistry analytes, IMAP sampling Summer, 2003.

Metals	Semi-volatile Organic Pollutants
Mercury	1,2,4-Trichlorobenzene
Aluminum	1,2-Dichlorobenzene
Antimony	1,3-Dichlorobenzene
Arsenic	1,4-Dichlorobenzene
Cadmium	2,4,6-Trichlorophenol
Chromium	2,4-Dichlorophenol
Copper	2,4-Dimethylphenol
Iron	2,4-Dinitrophenol
Lead	2,4-Dinitrotoluene
Manganese	2,6-Dinitrotoluene
Nickel	2-Chloronaphthalene
Selenium	2-Chlorophenol
Silver	2-Methyl-4,6-dinitrophenol
Tin	2-Nitrophenol
Zinc	3,3'-Dichlorobenzidine
Carbamates	DDD-p,p'
3-Hydroxycarbofuran	DDE-p,p'
Aldicarb	DDT-p,p'
Aldicarb Sulfone	4-Bromophenyl phenyl ether
Aldicarb Sulfoxide	4-Chloro-3-methylphenol
Carbaryl	4-Chlorophenyl phenyl ether
Carbofuran	4-Nitrophenol
Methiocarb	Acenaphthene
Methomyl	Acenaphthylene
Oxamyl	Aldrin
Propoxur	alpha-BHC
Organochlorine Pesticides	Anthracene
Alachlor	Azobenzene/1,2-Diphenylhydrazine
Aldrin	Benzidine
Alpha-BHC	Benzo(a)anthracene
Ametryn	Benzo(a)pyrene
Atrazine	Benzo(b)fluoranthene
Azinphos Methyl	Benzo(g,h,i)perylene
Beta-BHC	Benzo(k)fluoranthene
Bromacil	beta-BHC
Chlordane	Bis(2-chloroethoxy)methane
Chlorothalonil	Bis(2-chloroethyl)ether
Chlorpyrifos Ethyl	Bis(2-chloroisopropyl)ether
Chlorpyrifos Methyl	Bis(2-ethylhexyl)phthalate
DDD-o,p'	Butyl benzyl phthalate
DDE-o,p'	Chrysene
DDT-o,p'	delta-BHC
Organochlorine Pesticides (con.)	Dibenzo(a,h)anthracene
Delta-BHC	Dieldrin

Diazinon	Diethyl phthalate
Dieldrin	Dimethyl phthalate
Endosulfan I	Semi-volatile Organic Pollutants (con.)
Endosulfan II	Di-n-butyl phthalate
Endosulfan Sulfate	Di-n-octyl phthalate
Endrin	Endosulfan I
Endrin Aldehyde	Endosulfan II
Ethion	Endosulfan sulfate
Ethoprop	Endrin
Fenamiphos	Endrin aldehyde
Fenarimol	Fluoranthene
Fonofos	Fluorene
Gamma-BHC	gamma-BHC
Heptachlor	Heptachlor
Heptachlor Epoxide	Heptachlor epoxide
Hexazinone	Hexachlorobenzene
Iprodione	Hexachlorobutadiene
Malathion	Hexachlorocyclopentadiene
Metalaxyl	Hexachloroethane
Methamidophos	Indeno(1,2,3-cd)pyrene
Metolachlor	Isophorone
Metribuzin	Naphthalene
Mevinphos	Nitrobenzene
Monocrotophos	N-Nitrosodimethylamine
Naled	N-Nitrosodi-n-propylamine
Norflurazon	N-Nitrosodiphenylamine
Parathion Ethyl	Pentachlorophenol
Parathion Methyl	Phenanthrene
PCB 8	Phenol
PCB 18	Pyrene
PCB 28	
PCB 44	
PCB 52	
PCB 66	
PCB 77	
PCB 101	
PCB 105	
PCB 118	
PCB 126	
PCB 128	
PCB 138	
PCB 153	
PCB 170	
PCB 180	
PCB 187	
PCB 195	
PCB 206	
PCNB	
Phorate	

Prometryn	
Simazine	
Toxaphene	
Trans-Nonachlor	

Table A-5. Metals in sediment, IMAP Sampling summer 2003.

Results codes: U=Not detected; I=Detected but below laboratory minimum quantitation level; A=mean of two or more observations; J=estimated value; Q=sample exceeded recommended hold time.

Station	Component	Result (mg/kg)	Code
STR200303	ALUMINUM	24512.7	
STR200303	ANTIMONY	2.4	
STR200303	ARSENIC	13	
STR200303	CADMIUM	2.4	
STR200303	CHROMIUM	63.2	
STR200303	COPPER	19.5	
STR200303	IRON	27501.5	
STR200303	LEAD	26	
STR200303	MANGANESE	102.5	
STR200303	NICKEL	18.3	
STR200303	SELENIUM	0.5	U
STR200303	SILVER	1.2	
STR200303	TIN	120.3	
STR200303	ZINC	83.3	
STR200307	ALUMINUM	1003.8	
STR200307	ANTIMONY	1.1	
STR200307	ARSENIC	2.4	
STR200307	CADMIUM	0.8	
STR200307	CHROMIUM	2.2	
STR200307	COPPER	0.1	
STR200307	IRON	1767.4	
STR200307	LEAD	1.1	
STR200307	MANGANESE	20.2	
STR200307	NICKEL	1	
STR200307	SELENIUM	2.6	
STR200307	SILVER	0.4	
STR200307	TIN	0.1	U
STR200307	ZINC	2.1	
STR200312	ALUMINUM	591.2	
STR200312	ANTIMONY	0.9	
STR200312	ARSENIC	0.8	
STR200312	CADMIUM	1	
STR200312	CHROMIUM	1.6	
STR200312	COPPER	0.4	
STR200312	IRON	123.2	
STR200312	LEAD	0.5	
STR200312	MANGANESE	2.8	
STR200312	NICKEL	1	
STR200312	SELENIUM	1.9	
STR200312	SILVER	0.5	
STR200312	TIN	43.2	
STR200312	ZINC	1.1	
STR200317	ALUMINUM	469.8	
STR200317	ANTIMONY	2.4	
STR200317	ARSENIC	16.1	

STR200317	CADMIUM	2	
STR200317	CHROMIUM	4.3	
STR200317	COPPER	7	
STR200317	IRON	6160	
STR200317	LEAD	5.2	
STR200317	MANGANESE	16.5	
STR200317	NICKEL	1.1	
STR200317	SELENIUM	1.4	
STR200317	SILVER	2.4	
STR200317	TIN	0.1	U
STR200317	ZINC	11.9	
STR200318	ALUMINUM	1047.3	
STR200318	ANTIMONY	4.7	
STR200318	ARSENIC	8.7	
STR200318	CADMIUM	1	
STR200318	CHROMIUM	6.5	
STR200318	COPPER	3.3	
STR200318	IRON	2191.4	
STR200318	LEAD	0.5	U
STR200318	MANGANESE	22.3	
STR200318	NICKEL	1.1	
STR200318	SELENIUM	9	
STR200318	SILVER	5.8	
STR200318	TIN	59.6	
STR200318	ZINC	6.5	
STR200319	ALUMINUM	1164.6	
STR200319	ALUMINUM	1442.3	
STR200319	ANTIMONY	2.5	
STR200319	ANTIMONY	2.6	
STR200319	ARSENIC	2.5	
STR200319	ARSENIC	2.7	
STR200319	CADMIUM	3.2	
STR200319	CADMIUM	2.9	
STR200319	CHROMIUM	7	
STR200319	CHROMIUM	7.8	
STR200319	COPPER	5.1	
STR200319	COPPER	5	
STR200319	IRON	1994.3	
STR200319	IRON	2165.5	
STR200319	LEAD	0.5	U
STR200319	LEAD	0.5	U
STR200319	MANGANESE	37.9	
STR200319	MANGANESE	42.2	
STR200319	NICKEL	1	
STR200319	NICKEL	1.1	
STR200319	SELENIUM	4.5	
STR200319	SELENIUM	4.4	
STR200319	SILVER	3.5	
STR200319	SILVER	3.6	
STR200319	TIN	0.1	U
STR200319	TIN	0.1	U

STR200319	ZINC	1.8	
STR200319	ZINC	1.3	
STR200320	ALUMINUM	708.6	
STR200320	ANTIMONY	2.6	
STR200320	ARSENIC	4.2	
STR200320	CADMIUM	1	
STR200320	CHROMIUM	3.6	
STR200320	COPPER	0.3	
STR200320	IRON	762.3	
STR200320	LEAD	0.5	U
STR200320	MANGANESE	16.6	
STR200320	NICKEL	1	
STR200320	SELENIUM	5	
STR200320	SILVER	3.8	
STR200320	TIN	10.1	
STR200320	ZINC	1.9	
STR200321	ALUMINUM	1114.6	
STR200321	ANTIMONY	2.8	
STR200321	ARSENIC	2.3	
STR200321	CADMIUM	3	
STR200321	CHROMIUM	6	
STR200321	COPPER	6	
STR200321	IRON	1635.2	
STR200321	LEAD	0.5	U
STR200321	MANGANESE	35.4	
STR200321	NICKEL	1	
STR200321	SELENIUM	5.1	
STR200321	SILVER	4.3	
STR200321	TIN	0.1	U
STR200321	ZINC	1.2	
STR200322	ALUMINUM	1297.5	
STR200322	ANTIMONY	2.4	
STR200322	ARSENIC	2.1	
STR200322	CADMIUM	1	
STR200322	CHROMIUM	5.8	
STR200322	COPPER	0.6	
STR200322	IRON	617.5	
STR200322	LEAD	0.5	U
STR200322	MANGANESE	13.3	
STR200322	NICKEL	1.1	
STR200322	SELENIUM	4.7	
STR200322	SILVER	3	
STR200322	TIN	54.4	
STR200322	ZINC	3.2	
STR200323	ALUMINUM	565.2	
STR200323	ANTIMONY	3.3	
STR200323	ARSENIC	3.5	
STR200323	CADMIUM	3.1	
STR200323	CHROMIUM	3.3	
STR200323	COPPER	5	
STR200323	IRON	513.6	

STR200323	LEAD	0.5	U
STR200323	MANGANESE	13.5	
STR200323	NICKEL	1	
STR200323	SELENIUM	6.9	
STR200323	SILVER	3.7	
STR200323	TIN	0.1	U
STR200323	ZINC	0.8	
STR200324	ALUMINUM	1146.8	
STR200324	ANTIMONY	3.5	
STR200324	ARSENIC	5.7	
STR200324	CADMIUM	1	
STR200324	CHROMIUM	5.2	
STR200324	COPPER	1.1	
STR200324	IRON	607.7	
STR200324	LEAD	0.5	U
STR200324	MANGANESE	10.5	
STR200324	NICKEL	1.4	
STR200324	SELENIUM	7.6	
STR200324	SILVER	3.8	
STR200324	TIN	67.5	
STR200324	ZINC	1.4	
STR200325	ALUMINUM	750.6	
STR200325	ANTIMONY	5	
STR200325	ARSENIC	17.4	
STR200325	CADMIUM	3.2	
STR200325	CHROMIUM	3.7	
STR200325	COPPER	7.3	
STR200325	IRON	558.2	
STR200325	LEAD	0.5	U
STR200325	MANGANESE	10.5	
STR200325	NICKEL	3.2	
STR200325	SELENIUM	15.1	
STR200325	SILVER	3.2	
STR200325	TIN	0.1	U
STR200325	ZINC	4.1	
STR200326	ALUMINUM	395.6	
STR200326	ANTIMONY	2	
STR200326	ARSENIC	2.3	
STR200326	CADMIUM	1	U
STR200326	CHROMIUM	2.5	
STR200326	COPPER	0.4	
STR200326	IRON	214.7	
STR200326	LEAD	0.5	U
STR200326	MANGANESE	9.7	
STR200326	NICKEL	1	U
STR200326	SELENIUM	3.9	
STR200326	SILVER	2.7	
STR200326	TIN	0	
STR200326	ZINC	1.5	
STR200328	ALUMINUM	333.9	
STR200328	ANTIMONY	2.8	

STR200328	ARSENIC	3.7	
STR200328	CADMIUM	1	U
STR200328	CHROMIUM	2.8	
STR200328	COPPER	0.7	
STR200328	IRON	311	
STR200328	LEAD	0.5	U
STR200328	MANGANESE	5.2	
STR200328	NICKEL	1	U
STR200328	SELENIUM	5.2	
STR200328	SILVER	3.9	
STR200328	TIN	0	
STR200328	ZINC	3.3	
STR200329	ALUMINUM	662.7	
STR200329	ALUMINUM	801.4	
STR200329	ANTIMONY	4.7	
STR200329	ANTIMONY	5.2	
STR200329	ARSENIC	18.8	
STR200329	ARSENIC	21.8	
STR200329	CADMIUM	3.9	
STR200329	CADMIUM	3.6	
STR200329	CHROMIUM	5.1	
STR200329	CHROMIUM	6.5	
STR200329	COPPER	31.8	
STR200329	COPPER	40.4	
STR200329	IRON	925	
STR200329	IRON	1088.4	
STR200329	LEAD	17.7	
STR200329	LEAD	21.4	
STR200329	MANGANESE	9	
STR200329	MANGANESE	10.9	
STR200329	NICKEL	2.7	
STR200329	NICKEL	3.2	
STR200329	SELENIUM	13	
STR200329	SELENIUM	14.1	
STR200329	SILVER	1.2	
STR200329	SILVER	3.6	
STR200329	TIN	0.1	U
STR200329	TIN	0.1	U
STR200329	ZINC	50.6	
STR200329	ZINC	60.6	
STR200330	ALUMINUM	1215.6	
STR200330	ANTIMONY	3.2	
STR200330	ARSENIC	5	
STR200330	CADMIUM	2.8	
STR200330	CHROMIUM	4.6	
STR200330	COPPER	5.7	
STR200330	IRON	775.2	
STR200330	LEAD	0.5	U
STR200330	MANGANESE	13.8	
STR200330	NICKEL	1	
STR200330	SELENIUM	8.5	

STR200330	SILVER	3.4	
STR200330	TIN	0.1	U
STR200330	ZINC	1.6	
STT200304	ALUMINUM	3536.4	
STT200304	ANTIMONY	1.5	
STT200304	ARSENIC	1.3	
STT200304	CADMIUM	1	
STT200304	CHROMIUM	8.8	
STT200304	COPPER	1.8	
STT200304	IRON	2960.9	
STT200304	LEAD	3.1	
STT200304	MANGANESE	20.8	
STT200304	NICKEL	2.2	
STT200304	SELENIUM	1.1	
STT200304	SILVER	1.1	
STT200304	TIN	49.5	
STT200304	ZINC	10.2	
STT200306	ALUMINUM	1581.4	
STT200306	ANTIMONY	0.9	
STT200306	ARSENIC	1.6	
STT200306	CADMIUM	1	
STT200306	CHROMIUM	6	
STT200306	COPPER	16.7	
STT200306	IRON	728	
STT200306	LEAD	4.9	
STT200306	MANGANESE	3	
STT200306	NICKEL	1.2	
STT200306	SELENIUM	1.6	
STT200306	SILVER	0.5	
STT200306	TIN	11.4	
STT200306	ZINC	17.6	
STT200310	ALUMINUM	1103.9	
STT200310	ANTIMONY	2.6	
STT200310	ARSENIC	2.2	
STT200310	CADMIUM	1	
STT200310	CHROMIUM	4.8	
STT200310	COPPER	0.4	
STT200310	IRON	501.2	
STT200310	LEAD	0.5	U
STT200310	MANGANESE	17.4	
STT200310	NICKEL	1	
STT200310	SELENIUM	4.8	
STT200310	SILVER	3.3	
STT200310	TIN	72.4	
STT200310	ZINC	0.9	
STT200311	ALUMINUM	202.8	
STT200311	ANTIMONY	0.5	
STT200311	ARSENIC	0.5	
STT200311	CADMIUM	0.1	U
STT200311	CHROMIUM	1	
STT200311	COPPER	0.1	

STT200311	IRON	274.5	
STT200311	LEAD	0.5	
STT200311	MANGANESE	7.1	
STT200311	NICKEL	1	
STT200311	SELENIUM	1.9	
STT200311	SILVER	0.1	
STT200311	TIN	0.1	U
STT200311	ZINC	0.8	

Table A-6. Summary of IMAP fish sampling (seines and trawls combined) summer 2003.

NUMSETS=number of sets by sampling unit in which the listed species was caught; MNABUN=mean abundance per set; PCTSETS=percent of total sets by sampling unit containing the listed species; TOTALAB=total number of individuals caught by species and sampling unit. (ST=State Scale Stations; FLO=Florida/Biscayne Bays ; IRS=Indian River Lagoon South; PEN=Pensacola Bay; SUW=Suwannee River; WCC=West Central Coast)

SAMPUNIT	SCIENTIFIC NAME	NUMSETS	MNABUN	PCTSETS	TOTNUM
FLO	Lagodon rhomboides	17	19	56.67%	329
FLO	Haemulon plumieri	15	13	50.00%	201
FLO	Eucinostomus spp.	13	26	43.33%	342
FLO	Eucinostomus gula	13	9	43.33%	117
FLO	Monacanthus ciliatus	13	4	43.33%	57
FLO	Opsanus beta	13	2	43.33%	25
FLO	Nicholsina usta	10	2	33.33%	22
FLO	Calamus arctifrons	9	5	30.00%	46
FLO	Monacanthus hispidus	9	2	30.00%	22
FLO	Lactophrys quadricornis	8	3	26.67%	20
IRS	Eucinostomus spp.	23	25	76.67%	576
IRS	Anchoa mitchilli	15	81	50.00%	1222
IRS	Lagodon rhomboides	14	38	46.67%	528
IRS	Farfantepenaeus spp.	12	4	40.00%	43
IRS	Syngnathus scovelli	11	2	36.67%	27
IRS	Gobiosoma robustum	10	9	33.33%	85
IRS	Bairdiella chrysoura	10	8	33.33%	83
IRS	Eucinostomus gula	10	2	33.33%	24
IRS	Gobiosoma spp.	9	6	30.00%	51
IRS	Eucinostomus harengulus	9	3	30.00%	31
PEN	Anchoa mitchilli	14	86	46.67%	1198
PEN	Leiostomus xanthurus	13	120	43.33%	1557
PEN	Micropogonias undulatus	9	12	30.00%	109
PEN	Farfantepenaeus aztecus	5	2	16.67%	11
PEN	No gear set	5	0	16.67%	0
PEN	Lagodon rhomboides	4	9	13.33%	35
PEN	Brevoortia spp.	3	30	10.00%	91
PEN	Litopenaeus setiferus	3	13	10.00%	39
PEN	Bagre marinus	3	8	10.00%	23
PEN	Menidia spp.	2	8	6.67%	15
ST	Lagodon rhomboides	15	17	50.00%	252
ST	Eucinostomus spp.	14	27	46.67%	383
ST	Eucinostomus gula	13	12	43.33%	159
ST	Chilomycterus schoepfi	8	4	26.67%	29
ST	Callinectes sapidus	8	2	26.67%	13
ST	Anchoa mitchilli	7	101	23.33%	705
ST	Haemulon plumieri	7	6	23.33%	43
ST	Farfantepenaeus duorarum	7	4	23.33%	30
ST	Syngnathus scovelli	6	4	20.00%	26
ST	Synodus foetens	6	4	20.00%	23
SUW	Anchoa mitchilli	16	177	53.33%	2837
SUW	Bairdiella chrysoura	12	37	40.00%	445

SUW	Menticirrhus americanus	12	28	40.00%	334
SUW	Cynoscion arenarius	11	133	36.67%	1459
	Farfantepenaeus				
SUW	duorarum	11	4	36.67%	40
SUW	Etropus crossotus	10	19	33.33%	186
SUW	Lagodon rhomboides	8	6	26.67%	46
SUW	Bagre marinus	7	39	23.33%	271
SUW	Leiostomus xanthurus	7	21	23.33%	147
SUW	Chaetodipterus faber	7	4	23.33%	29
WCC	Lagodon rhomboides	20	138	66.67%	2755
WCC	Eucinostomus spp.	19	101	63.33%	1924
WCC	Synodus foetens	13	3	43.33%	38
WCC	Eucinostomus gula	11	8	36.67%	91
	Farfantepenaeus				
WCC	duorarum	11	7	36.67%	77
WCC	Lucania parva	10	60	33.33%	597
WCC	Orthopristis chrysoptera	10	30	33.33%	296
WCC	Bairdiella chrysoura	9	15	30.00%	136
WCC	Sphoeroides nephelus	9	2	30.00%	21
WCC	Syngnathus scovelli	8	6	26.67%	46

**Table A-7. Qualitative submerged aquatic vegetation data from IMAP 2003 sampling.
(Abundance codes appear at the bottom of the table)**

station	sampunit	Quadrant	Abundance	Species ID	Species
FLO200301	FLO	1	4	TT - Thalassia testudinum	TT
FLO200301	FLO	1.1	0.5	SF - Syringodium filiforme	SF
FLO200301	FLO	1.2	0.5	CGA - Acetabularia	CGA
FLO200301	FLO	1.3	2	ACS - Acanthophora spp.	ACS
FLO200301	FLO	1.4	0.5	CGH - Halimeda	CGH
FLO200301	FLO	2	4	TT - Thalassia testudinum	TT
FLO200301	FLO	2.1	0.5	SF - Syringodium filiforme	SF
FLO200301	FLO	2.2	0.5	CGA - Acetabularia	CGA
FLO200301	FLO	2.3	2	ACS - Acanthophora spp.	ACS
FLO200301	FLO	2.4	0.5	CGH - Halimeda	CGH
FLO200301	FLO	3	3	TT - Thalassia testudinum	TT
FLO200301	FLO	3.1	0.5	SF - Syringodium filiforme	SF
FLO200301	FLO	3.2	1	CGA - Acetabularia	CGA
FLO200301	FLO	3.3	2	ACS - Acanthophora spp.	ACS
FLO200301	FLO	3.4	1	CGH - Halimeda	CGH
FLO200301	FLO	4	3	TT - Thalassia testudinum	TT
FLO200301	FLO	4.1	0.5	SF - Syringodium filiforme	SF
FLO200301	FLO	4.2	0.5	CGA - Acetabularia	CGA
FLO200301	FLO	4.3	1	ACS - Acanthophora spp.	ACS
FLO200301	FLO	4.4	2	CGH - Halimeda	CGH
FLO200301	FLO	4.5	2	GO - Green Other	GO
FLO200302	FLO	1	4	TT - Thalassia testudinum	TT
FLO200302	FLO	1.1	1	CGP - Penicillus	CGP
FLO200302	FLO	2	4	TT - Thalassia testudinum	TT
FLO200302	FLO	2.1	0.1	CGU - Udotea	CGU
FLO200302	FLO	3	4	TT - Thalassia testudinum	TT
FLO200302	FLO	3.1	0.5	CGH - Halimeda	CGH
FLO200302	FLO	4	4	TT - Thalassia testudinum	TT
FLO200303	FLO	1	1	CGP - Penicillus	CGP
FLO200303	FLO	1.1	1	CGA - Acetabularia	CGA
FLO200303	FLO	1.2	2	BA - Batophora	BA
FLO200303	FLO	1.3	1	TT - Thalassia testudinum	TT
FLO200303	FLO	1.4	1	CGU - Udotea	CGU
FLO200303	FLO	2	2	TT - Thalassia testudinum	TT
FLO200303	FLO	2.1	1	CGA - Acetabularia	CGA
FLO200303	FLO	2.2	2	BA - Batophora	BA
FLO200303	FLO	2.3	0.5	CGP - Penicillus	CGP
FLO200303	FLO	3	2	DR - Drift Reds	DR
FLO200303	FLO	3.1	2	BA - Batophora	BA
FLO200303	FLO	3.2	0.5	CGU - Udotea	CGU
FLO200303	FLO	3.3	0.5	CGP - Penicillus	CGP
FLO200303	FLO	4	2	TT - Thalassia testudinum	TT
FLO200303	FLO	4.1	0.5	CGP - Penicillus	CGP
FLO200303	FLO	4.2	1	BA - Batophora	BA
FLO200303	FLO	4.3	1	CGA - Acetabularia	CGA
FLO200304	FLO	1	0.5	CGP - Penicillus	CGP

FLO200304	FLO	1.1	0.5	CGH - Halimeda	CGH
FLO200304	FLO	1.2	1	DR - Drift Reds	DR
FLO200304	FLO	1.3	1	BA - Batophora	BA
FLO200304	FLO	2	2	TT - Thalassia testudinum	TT
FLO200304	FLO	2.1	1	DR - Drift Reds	DR
FLO200304	FLO	2.2	1	CGP - Penicillus	CGP
FLO200304	FLO	2.3	1	BA - Batophora	BA
FLO200304	FLO	2.4	0.5	CGA - Acetabularia	CGA
FLO200304	FLO	3	2	TT - Thalassia testudinum	TT
FLO200304	FLO	3.1	2	BA - Batophora	BA
FLO200304	FLO	3.2	2	DR - Drift Reds	DR
FLO200304	FLO	3.3	1	CGP - Penicillus	CGP
FLO200304	FLO	4	2	TT - Thalassia testudinum	TT
FLO200304	FLO	4.1	1	CGP - Penicillus	CGP
FLO200304	FLO	4.2	1	BA - Batophora	BA
FLO200304	FLO	4.3	0.5	CGU - Udotea	CGU
FLO200307	FLO	1	4	TT - Thalassia testudinum	TT
FLO200307	FLO	2	3	TT - Thalassia testudinum	TT
FLO200307	FLO	3	3	TT - Thalassia testudinum	TT
FLO200307	FLO	4	3	TT - Thalassia testudinum	TT
FLO200308	FLO	1	5	TT - Thalassia testudinum	TT
FLO200308	FLO	2	5	TT - Thalassia testudinum	TT
FLO200308	FLO	3	4	TT - Thalassia testudinum	TT
FLO200308	FLO	4	3	TT - Thalassia testudinum	TT
FLO200309	FLO	1	2	TT - Thalassia testudinum	TT
FLO200309	FLO	1.1	1	BA - Batophora	BA
FLO200309	FLO	2	1	TT - Thalassia testudinum	TT
FLO200309	FLO	2.1	0.5	BA - Batophora	BA
FLO200309	FLO	3	2	TT - Thalassia testudinum	TT
FLO200309	FLO	3.1	0.5	BA - Batophora	BA
FLO200309	FLO	4	2	TT - Thalassia testudinum	TT
FLO200309	FLO	4.1	0.1	CGA - Acetabularia	CGA
FLO200309	FLO	4.3	0.1	TT - Thalassia testudinum	TT
FLO200311	FLO	1	4	TT - Thalassia testudinum	TT
FLO200311	FLO	1.1	2	HW - Halodule wrightii	HW
FLO200311	FLO	2	4	SF - Syringodium filiforme	SF
FLO200311	FLO	2.1	2	TT - Thalassia testudinum	TT
FLO200311	FLO	3	4	SF - Syringodium filiforme	SF
FLO200311	FLO	3.1	2	TT - Thalassia testudinum	TT
FLO200311	FLO	4	3	TT - Thalassia testudinum	TT
FLO200311	FLO	4.1	3	SF - Syringodium filiforme	SF
FLO200312	FLO	1	3	TT - Thalassia testudinum	TT
FLO200312	FLO	1.1	1	BA - Batophora	BA
FLO200312	FLO	1.2	0.5	CGA - Acetabularia	CGA
FLO200312	FLO	2	2	TT - Thalassia testudinum	TT
FLO200312	FLO	2.1	1	BA - Batophora	BA
FLO200312	FLO	2.2	1	CGP - Penicillus	CGP
FLO200312	FLO	2.3	0.5	CGA - Acetabularia	CGA
FLO200312	FLO	3	2	TT - Thalassia testudinum	TT
FLO200312	FLO	3.1	0.5	CGP - Penicillus	CGP
FLO200312	FLO	3.2	1	BA - Batophora	BA

FLO200312	FLO	3.3	0.1	CGA - Acetabularia	CGA
FLO200312	FLO	4	3	TT - Thalassia testudinum	TT
FLO200312	FLO	4.1	1	BA - Batophora	BA
FLO200312	FLO	4.2	1	CGP - Penicillus	CGP
FLO200313	FLO	1	1	CGU - Udotea	CGU
FLO200313	FLO	1.1	1	CGP - Penicillus	CGP
FLO200313	FLO	2	1	CGU - Udotea	CGU
FLO200313	FLO	2.1	0.5	CGP - Penicillus	CGP
FLO200313	FLO	3	0.5	ACS - Acanthophora spp.	ACS
FLO200313	FLO	4 Bare		Bare	Bare
FLO200314	FLO	1	4	SF - Syringodium filiforme	SF
FLO200314	FLO	2	2	SF - Syringodium filiforme	SF
FLO200314	FLO	2.1	1	CGP - Penicillus	CGP
FLO200314	FLO	2.2	1	CGU - Udotea	CGU
FLO200314	FLO	3	2	SF - Syringodium filiforme	SF
FLO200314	FLO	3.1	2	CGP - Penicillus	CGP
FLO200314	FLO	3.2	1	GO - Green Other	GO
FLO200314	FLO	4	3	SF - Syringodium filiforme	SF
FLO200315	FLO	1	3	TT - Thalassia testudinum	TT
FLO200315	FLO	1.1	1	CGP - Penicillus	CGP
FLO200315	FLO	1.2	1	BA - Batophora	BA
FLO200315	FLO	1.3	1	HW - Halodule wrightii	HW
FLO200315	FLO	1.4	1	CGH - Halimeda	CGH
FLO200315	FLO	2	3	TT - Thalassia testudinum	TT
FLO200315	FLO	2.1	2	HW - Halodule wrightii	HW
FLO200315	FLO	2.2	1	BA - Batophora	BA
FLO200315	FLO	2.3	1	CGP - Penicillus	CGP
FLO200315	FLO	2.4	2	DR - Drift Reds	DR
FLO200315	FLO	3	3	TT - Thalassia testudinum	TT
FLO200315	FLO	3.1	1	CGP - Penicillus	CGP
FLO200315	FLO	3.2	2	BA - Batophora	BA
FLO200315	FLO	3.3	2	DR - Drift Reds	DR
FLO200315	FLO	4	3	TT - Thalassia testudinum	TT
FLO200315	FLO	4.1	0.5	HW - Halodule wrightii	HW
FLO200315	FLO	4.2	3	DR - Drift Reds	DR
FLO200315	FLO	4.3	1	CGP - Penicillus	CGP
FLO200315	FLO	4.4	1	BA - Batophora	BA
FLO200316	FLO	1	1	TT - Thalassia testudinum	TT
FLO200316	FLO	1.1	2	BA - Batophora	BA
FLO200316	FLO	2	2	TT - Thalassia testudinum	TT
FLO200316	FLO	2.1	2	BA - Batophora	BA
FLO200316	FLO	3	2	TT - Thalassia testudinum	TT
FLO200316	FLO	3.1	2	BA - Batophora	BA
FLO200316	FLO	4	1	TT - Thalassia testudinum	TT
FLO200316	FLO	4.1	2	BA - Batophora	BA
FLO200318	FLO	1	0.5	GO - Green Other	GO
FLO200318	FLO	1.1	0.5	TT - Thalassia testudinum	TT
FLO200318	FLO	1.2	0.5	CGP - Penicillus	CGP
FLO200318	FLO	2	2	TT - Thalassia testudinum	TT
FLO200318	FLO	2.1	1	CGP - Penicillus	CGP
FLO200318	FLO	2.2	1	CGH - Halimeda	CGH

FLO200318	FLO	3	2	CGP - Penicillus	CGP
FLO200318	FLO	3.1	1	CGH - Halimeda	CGH
FLO200318	FLO	4	3	DR - Drift Reds	DR
FLO200318	FLO	4.1	2	CGP - Penicillus	CGP
FLO200319	FLO	1	3	TT - Thalassia testudinum	TT
FLO200319	FLO	1.1	0.5	CGP - Penicillus	CGP
FLO200319	FLO	2	3	TT - Thalassia testudinum	TT
FLO200319	FLO	2.1	1	BA - Batophora	BA
FLO200319	FLO	2.2	1	CGH - Halimeda	CGH
FLO200319	FLO	2.3	1	CGP - Penicillus	CGP
FLO200319	FLO	3	3	TT - Thalassia testudinum	TT
FLO200319	FLO	3.1	0.5	BA - Batophora	BA
FLO200319	FLO	3.2	0.5	CGP - Penicillus	CGP
FLO200319	FLO	4	3	TT - Thalassia testudinum	TT
FLO200319	FLO	4.1	1	CGP - Penicillus	CGP
FLO200320	FLO	1	0.5	TT - Thalassia testudinum	TT
FLO200320	FLO	1.1	0.5	CGP - Penicillus	CGP
FLO200320	FLO	1.2	0.5	CGH - Halimeda	CGH
FLO200320	FLO	1.3	0.5	CGU - Udotea	CGU
FLO200320	FLO	2	1	CGP - Penicillus	CGP
FLO200320	FLO	2.1	0.5	CGH - Halimeda	CGH
FLO200320	FLO	3	1	SF - Syringodium filiforme	SF
FLO200320	FLO	3.1	1	CGP - Penicillus	CGP
FLO200320	FLO	4	1	SF - Syringodium filiforme	SF
FLO200320	FLO	4.1	1	CGP - Penicillus	CGP
FLO200321	FLO	1	2	CGH - Halimeda	CGH
FLO200321	FLO	2	0.1	CGP - Penicillus	CGP
FLO200321	FLO	3	2	CGH - Halimeda	CGH
FLO200321	FLO	3.1	2	CGP - Penicillus	CGP
FLO200321	FLO	4	3	TT - Thalassia testudinum	TT
FLO200321	FLO	4.1	2	SF - Syringodium filiforme	SF
FLO200321	FLO	4.2	1	CGP - Penicillus	CGP
FLO200322	FLO	1	4	SF - Syringodium filiforme	SF
FLO200322	FLO	1.1	2	TT - Thalassia testudinum	TT
FLO200322	FLO	1.2	0.5	CGP - Penicillus	CGP
FLO200322	FLO	2	5	SF - Syringodium filiforme	SF
FLO200322	FLO	2.1	0.5	TT - Thalassia testudinum	TT
FLO200322	FLO	3	5	SF - Syringodium filiforme	SF
FLO200322	FLO	3.1	0.5	ACS - Acanthophora spp.	ACS
FLO200322	FLO	4	4	TT - Thalassia testudinum	TT
FLO200322	FLO	4.1	3	SF - Syringodium filiforme	SF
FLO200322	FLO	4.2	1	CGP - Penicillus	CGP
FLO200323	FLO	1	5	TT - Thalassia testudinum	TT
FLO200323	FLO	1.1	1	CGP - Penicillus	CGP
FLO200323	FLO	2	5	TT - Thalassia testudinum	TT
FLO200323	FLO	2.1	2	CGP - Penicillus	CGP
FLO200323	FLO	3	5	TT - Thalassia testudinum	TT
FLO200323	FLO	3.1	0.5	CGP - Penicillus	CGP
FLO200323	FLO	4	5	TT - Thalassia testudinum	TT
FLO200323	FLO	4.1	0.5	CGP - Penicillus	CGP
FLO200324	FLO	1	0.5	CGP - Penicillus	CGP

FLO200324	FLO	1.1	0.5	CGU - Udotea	CGU
FLO200324	FLO	2	0.5	TT - Thalassia testudinum	TT
FLO200324	FLO	2.1	0.5	CGP - Penicillus	CGP
FLO200324	FLO	2.2	0.5	CGH - Halimeda	CGH
FLO200324	FLO	3	0.5	CGP - Penicillus	CGP
FLO200324	FLO	3.1	0.1	CGU - Udotea	CGU
FLO200324	FLO	4	1	CGP - Penicillus	CGP
FLO200324	FLO	4.1	1	GO - Green Other	GO
FLO200325	FLO	1	5	TT - Thalassia testudinum	TT
FLO200325	FLO	2	4	TT - Thalassia testudinum	TT
FLO200325	FLO	3	4	TT - Thalassia testudinum	TT
FLO200325	FLO	4	4	TT - Thalassia testudinum	TT
FLO200326	FLO	1	2	TT - Thalassia testudinum	TT
FLO200326	FLO	1.1	0.5	CGP - Penicillus	CGP
FLO200326	FLO	1.2	0.5	CGH - Halimeda	CGH
FLO200326	FLO	2	3	TT - Thalassia testudinum	TT
FLO200326	FLO	2.1	0.5	CGP - Penicillus	CGP
FLO200326	FLO	2.2	0.5	CGH - Halimeda	CGH
FLO200326	FLO	3	2	TT - Thalassia testudinum	TT
FLO200326	FLO	3.1	0.5	CGP - Penicillus	CGP
FLO200326	FLO	3.2	0.5	CGH - Halimeda	CGH
FLO200326	FLO	4	2	TT - Thalassia testudinum	TT
FLO200326	FLO	4.1	0.5	CGP - Penicillus	CGP
FLO200326	FLO	4.2	0.5	CGH - Halimeda	CGH
FLO200327	FLO	1	4	CGP - Penicillus	CGP
FLO200327	FLO	2	3	CGP - Penicillus	CGP
FLO200327	FLO	2.1	0.5	CA - Caulerpa	CA
FLO200327	FLO	3	3	CGP - Penicillus	CGP
FLO200327	FLO	3.1	0.5	CA - Caulerpa	CA
FLO200327	FLO	4	4	CGP - Penicillus	CGP
FLO200327	FLO	4.1	0.5	CA - Caulerpa	CA
IRS200304	IRS	1	0.5	CA - Caulerpa	CA
IRS200304	IRS	2	3	CA - Caulerpa	CA
IRS200304	IRS	3	2	CA - Caulerpa	CA
IRS200304	IRS	4	2	CA - Caulerpa	CA
IRS200307	IRS	1	0.5	GR - Gracilaria	GR
IRS200307	IRS	2	1	GR - Gracilaria	GR
IRS200307	IRS	3	4	GR - Gracilaria	GR
IRS200307	IRS	4	5	GR - Gracilaria	GR
IRS200308	IRS	1	Bare	Bare	Bare
IRS200308	IRS	2	1	GR - Gracilaria	GR
IRS200308	IRS	3	2	GR - Gracilaria	GR
IRS200308	IRS	4	2	GR - Gracilaria	GR
IRS200309	IRS	1	5	SF - Syringodium filiforme	SF
IRS200309	IRS	2	5	SF - Syringodium filiforme	SF
IRS200309	IRS	3	4	SF - Syringodium filiforme	SF
IRS200309	IRS	3.1	1	HW - Halodule wrightii	HW
IRS200309	IRS	4	3	SF - Syringodium filiforme	SF
IRS200309	IRS	4.1	2	HW - Halodule wrightii	HW
IRS200309	IRS	4.2	0.5	GR - Gracilaria	GR
IRS200310	IRS	1	2	HW - Halodule wrightii	HW

IRS200310	IRS	2	1	HW - Halodule wrightii	HW
IRS200310	IRS	3	1	HW - Halodule wrightii	HW
IRS200310	IRS	4	2	HW - Halodule wrightii	HW
IRS200311	IRS	1	1	HW - Halodule wrightii	HW
IRS200311	IRS	1.1	4	DR - Drift Reds	DR
IRS200311	IRS	2	2	HW - Halodule wrightii	HW
IRS200311	IRS	2.1	4	DR - Drift Reds	DR
IRS200311	IRS	3	2	HW - Halodule wrightii	HW
IRS200311	IRS	3.1	3	DR - Drift Reds	DR
IRS200311	IRS	4	3	HW - Halodule wrightii	HW
IRS200311	IRS	4.1	3	DR - Drift Reds	DR
IRS200311	IRS	4.2	0.5	CA - Caulerpa	CA
IRS200313	IRS	1 Bare		Bare	Bare
IRS200313	IRS	2	0.5	HW - Halodule wrightii	HW
IRS200313	IRS	3	1	HW - Halodule wrightii	HW
IRS200313	IRS	4	0.5	HW - Halodule wrightii	HW
IRS200315	IRS	1	4	SF - Syringodium filiforme	SF
IRS200315	IRS	2	5	SF - Syringodium filiforme	SF
IRS200315	IRS	3	2	SF - Syringodium filiforme	SF
IRS200315	IRS	4	4	SF - Syringodium filiforme	SF
IRS200315	IRS	4.1	0.5	CA - Caulerpa	CA
IRS200316	IRS	1 Bare		Bare	Bare
IRS200316	IRS	2 Bare		Bare	Bare
IRS200316	IRS	3 Bare		Bare	Bare
IRS200316	IRS	4 Bare		Bare	Bare
IRS200317	IRS	1	0.5	CA - Caulerpa	CA
IRS200317	IRS	2 Bare		Bare	Bare
IRS200317	IRS	3 Bare		Bare	Bare
IRS200317	IRS	4 Bare		Bare	Bare
IRS200318	IRS	1	3	SF - Syringodium filiforme	SF
IRS200318	IRS	2	3	SF - Syringodium filiforme	SF
IRS200318	IRS	2.1	3	DR - Drift Reds	DR
IRS200318	IRS	3	3	SF - Syringodium filiforme	SF
IRS200318	IRS	3.1	3	DR - Drift Reds	DR
IRS200318	IRS	4	3	SF - Syringodium filiforme	SF
IRS200318	IRS	4.1	3	DR - Drift Reds	DR
IRS200319	IRS	1	2	SF - Syringodium filiforme	SF
IRS200319	IRS	1.1	2	GR - Gracilaria	GR
IRS200319	IRS	2	2	SF - Syringodium filiforme	SF
IRS200319	IRS	2.1	1	GR - Gracilaria	GR
IRS200319	IRS	3	2	HW - Halodule wrightii	HW
IRS200319	IRS	4	3	SF - Syringodium filiforme	SF
IRS200319	IRS	4.1	1	GR - Gracilaria	GR
IRS200326	IRS	1	2	CA - Caulerpa	CA
IRS200326	IRS	2	2	CA - Caulerpa	CA
IRS200326	IRS	3	2	CA - Caulerpa	CA
IRS200326	IRS	4	3	CA - Caulerpa	CA
STR200309	ST	1	2	CA - Caulerpa	CA
STR200309	ST	2	2	CA - Caulerpa	CA
STR200309	ST	3	2	CA - Caulerpa	CA
STR200309	ST	3.1	0.5	DR - Drift Reds	DR

STR200309	ST	4	5	CA - Caulerpa	CA
STR200309	ST	4.1	1	DR - Drift Reds	DR
STR200315	ST	1	2	TT - Thalassia testudinum	TT
STR200315	ST	2	2	TT - Thalassia testudinum	TT
STR200315	ST	3	2	TT - Thalassia testudinum	TT
STR200315	ST	3.1	1	HW - Halodule wrightii	HW
STR200315	ST	4	3	TT - Thalassia testudinum	TT
STR200318	ST	1	3	TT - Thalassia testudinum	TT
STR200318	ST	1.1	0.5	CGP - Penicillus	CGP
STR200318	ST	1.2	1	ACS - Acanthophora spp.	ACS
STR200318	ST	2	3	TT - Thalassia testudinum	TT
STR200318	ST	2.1	1	CGP - Penicillus	CGP
STR200318	ST	2.2	0.5	CGA - Acetabularia	CGA
STR200318	ST	2.3	1	ACS - Acanthophora spp.	ACS
STR200318	ST	3	3	TT - Thalassia testudinum	TT
STR200318	ST	3.1	0.5	CGH - Halimeda	CGH
STR200318	ST	3.2	1	ACS - Acanthophora spp.	ACS
STR200318	ST	3.3	0.5	CGP - Penicillus	CGP
STR200318	ST	4	3	TT - Thalassia testudinum	TT
STR200318	ST	4.1	2	ACS - Acanthophora spp.	ACS
STR200318	ST	4.2	0.5	CGP - Penicillus	CGP
STR200318	ST	4.3	0.5	CGH - Halimeda	CGH
STR200320	ST	1	1	TT - Thalassia testudinum	TT
STR200320	ST	1.1	0.1	CGA - Acetabularia	CGA
STR200320	ST	1.2	0.5	BA - Batophora	BA
STR200320	ST	1.3	0.5	CGH - Halimeda	CGH
STR200320	ST	2	1	TT - Thalassia testudinum	TT
STR200320	ST	2.1	2	DR - Drift Reds	DR
STR200320	ST	2.2	1	BA - Batophora	BA
STR200320	ST	3	1	TT - Thalassia testudinum	TT
STR200320	ST	3.1	0.5	CGH - Halimeda	CGH
STR200320	ST	4	2	TT - Thalassia testudinum	TT
STR200320	ST	4.1	1	CGP - Penicillus	CGP
STR200320	ST	4.2	0.5	CGH - Halimeda	CGH
STR200322	ST	1	2	TT - Thalassia testudinum	TT
STR200322	ST	2	2	TT - Thalassia testudinum	TT
STR200322	ST	3	2	TT - Thalassia testudinum	TT
STR200322	ST	4	2	TT - Thalassia testudinum	TT
STR200323	ST	1	3	TT - Thalassia testudinum	TT
STR200323	ST	1.1	2	SF - Syringodium filiforme	SF
STR200323	ST	1.2	0.5	CGP - Penicillus	CGP
STR200323	ST	1.3	0.5	CGH - Halimeda	CGH
STR200323	ST	2	3	TT - Thalassia testudinum	TT
STR200323	ST	2.1	0.5	CGP - Penicillus	CGP
STR200323	ST	2.2	0.5	CGH - Halimeda	CGH
STR200323	ST	3	3	TT - Thalassia testudinum	TT
STR200323	ST	3.1	2	SF - Syringodium filiforme	SF
STR200323	ST	3.2	1	GO - Green Other	GO
STR200323	ST	3.3	1	CGO - Calcareous Green	CGO
STR200323	ST	4	0.5	Other	CGO
STR200323	ST	4	0.5	TT - Thalassia testudinum	TT

STR200323	ST	4.1	1	CGH - Halimeda	CGH
STR200323	ST	4.2	1	CGP - Penicillus	CGP
STR200323	ST	4.3	2	SF - Syringodium filiforme	SF
STR200323	ST	4.4	0.5	CA - Caulerpa	CA
STR200324	ST	1	4	TT - Thalassia testudinum	TT
STR200324	ST	2	5	TT - Thalassia testudinum	TT
STR200324	ST	2.1	0.1	CGP - Penicillus	CGP
STR200324	ST	3	3	TT - Thalassia testudinum	TT
STR200324	ST	3.1	0.5	CGH - Halimeda	CGH
STR200324	ST	4	3	TT - Thalassia testudinum	TT
STR200324	ST	4.1	0.1	CGP - Penicillus	CGP
STR200325	ST	1	5	TT - Thalassia testudinum	TT
STR200325	ST	1.1	2	SF - Syringodium filiforme	SF
STR200325	ST	1.2	0.5	CGP - Penicillus	CGP
STR200325	ST	2	5	TT - Thalassia testudinum	TT
STR200325	ST	2.1	2	SF - Syringodium filiforme	SF
STR200325	ST	3	4	TT - Thalassia testudinum	TT
STR200325	ST	3.1	2	SF - Syringodium filiforme	SF
STR200325	ST	3.2	0.5	CGP - Penicillus	CGP
STR200325	ST	4	4	TT - Thalassia testudinum	TT
STR200325	ST	4.1	2	SF - Syringodium filiforme	SF
STR200325	ST	4.2	0.5	CGH - Halimeda	CGH
STR200326	ST	1	1	TT - Thalassia testudinum	TT
STR200326	ST	1.1	2	CGU - Udotea	CGU
STR200326	ST	2	1	TT - Thalassia testudinum	TT
STR200326	ST	2.1	3	CGO - Calcareous Green	CGO
STR200326	ST	2.2	0.5	Other	CGO
STR200326	ST	3	0.5	CGP - Penicillus	CGP
STR200326	ST	3.1	0.5	CGU - Udotea	CGU
STR200326	ST	4	0.5	CGP - Penicillus	CGP
STR200326	ST	4.1	1	TT - Thalassia testudinum	TT
STR200326	ST	4.2	1	CGP - Penicillus	CGP
STR200326	ST	4.2	0.5	CGH - Halimeda	CGH
STR200327	ST	1	2	TT - Thalassia testudinum	TT
STR200327	ST	1.1	1	CGP - Penicillus	CGP
STR200327	ST	2	2	TT - Thalassia testudinum	TT
STR200327	ST	2.1	1	CGP - Penicillus	CGP
STR200327	ST	3	3	TT - Thalassia testudinum	TT
STR200327	ST	3.1	0.5	CGP - Penicillus	CGP
STR200327	ST	3.2	0.5	CGH - Halimeda	CGH
STR200327	ST	4	2	TT - Thalassia testudinum	TT
STR200327	ST	4.1	1	CGH - Halimeda	CGH
STR200327	ST	4.2	1	CGP - Penicillus	CGP
STR200328	ST	1	2	CGP - Penicillus	CGP
STR200328	ST	1.1	2	CGU - Udotea	CGU
STR200328	ST	1.2	2	CGH - Halimeda	CGH
STR200328	ST	2	2	CGP - Penicillus	CGP
STR200328	ST	2.1	2	CGU - Udotea	CGU
STR200328	ST	3	2	CGP - Penicillus	CGP
STR200328	ST	3.1	2	CGH - Halimeda	CGH
STR200328	ST	4	3	CGH - Halimeda	CGH

STR200328	ST	4.1	2	CGP - Penicillus	CGP
STR200329	ST	1	5	TT - Thalassia testudinum	TT
STR200329	ST	1.1	0.5	CGP - Penicillus	CGP
STR200329	ST	2	4	TT - Thalassia testudinum	TT
STR200329	ST	3	4	TT - Thalassia testudinum	TT
STR200329	ST	3.1	0.5	CGP - Penicillus	CGP
STR200329	ST	3.2	0.5	CGA - Acetabularia	CGA
STR200329	ST	3.3	0.5	CGH - Halimeda	CGH
STR200329	ST	4	5	TT - Thalassia testudinum	TT
STR200329	ST	4.1	0.5	CGA - Acetabularia	CGA
STR200330	ST	1	2	TT - Thalassia testudinum	TT
STR200330	ST	1.1	2	BA - Batophora	BA
STR200330	ST	2	2	TT - Thalassia testudinum	TT
STR200330	ST	2.1	0.5	CGP - Penicillus	CGP
STR200330	ST	3	2	TT - Thalassia testudinum	TT
STR200330	ST	3.1	0.5	CGP - Penicillus	CGP
STR200330	ST	4	2	TT - Thalassia testudinum	TT
STR200330	ST	4.1	0.5	CGP - Penicillus	CGP
STT200306	ST	1	4	HW - Halodule wrightii	HW
STT200306	ST	2	3	HW - Halodule wrightii	HW
STT200306	ST	3	4	HW - Halodule wrightii	HW
STT200306	ST	4	3	HW - Halodule wrightii	HW
STT200310	ST	1	2	TT - Thalassia testudinum	TT
STT200310	ST	2	0.5	TT - Thalassia testudinum	TT
STT200310	ST	2.1	0.5	BA - Batophora	BA
STT200310	ST	3	1	TT - Thalassia testudinum	TT
STT200310	ST	3.1	0.5	BA - Batophora	BA
STT200310	ST	4	1	TT - Thalassia testudinum	TT
SUW200324	SUW	1	3	HW - Halodule wrightii	HW
SUW200324	SUW	2	2	HW - Halodule wrightii	HW
SUW200324	SUW	2.1	1	LA - Laurencia	LA
SUW200324	SUW	3	2	HW - Halodule wrightii	HW
SUW200324	SUW	3.1	0.5	LA - Laurencia	LA
SUW200324	SUW	4	3	HW - Halodule wrightii	HW
SUW200324	SUW	4.1	1	LA - Laurencia	LA
SUW200325	SUW	1	2	SF - Syringodium filiforme	SF
SUW200325	SUW	1.1	1	CA - Caulerpa	CA
SUW200325	SUW	2	2	SF - Syringodium filiforme	SF
SUW200325	SUW	2.1	2	CA - Caulerpa	CA
SUW200325	SUW	3	3	SF - Syringodium filiforme	SF
SUW200325	SUW	3.1	2	CA - Caulerpa	CA
SUW200325	SUW	4			
SUW200327	SUW	1	4	TT - Thalassia testudinum	TT
SUW200327	SUW	2	3	TT - Thalassia testudinum	TT
SUW200327	SUW	3	4	TT - Thalassia testudinum	TT
SUW200327	SUW	4	4	TT - Thalassia testudinum	TT
WCC200301	WCC	1	5	SG - Sargassum	SG
WCC200301	WCC	2	4	SG - Sargassum	SG
WCC200301	WCC	2.1	2	CA - Caulerpa	CA
WCC200301	WCC	3	5	SG - Sargassum	SG
WCC200301	WCC	3.1	1	ACS - Acanthophora spp.	ACS

WCC200301	WCC	4	5	SG - Sargassum	SG
WCC200303	WCC	1	2	SF - Syringodium filiforme	SF
WCC200303	WCC	1.1	0.5	ACS - Acanthophora spp.	ACS
WCC200303	WCC	2	1	SF - Syringodium filiforme	SF
WCC200303	WCC	3	Bare	Bare	Bare
WCC200303	WCC	4	2	SF - Syringodium filiforme	SF
WCC200304	WCC	1	5	SF - Syringodium filiforme	SF
WCC200304	WCC	2	5	SF - Syringodium filiforme	SF
WCC200304	WCC	3	4	SF - Syringodium filiforme	SF
WCC200304	WCC	3.1	0.5	BA - Batophora	BA
WCC200304	WCC	4	4	SF - Syringodium filiforme	SF
WCC200304	WCC	4.1	0.5	BA - Batophora	BA
WCC200305	WCC	1	3	HW - Halodule wrightii	HW
WCC200305	WCC	2	4	HW - Halodule wrightii	HW
WCC200305	WCC	3	3	HW - Halodule wrightii	HW
WCC200305	WCC	4	4	HW - Halodule wrightii	HW
WCC200306	WCC	1	2	SF - Syringodium filiforme	SF
WCC200306	WCC	1.1	1	CA - Caulerpa	CA
WCC200306	WCC	2	2	TT - Thalassia testudinum	TT
WCC200306	WCC	2.1	2	SF - Syringodium filiforme	SF
WCC200306	WCC	2.2	1	CA - Caulerpa	CA
WCC200306	WCC	3	2	SF - Syringodium filiforme	SF
WCC200306	WCC	3.1	0.5	CA - Caulerpa	CA
WCC200306	WCC	3.2	0.5	GO - Green Other	GO
WCC200306	WCC	4	4	TT - Thalassia testudinum	TT
WCC200306	WCC	4.1	0.5	SF - Syringodium filiforme	SF
WCC200306	WCC	4.2	0.5	CA - Caulerpa	CA
WCC200308	WCC	1	2	CA - Caulerpa	CA
WCC200308	WCC	1.1	2	TT - Thalassia testudinum	TT
WCC200308	WCC	1.2	1	BA - Batophora	BA
WCC200308	WCC	2	3	TT - Thalassia testudinum	TT
WCC200308	WCC	2.1	2	CA - Caulerpa	CA
WCC200308	WCC	3	1	CGP - Penicillus	CGP
WCC200308	WCC	3.1	2	CA - Caulerpa	CA
WCC200308	WCC	3.2	4	TT - Thalassia testudinum	TT
WCC200308	WCC	4	5	TT - Thalassia testudinum	TT
WCC200308	WCC	4.1	0.5	CA - Caulerpa	CA
WCC200308	WCC	4.2	0.5	CGH - Halimeda	CGH
WCC200309	WCC	1	4	TT - Thalassia testudinum	TT
WCC200309	WCC	1.1	2	CGP - Penicillus	CGP
WCC200309	WCC	1.2	0.1	CA - Caulerpa	CA
WCC200309	WCC	1.3	0.5	CGH - Halimeda	CGH
WCC200309	WCC	2	0.5	CA - Caulerpa	CA
WCC200309	WCC	2.1	2	CGP - Penicillus	CGP
WCC200309	WCC	2.2	4	TT - Thalassia testudinum	TT
WCC200309	WCC	3	4	TT - Thalassia testudinum	TT
WCC200309	WCC	3.1	0.5	CA - Caulerpa	CA
WCC200309	WCC	3.2	2	CGP - Penicillus	CGP
WCC200309	WCC	3.3	1	ACS - Acanthophora spp.	ACS
WCC200309	WCC	4	3	TT - Thalassia testudinum	TT
WCC200309	WCC	4.1	3	ACS - Acanthophora spp.	ACS

WCC200309	WCC	4.2	2	CGP - Penicillus	CGP
WCC200310	WCC	1	5	TT - Thalassia testudinum	TT
WCC200310	WCC	2	5	TT - Thalassia testudinum	TT
WCC200310	WCC	2.1	2	ACS - Acanthophora spp.	ACS
WCC200310	WCC	3	4	ACS - Acanthophora spp.	ACS
WCC200310	WCC	3.1	1	TT - Thalassia testudinum	TT
WCC200310	WCC	3.2	2	SF - Syringodium filiforme	SF
WCC200310	WCC	4	5	TT - Thalassia testudinum	TT
WCC200310	WCC	4.1	0.5	SF - Syringodium filiforme	SF
WCC200311	WCC	1 Bare		Bare	Bare
WCC200311	WCC	2 Bare		Bare	Bare
WCC200311	WCC	3 Bare		Bare	Bare
WCC200311	WCC	4 Bare		Bare	Bare
WCC200312	WCC	1	2	TT - Thalassia testudinum	TT
WCC200312	WCC	1.1	0.5	ACS - Acanthophora spp. CGO - Calcareous Green	ACS
WCC200312	WCC	1.2	0.5	Other CGO - Calcareous Green	CGO
WCC200312	WCC	2	0.5	Other	CGO
WCC200312	WCC	2.1	0.5	CGP - Penicillus	CGP
WCC200312	WCC	2.2	0.5	GO - Green Other	GO
WCC200312	WCC	3	2	HW - Halodule wrightii	HW
WCC200312	WCC	3.1	2	CGP - Penicillus CGO - Calcareous Green	CGP
WCC200312	WCC	3.2	1	Other	CGO
WCC200312	WCC	4	2	HW - Halodule wrightii CGO - Calcareous Green	HW
WCC200312	WCC	4.1	2	Other	CGO
WCC200313	WCC	1	5	HW - Halodule wrightii	HW
WCC200313	WCC	1.1	2	GO - Green Other	GO
WCC200313	WCC	2	5	HW - Halodule wrightii	HW
WCC200313	WCC	2.1	2	GO - Green Other	GO
WCC200313	WCC	3	5	HW - Halodule wrightii	HW
WCC200313	WCC	3.1	2	GO - Green Other	GO
WCC200313	WCC	4	5	HW - Halodule wrightii	HW
WCC200313	WCC	4.1	2	GO - Green Other	GO
WCC200314	WCC	1	1	CA - Caulerpa	CA
WCC200314	WCC	1.1	1	CGH - Halimeda	CGH
WCC200314	WCC	2	1	HW - Halodule wrightii	HW
WCC200314	WCC	2.1	1	CA - Caulerpa	CA
WCC200314	WCC	3	1	TT - Thalassia testudinum	TT
WCC200314	WCC	3.1	1	CGP - Penicillus	CGP
WCC200314	WCC	3.2	1	CGH - Halimeda	CGH
WCC200314	WCC	4	1	ACS - Acanthophora spp.	ACS
WCC200315	WCC	1	1	TT - Thalassia testudinum	TT
WCC200315	WCC	1.1	0.5	CGP - Penicillus	CGP
WCC200315	WCC	2	2	CGP - Penicillus	CGP
WCC200315	WCC	3	4	CGP - Penicillus	CGP
WCC200315	WCC	4	3	TT - Thalassia testudinum	TT
WCC200315	WCC	4.1	3	CGP - Penicillus	CGP
WCC200316	WCC	1	2	HE - Halophila engelmannii	HE
WCC200316	WCC	1.1	2	HW - Halodule wrightii	HW
WCC200316	WCC	2	3	HE - Halophila engelmannii	HE

WCC200316	WCC	3		3	SG - Sargassum	SG
WCC200316	WCC	3.1		1	LA - Laurencia	LA
WCC200316	WCC	4		3	SG - Sargassum	SG
WCC200316	WCC	4.1		2	HW - Halodule wrightii	HW
WCC200317	WCC	1		2	TT - Thalassia testudinum	TT
WCC200317	WCC	1.1		1	GR - Gracilaria	GR
WCC200317	WCC	2		2	TT - Thalassia testudinum	TT
WCC200317	WCC	3		3	TT - Thalassia testudinum	TT
WCC200317	WCC	4		3	TT - Thalassia testudinum	TT
WCC200318	WCC	1		2	HW - Halodule wrightii	HW
WCC200318	WCC	2		2	HW - Halodule wrightii	HW
WCC200318	WCC	3		3	HW - Halodule wrightii	HW
WCC200318	WCC	4		3	HW - Halodule wrightii	HW
WCC200320	WCC	1	Bare		Bare	Bare
WCC200320	WCC	2		3	TT - Thalassia testudinum	TT
WCC200320	WCC	3		2	TT - Thalassia testudinum	TT
WCC200320	WCC	4	Bare		Bare	Bare
WCC200321	WCC	1		4	SF - Syringodium filiforme	SF
WCC200321	WCC	2		4	SF - Syringodium filiforme	SF
WCC200321	WCC	3		4	SF - Syringodium filiforme	SF
WCC200321	WCC	4		4	SF - Syringodium filiforme	SF
WCC200321	WCC	1		4	SF - Syringodium filiforme	SF
WCC200321	WCC	2		4	SF - Syringodium filiforme	SF
WCC200321	WCC	3		4	SF - Syringodium filiforme	SF
WCC200321	WCC	4		4	SF - Syringodium filiforme	SF
WCC200322	WCC	1		4	HW - Halodule wrightii	HW
WCC200322	WCC	2		4	HW - Halodule wrightii	HW
WCC200322	WCC	3		4	HW - Halodule wrightii	HW
WCC200322	WCC	4		4	HW - Halodule wrightii	HW
WCC200323	WCC	1		4	HW - Halodule wrightii	HW
WCC200323	WCC	2		5	HW - Halodule wrightii	HW
WCC200323	WCC	3		4	HW - Halodule wrightii	HW
WCC200323	WCC	3.1		0.5	TT - Thalassia testudinum	TT
WCC200323	WCC	4		5	HW - Halodule wrightii	HW
WCC200324	WCC	1	Bare		Bare	Bare
WCC200324	WCC	2	Bare		Bare	Bare
WCC200324	WCC	3	Bare		Bare	Bare
WCC200324	WCC	4	Bare		Bare	Bare
WCC200328	WCC	1		4	RM - Ruppia maritima	RM
WCC200328	WCC	2	Bare		Bare	Bare
WCC200328	WCC	3		2	RM - Ruppia maritima	RM
WCC200328	WCC	4		2	RM - Ruppia maritima	RM
WCC200329	WCC	1		1	HW - Halodule wrightii	HW
WCC200329	WCC	2		1	HW - Halodule wrightii	HW
WCC200329	WCC	3		1	HW - Halodule wrightii	HW
WCC200329	WCC	4		1	HW - Halodule wrightii	HW

Braun Blanquet Code	Cover/ Abundance
0.1	Solitary, with small cover
0.5	Few, with small cover
1	Numerous, but less than 5% cover, or scattered with up to 5% cover
2	Any number, with 5-25% cover
3	Any number, with 25-50% cover
4	Any number, with 50-75% cover
5	Any number, with cover of more than 75% of the quad

Appendix B

IMAP Metadata from the Fish and Wildlife Research Institute's Metadata Management System

IMAP_Inshore Marine Monitoring and Assessment Program Database

[Identification Information](#)
[Data Quality Information](#)
[Entity and Attribute Information](#)
[Distribution Information](#)
[Metadata Reference Information](#)

Identification Information

[Section Index](#)

Citation:

Citation Information:

Originator: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Publication Date: Unpublished Material

Publication Time: Unknown

Title: IMAP_Inshore Marine Monitoring and Assessment Program Database

Geospatial Data Presentation Form: Database

Online Linkage: [G:\Groups\RHA\qilstuff\IMAPFIELD\Manual](#)

Description:

Abstract:

Florida's inshore marine resources are one of the state's most valuable assets. They are unique and diverse, ranging from major embayments and lagoons to smaller estuaries at river mouths to tidal marshes and mangrove forests which merge directly with the sea. IMAP is a collaborative project between EPA and the FWC Fish and Wildlife Research Institute (FWRI) designed to assess the ecological condition of Florida's inshore waters using a set of ecological indicators. Much of the field capability for IMAP will be provided by FWRI's Fisheries Independent Monitoring Program (FIM). The FIM program operates out of FWRI field labs in Apalachicola, Cedar Key, Tampa Bay, Charlotte Harbor, Marathon, Tequesta, and Melbourne. To ensure that sample locations are selected in an unbiased manner, a hexagonal grid is used to define sampling areas in IMAP. IMAP samples on two different scales: statewide and regional. The regions correspond to Florida's 5 Water Management Districts (WMD). At both scales, sample sites are determined randomly within a network of hexagonal grids. IMAP does not have the resources to characterize the variation in each indicator over fine spatial and temporal scales. Because of this limitation, the IMAP sampling design focuses on characterizing spatial differences. IMAP will sample only once a year, but cover several locations throughout the state during each sampling period. In order for this strategy to work, there must be an identifiable time window (an index period) within which inshore resources are under significant stress, and conditions are not changing dramatically. Although there are exceptions, for most of Florida, a late summer index period meets these criteria. Under this framework, IMAP will sample 180 stations each year during a concentrated late-summer index period. IMAP indicators are environmental measurements that are used to reflect the quality of the ecosystem from which they are sampled. It is critical that these indicators are 1) responsive to environmental problems (such as pollution or nutrient enrichment), 2) easily measured, and 3) representative of the area being sampled. Highly mobile organisms or those that are tolerant of environmental pollution are not good choices in this type of program. The indicators chosen for IMAP can be divided into two broad categories: physical/chemical and biological. Physical/chemical indicators chosen for IMAP include the traditional water quality measurements such as temperature, salinity, dissolved oxygen, and pH, in addition to nutrients and chlorophyll a, which are indicators of productivity. Most water quality measurements will be obtained using an automated sampler (Hydrolab). Environmental contamination will be assessed by collecting both sediment and fish tissue for chemical analyses. IMAP biological indicators integrate environmental stressors over larger spatial and temporal scales. Fish, crabs and shrimp will be sampled with trawls and seines. Community composition will be assessed by identifying and counting all animals in the sample. In addition, all fish and shrimp will be examined for gross external pathologies (lumps, lesions, ulcers, skeletal abnormalities) and any abnormal individuals will be returned to the lab for pathological examination. Seagrass community composition will be assessed with two methods: 1) a visual examination of % cover occupied by each species, and 2) a core sample in which seagrasses and the underlying sediment are returned to the lab for detailed analyses. Benthic macroinvertebrates will be sampled to determine community composition and the occurrence of pollution tolerant or intolerant species. Some dinoflagellates produce toxins that

are harmful to marine life. These organisms are extremely small so the toxins they produce are only a problem when they are very numerous (that is, when an algae bloom occurs). Recent studies indicate that several different types of dinoflagellates

Purpose:

This program is designed to assess the ecological condition of Florida's marine aquatic ecosystems through synoptic sampling of key indicators of environmental quality. These assessments, in turn, are used to identify potentially degraded areas and to direct management initiatives. Projects within this program constitute the estuarine and coastal component of the FWC and Florida Department of Environmental Protection's Integrated Water Resource Monitoring Network, which integrates groundwater, freshwater, and nearshore marine monitoring under a common framework.

Much of the research and monitoring conducted in Florida's marine ecosystems is directed toward particular environmental perturbations (e.g., harmful algal blooms) or economically important species (e.g., sportfish). Although these directed-research initiatives provide valuable information on the status and trends of particular components of an ecosystem, they are not designed to provide an overall assessment of ecological condition. The projects within the Environmental Monitoring and Assessment program are designed to provide, with a known degree of certainty, assessments of Florida's marine ecosystems on both a regional and statewide basis.

Time Period of Content:

Time Period Information:

Range of Dates/Times:

Beginning Date: 11/1/1999

Beginning Time: Unknown

Ending Date: 12/31/2004

Ending Time: Unknown

Currentness Reference: Project Date

Status:

Progress: In Work

Maintenance and Update Frequency: Quarterly

Spatial Domain:

Description of Geographic Extent: State of Florida

Keywords:

Theme:

Theme Keyword Thesaurus: FWRltheme

Theme Keyword: assessment

Theme Keyword: biology

Theme Keyword: coastal

Theme Keyword: marine

Theme Keyword: monitoring

Place:

Place Keyword Thesaurus: FWRlplace

Place Keyword: Florida

Stratum:

Stratum Keyword Thesaurus: FWRlstratum

Taxonomy:

Keywords/Taxon:

Taxonomic Keyword Thesaurus: FWRlcommon names

Taxonomic System:

Identification Reference:

Citation Information:

Originator: Charles C. Davis

Publication Date: March 1948

Title: *Gymnodinium brevis* sp. Nov., A Cause of Discolored Water and Animal Mortality in the Gulf of Mexico

Edition: The Botanical Gazette Vol. 109, No. 3

Series Information:

Series Name: The Botanical Gazette

Issue Identification: Vol. 109

Publication Information:

Publication Place: USA

Taxonomic Classification:

Taxon Rank Name: Kingdom

Taxonomic Classification:

Taxon Rank Name: Division

Taxonomic Classification:

Taxon Rank Name: Class

Taxonomic Classification:

Taxon Rank Name: Sub Class

Taxonomic Classification:

Taxon Rank Name: Order

Taxonomic Classification:

Taxon Rank Name: Family

Taxonomic Classification:

Taxon Rank Name: Genus
Taxonomic Classification:
Taxon Rank Name: Species

Access Constraints: All data must be verified by Principle Investigator or Group Database Analyst prior to release.
Use Constraints: All data must be credited to Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute.

Point of Contact:

Contact Information:

Contact Person Primary:

Contact Person: Julian, Marc

Contact Organization: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Contact Address:

Address Type: mailing and physical address

Address:

Fish and Wildlife Research Institute 100 Eighth Avenue Southeast

City: St. Petersburg

State or Province: FL

Postal Code: 33701-5095

Country: USA

Contact Voice Telephone: 727-896-8626

Contact Facsimile Telephone: 727- 823-0166

Contact Electronic Mail Address: metadata@fwc.state.fl.us

Data Set Credit: Funding Source - Environmental Protection Agency

Native Data Set Environment: Microsoft Access

Cross Reference:

Citation Information:

Originator: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Publication Date: Unpublished Material

Publication Time: Unknown

Title: IMAP_Inshore Marine Monitoring and Assessment Program Database

Geospatial Data Presentation Form: Database

Online Linkage: <G:\Groups\RHA\qilstuff\IMAPFIELD\Manual>

Analytical Tool:

Analytical Tool Description: The database was made using Microsoft Access.

Analytical Tool:

Analytical Tool Description:

Desktop Geographical Information System with an easy-to-use, point-and-click graphical user interface that lets you easily load spatial and tabular data so you can display the data as maps, tables, and charts. ArcView provides tools to query and analyze the data and present your results as presentation-quality maps.

Tool Access Information:

Online Linkage: <http://www.esri.com/>

Tool Contact:

Contact Information:

Contact Organization Primary:

Contact Organization: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Contact Address:

Address Type: mailing and physical address

Address:

Fish and Wildlife Research Institute 100 Eighth Avenue Southeast

City: St. Petersburg

State or Province: FL

Postal Code: 33701-5095

Country: USA

Contact Voice Telephone: 727-896-8626

Contact Facsimile Telephone: 727- 823-0166

Contact Electronic Mail Address: metadata@fwc.state.fl.us

Tool Citation:

Citation Information:

Originator: Environmental Systems Research Institute

Publication Date: 1996

Title: Introduction to ArcView GIS

Geospatial Data Presentation Form: Book chapter

Data Quality Information

[Section Index](#)

Attribute Accuracy:

Attribute Accuracy Report: All entities and attributes have been identified and documented.

Logical Consistency Report: Data in Access database (original data source) are proofed for agreement with hard copy field data sheets. No further efforts have been made to verify the logical consistency of these data.

Completeness Report: Due to equipment failure, weather, or inaccessibility of selected station coordinates, data may be selectively incomplete.

Lineage:

Methodology:

Methodology Type: Field and Lab

Methodology Identifier:

Methodology Keyword Thesaurus: None

Methodology Description: L:\IMAP\Field Manual

Methodology Citation:

Citation Information:

Originator: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Publication Date: Unpublished Material

Publication Time: Unknown

Title: IMAP_Inshore Marine Monitoring and Assessment Program Database

Geospatial Data Presentation Form: Database

Online Linkage: <G:\Groups\RHA\qilstuff\IMAPFIELD\Manual>

Cloud Cover: Unknown

Entity and Attribute Information

[Section Index](#)

Detailed Description:

Entity Type:

Entity Type Label: Initial Sampling Main Record

Entity Type Definition: Information pertaining to the actual visitation of the site to be sampled during the primary examination

Attribute:

Attribute Label: Actual Latitude

Attribute Definition: Latitude recorded at sampling site.

Attribute Value Accuracy Information:

Attribute Value Accuracy Explanation: Information is captured in both decimal degrees and degrees and decimal minutes. Decimal degrees may be calculated from degrees and decimal minutes.

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Actual Longitude

Attribute Definition: Longitude recorded at sampling site.

Attribute Value Accuracy Information:

Attribute Value Accuracy Explanation: Information is captured in both decimal degrees and degrees and decimal minutes. Decimal degrees may be calculated from degrees and decimal minutes.

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Bay

Attribute Definition: Two alpha character code used for the identification of an area in which the sample was taken

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: AP

Enumerated Domain Value Definition: Apalachicola Bay

Enumerated Domain Value: CH

Enumerated Domain Value Definition: Charlotte Harbor Bay

Enumerated Domain Value: CK

Enumerated Domain Value Definition: Cedar Key Bay

Enumerated Domain Value: IR

Enumerated Domain Value Definition: Indian River Bay

Enumerated Domain Value: KY

Enumerated Domain Value Definition: Florida Keys Bay

Enumerated Domain Value: SA

Enumerated Domain Value Definition: Santa Rosa Bay

Enumerated Domain Value: TB

Enumerated Domain Value Definition: Tampa Bay

Enumerated Domain Value: TQ

Enumerated Domain Value Definition: Tequesta Bay

Attribute Measurement Frequency: Required on every record

Attribute:

Attribute Label: Boat

Attribute Definition: Single alphanumeric character used to identify boat used to conduct sampling.

Attribute Definition Source: FIM data manual
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Available from "FIMCodes" table "Comments" field.
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: Null value available when no boat was used.
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: Collection Number
Attribute Definition: Four digit number used to identify sample collection (year 2000 definition)
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: Crew1
Attribute Definition: Initials of crew member who comprised the sampling team.
Attribute Measurement Frequency: As needed
Attribute:
Attribute Label: Crew2
Attribute Definition: Initials of crew member who comprised the sampling team.
Attribute Measurement Frequency: As needed
Attribute:
Attribute Label: Crew3
Attribute Definition: Initials of crew member who comprised the sampling team.
Attribute Measurement Frequency: As needed
Attribute:
Attribute Label: Crew4
Attribute Definition: Initials of crew member who comprised the sampling team.
Attribute Measurement Frequency: As needed
Attribute:
Attribute Label: Distance from Target
Attribute Definition: Calculated estimation of distance between Actual location and Target location in nautical miles.
Attribute Definition Source: <http://nmml.afsc.noaa.gov/Software/ExcelGeoFunctions/excelgeofunc.htm>
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: $60 * \arccos(\sin(Rlat1) * \sin(Rlat2) + \cos(Rlat1) * \cos(Rlat2) * \cos(Rlon))$
Attribute Measurement Frequency: Required where "Actual Coordinates" were measured.
Attribute:
Attribute Label: F,M,G
Attribute Definition: Code used to identify sampling methodology. Default is M for the IMAP project
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: FIM Number
Attribute Definition: Code used to connect an IMAP record set to the FIM database.
Attribute Measurement Frequency: Required on every record
Attribute:
Attribute Label: Gear
Attribute Definition: Numeric code used to identify sampling gear used and method it was deployed.
Attribute Definition Source: FIM Data Manual
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value:
See database "Gear Codes" table, "Comments" field for definitions
Enumerated Domain Value Definition Source: FIM Data Manual
Attribute Measurement Frequency: Required on every record containing Fisheries information
Attribute:
Attribute Label: Instrument
Attribute Definition: Single alpha character used to indicated instrument used to capture location Latitude and Longitude of sampling site.
Attribute Definition Source: FIM data manual
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: L
Enumerated Domain Value Definition: Loran
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: C
Enumerated Domain Value Definition: Chart
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: D
Enumerated Domain Value Definition: Differential GPS
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: G

Enumerated Domain Value Definition: GPS (Not differencial)
Enumerated Domain Value Definition Source: FIM Data Manual

Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Primary Investigator
Attribute Definition: Initials of Primary Investigator who headed the sampling team.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Project
Attribute Definition: Single alpha character code used to identify project samples were collected for. Default for IMAP is I.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: R
Enumerated Domain Value Definition: River Sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: M
Enumerated Domain Value Definition: Regular FIM Sampling
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: I
Enumerated Domain Value Definition: IMAP
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: H
Enumerated Domain Value Definition: Hatchery Release Monitoring
Enumerated Domain Value Definition Source: FIM data manual
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.
Attribute Definition Source: Thomas Corbin
Beginning Date of Attribute Values: Initial Sampling start date
Ending Date of Attribute Values: Initial Sampling end date
Attribute Value Accuracy Information:
Attribute Value Accuracy Explanation: Dependent upon entry of information used to create field.
Attribute Measurement Frequency: Every Record

Attribute:
Attribute Label: Rep
Attribute Definition: Number indicating which net set the recorded samples came from. Default of 1.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Sampling date
Attribute Definition: Date when IMAP site was initially visited and sampled
Beginning Date of Attribute Values: Not less than 2000
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Start Depth
Attribute Definition: Depth of station at the start of sampling. Measured in meters
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Start Time
Attribute Definition: Start time sampling began at site. Captured in 24 hour military time.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Station code
Attribute Definition:
Code used to identify location of the sampling site. Consists of three alpha characters depicting the sampling type, four numeric characters depicting the year sampling will occur, and up to three numeric characters depicting the individual site.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Strata
Attribute Definition: Single alpha character used to indicated stratum sampled.
Attribute Definition Source: FIM data manual
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: A
Enumerated Domain Value Definition: Offshore seine over grass
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: B
Enumerated Domain Value Definition: Offshore seine not over grass

Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: C
Enumerated Domain Value Definition: Boat seine with overhanging vegetation
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: D
Enumerated Domain Value Definition: Boat seine without overhanging vegetation
Enumerated Domain Value Definition Source: FIM Data Manual
Enumerated Domain Value: S

Attribute:
Attribute Label: Target Latitude
Attribute Definition: Latitude established by EPA as target site.
Attribute Measurement Frequency: Required on every record

Attribute:
Attribute Label: Target Longitude
Attribute Definition: Longitude established by EPA as target site.
Attribute Measurement Frequency: Required on every record

Detailed Description:
Entity Type:
Entity Type Label: HydroLab Data Capture Subform
Entity Type Definition: Water quality information captured by use of an instrument package lowered at the site of sampling.

Attribute:
Attribute Label: Conductivity
Attribute Definition: Specific conductance reading taken at depth.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Conductivity Instrument
Attribute Definition: Instrument used to measure specific conductance. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Depth
Attribute Definition: Depth in meters that the following measurements were taken.
Attribute Measurement Frequency: Required on every HydroLab entry

Attribute:
Attribute Label: Dissolved Oxygen
Attribute Definition: Dissolved oxygen reading taken at depth. Measured in milligrams per Liter.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Dissolved Oxygen Instrument
Attribute Definition: Instrument used to measure D.O.. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Field Lab
Attribute Definition: FWCC Field Laboratory that owns the equipment package used to capture readings.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Tampa Bay
Enumerated Domain Value Definition: FWCC Fish and Wildlife Research Institute, Saint Petersburg, Florida
Enumerated Domain Value: Tequesta
Enumerated Domain Value Definition: FWCC Field Lab station, Tequesta, Florida
Enumerated Domain Value: Indian River
Enumerated Domain Value Definition: FWCC Indian River Field station, Indian River, Florida
Enumerated Domain Value: Common
Enumerated Domain Value Definition: Instruments common to all field labs.
Enumerated Domain Value: Charlotte Harbor
Enumerated Domain Value Definition: FWCC Charlotte Harbor Field station, Charlotte Harbor, Florida
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: HydroLab Used
Attribute Definition: Specific instrument package used to collect data. This field is filtered by the selection made in the Field Lab field to make selectable only those instrument packages owned by that Field Lab
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Available within database as HydroCodes table.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: Salinity
Attribute Definition: Salinity reading taken at depth. Measure in Parts Per Thousand (PPT).
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Salinity Instrument
Attribute Definition: Instrument used to measure Salinity. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Temperature
Attribute Definition: Temperature reading taken at depth. Measure in degrees Celsius.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: Temperature Instrument
Attribute Definition: Instrument used to measure Temperature. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: pH
Attribute Definition: pH reading taken at depth.
Attribute Measurement Frequency: As needed

Attribute:
Attribute Label: pH Instrument
Attribute Definition: Instrument used to measure pH. Defaults to the "HydroLab Used" field value.
Attribute Measurement Frequency: As needed

Detailed Description:
Entity Type:
Entity Type Label: Gear Data Capture Subform
Entity Type Definition: Information captured concerning the Fisheries gear used at the site of sampling. This information is subcatagorized into either Seine or Trawl information

Attribute:
Attribute Label: Siene Method of capture
Attribute Definition: dataset created when the gear type choosen in the main table is of a Seine type deployment.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Bottom Type 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Type 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg 1
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg 2
Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Vitality 1
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Vitality 2
Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Ratio 1
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.
Enumerated Domain Value Definition Source: FIM data manual
Enumerated Domain Value: Bottom Veg Ratio 2
Enumerated Domain Value Definition: Numeric code depicting the percent this bottom

vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Shore Type 1

Enumerated Domain Value Definition: Double alpha character code depicting the type of shore structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Shore Type 2

Enumerated Domain Value Definition: Double alpha character code depicting the type of shore structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Shore Type Ratio 1

Enumerated Domain Value Definition: Numeric code depicting the percent this shore type makes up of all shore types encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Type 1

Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Type 2

Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Vitality 1

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Vitality 2

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Ratio 1

Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Ratio 2

Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bank

Enumerated Domain Value Definition: Single alpha code used to describe bank conditions encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bottom Cover

Enumerated Domain Value Definition: Numeric value indicating percent bottom cover by vegetation.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bank Distance

Enumerated Domain Value Definition: Estimated distance in meters to the nearest bank.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Bycatch Quantity

Enumerated Domain Value Definition: Quantity in gallons of bycatch caught during sampling.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Relative Current

Enumerated Domain Value Definition: Strength in knots of current at time of sampling

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Relative Wind

Enumerated Domain Value Definition: Strength in mph of wind at time of sampling

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Wing Depth

Enumerated Domain Value Definition: Depth of water at deepest end of siene at the

beginning of the pull.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Net Width

Enumerated Domain Value Definition: Width of net pulled in meters or panels

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Distance to Bag

Enumerated Domain Value Definition: Distance to the bag of a purse seine net. Measured in meters or panels

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Shore Distance

Enumerated Domain Value Definition: Distance to nearest shore in meters.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Reference

Enumerated Domain Value Definition:

Main data key used to link together data from related tables. Created as a

Smart Key through the concatenation of the sampling date, an

@ symbol, and the station code.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Trawl Method of capture

Attribute Definition: dataset created when the gear type chosen in the main table is of a Trawl type deployment.

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Bottom Type 1

Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Type 2

Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom structure encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg 1

Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg 2

Enumerated Domain Value Definition: Single alpha character code depicting the type of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg Vitality 1

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg Vitality 2

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg Ratio 1

Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bottom Veg Ratio 2

Enumerated Domain Value Definition: Numeric code depicting the percent this bottom vegetation makes up of all bottom vegetation encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Type 1

Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Type 2

Enumerated Domain Value Definition: Double alpha character code depicting the type of bycatch encountered during sampling. Code definition can be found in the database under the

FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Vitality 1

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Vitality 2

Enumerated Domain Value Definition: Single alpha character code depicting the vitality of bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Ratio 1

Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Ratio 2

Enumerated Domain Value Definition: Numeric code depicting the percent this bycatch makes up of all bycatch encountered during sampling. Code definition can be found in the database under the FIMCodes table.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bycatch Quantity

Enumerated Domain Value Definition: Quantity in gallons of bycatch caught during sampling.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Soak Time

Enumerated Domain Value Definition: Amount of time the net was in the water.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Relative Current

Enumerated Domain Value Definition: Strength in knots of current at time of sampling

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Relative Wind

Enumerated Domain Value Definition: Strength in mph of wind at time of sampling

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: End Depth

Enumerated Domain Value Definition: Depth of water at the end of trawl in meters.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Distance Towed

Enumerated Domain Value Definition: Distance net was towed in meters during sampling.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Bearing

Enumerated Domain Value Definition: Compass direction in which the net was pulled away from beginning set.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Speed

Enumerated Domain Value Definition: Speed in mph the net was pulled at.

Enumerated Domain Value Definition Source: FIM Data Manual

Enumerated Domain Value: Reference

Enumerated Domain Value Definition:

Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Detailed Description:

Entity Type:

Entity Type Label: Ambient and Water Quality Data Subform

Entity Type Definition: Information captured concerning the ambient weather conditions at the site of sampling.

Attribute:

Attribute Label: Water Sample Confirmation Data

Attribute Definition: Data confirming the collection of specific samples for later analysis

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Surface Water collection

Enumerated Domain Value Definition: Boolean field "Yes or No"

Enumerated Domain Value: Bottom Water Collection

Enumerated Domain Value Definition: Boolean field "Yes or No"

Enumerated Domain Value: Unfiltered Nutrient Processing

Enumerated Domain Value Definition: Boolean field "Yes or No"

Enumerated Domain Value: Turbidity

Enumerated Domain Value Definition: Boolean field "Yes or No"

Enumerated Domain Value: Filtered Nutrient

Enumerated Domain Value Definition: Amount of water filtered to provide nutrient analysis. Measured in milliliters.

Enumerated Domain Value: Chlorophyll A

Enumerated Domain Value Definition: Amount of water filtered to provide Chlorophyll A analysis. Measured in milliliters.

Enumerated Domain Value: Chlorophyll B

Enumerated Domain Value Definition: Amount of water filtered to provide Chlorophyll B analysis. Measured in milliliters.

Enumerated Domain Value: Reference

Enumerated Domain Value Definition:

Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Weather Data

Attribute Definition: Data describing aspects of surface conditions during sampling

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Moon

Enumerated Domain Value Definition: Numeric code indicating the moon phase during sampling

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Period

Enumerated Domain Value Definition: Numeric code indicating the moon period phase during sampling

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Sunrise

Enumerated Domain Value Definition: Time at which sunrise occurred that morning

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Sunset

Enumerated Domain Value Definition: Time at which sunset occurred that evening

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Secchi Depth

Enumerated Domain Value Definition: Depth at which the Secchi disk is no longer visible.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Secchi Bottom

Enumerated Domain Value Definition: Whether or not the secchi disk was on the bottom when measurement was taken

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Wind Direction

Enumerated Domain Value Definition: Direction wind is coming from

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Wind speed

Enumerated Domain Value Definition: Speed of the wind in mph

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Cloud Cover

Enumerated Domain Value Definition: Visual estimation of the percent cloud cover during sampling

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Tide

Enumerated Domain Value Definition: Alpha character code indicating the tidal phase during sampling.

Enumerated Domain Value Definition Source: FIM data manual

Enumerated Domain Value: Reference

Enumerated Domain Value Definition:

Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute Measurement Frequency: As needed

Detailed Description:

Entity Type:

Entity Type Label: Sediment Grab Data Subform

Entity Type Definition: Information captured concerning sediment grab sample testing

Attribute:

Attribute Label: Alternate Coordinates

Attribute Definition: Coordinates of sediment sampling site if different from original site coordinates.

Attribute Domain Values:

Enumerated Domain:

Enumerated Domain Value: Decimal Latitude

Enumerated Domain Value: Decimal Longitude

Enumerated Domain Value: Degree Latitude
Enumerated Domain Value: Degree Longitude
Enumerated Domain Value: Decimal Minute Latitude
Enumerated Domain Value: Decimal Minute Longitude
Enumerated Domain Value: Distance
Enumerated Domain Value Definition: Distance calculated in nautical miles of sampling site from original site

Attribute:

Attribute Label: Depth
Attribute Definition: Depth at which sample was taken.
Attribute Measurement Frequency: Required

Attribute:

Attribute Label: Grab Type
Attribute Definition: Type of test performed on sample.
Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Observations
Attribute Definition: Text field used to capture comments concerning data or its capture.

Attribute:

Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute:

Attribute Label: SAV
Attribute Definition: Indicates presents or absents of Submerged Aquatic Vegetation
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: True
Enumerated Domain Value Definition: SAV was present
Enumerated Domain Value: False
Enumerated Domain Value Definition: SAV was not present
Attribute Measurement Frequency: As needed

Attribute:

Attribute Label: Sample Codes
Attribute Definition: Codes used to describe analysis of sample.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: TOC
Enumerated Domain Value: BN1
Enumerated Domain Value: BN2
Enumerated Domain Value: PSZ
Enumerated Domain Value: PLS
Enumerated Domain Value: SC1
Enumerated Domain Value: SC2
Enumerated Domain Value: STX

Attribute:

Attribute Label: Sample Composition
Attribute Definition: Description of environment sample was taken from.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Mud
Enumerated Domain Value Definition: Bottom was primarily mud
Enumerated Domain Value: Sand
Enumerated Domain Value Definition: Bottom was primarily sand
Enumerated Domain Value: Muddy Sand
Enumerated Domain Value Definition: Bottom was primarily sand with mud component
Enumerated Domain Value: Sandy Mud
Enumerated Domain Value Definition: Bottom was primarily mud with sand component
Enumerated Domain Value: Shellhash
Enumerated Domain Value Definition: Bottom composed of broken shell debris

Detailed Description:

Entity Type:

Entity Type Label: SAV Coverage Data Subform
Entity Type Definition: Information captured concerning Submerged Aquatic Vegetation bottom coverage.

Attribute:

Attribute Label: Alternate Coordinates
Attribute Definition: Coordinates of sediment sampling site if different from original site coordinates.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Decimal Latitude
Enumerated Domain Value: Decimal Longitude

Enumerated Domain Value: Degree Latitude
Enumerated Domain Value: Degree Longitude
Enumerated Domain Value: Decimal Minute Latitude
Enumerated Domain Value: Decimal Minute Longitude
Enumerated Domain Value: Distance
Enumerated Domain Value Definition: Distance calculated in nautical miles of sampling site from original site

Attribute:
Attribute Label: Instrumentation
Attribute Definition: Check boxes indicating instrument use to assess SAV coverage.
Attribute Domain Values:
Enumerated Domain:
Enumerated Domain Value: Trawl
Enumerated Domain Value: SeaViewer
Enumerated Domain Value: Mask and Snorkel

Attribute:
Attribute Label: Methodology
Attribute Definition: Checkbox indicating how SAV coverage was assessed.

Attribute:
Attribute Label: Notes

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: SAV Coverage
Attribute Definition: Visual estimation of SAV bottom coverage

Detailed Description:

Entity Type:
Entity Type Label: Fish Length Data Subform
Entity Type Definition: Information captured concerning Fish identification and up to twenty length measurements.

Attribute:
Attribute Label: Commonname
Attribute Definition: Lay person name for the specimens measured in this dataset.

Attribute:
Attribute Label: FHC
Attribute Definition: Fish Health Code used to identify analysis to be performed on specimens measured in this dataset.

Attribute:
Attribute Label: Len1
Attribute Definition: Length of first specimen measured.

Attribute:
Attribute Label: Len10
Attribute Definition: Length of tenth specimen measured.

Attribute:
Attribute Label: Len11
Attribute Definition: Length of eleventh specimen measured.

Attribute:
Attribute Label: Len12
Attribute Definition: Length of twelfth specimen measured.

Attribute:
Attribute Label: Len13
Attribute Definition: Length of thirteenth specimen measured.

Attribute:
Attribute Label: Len14
Attribute Definition: Length of fourteenth specimen measured.

Attribute:
Attribute Label: Len15
Attribute Definition: Length of fifteenth specimen measured.

Attribute:
Attribute Label: Len16
Attribute Definition: Length of sixteenth specimen measured.

Attribute:
Attribute Label: Len17
Attribute Definition: Length of seventeenth specimen measured.

Attribute:
Attribute Label: Len18
Attribute Definition: Length of eighteenth specimen measured.

Attribute:
Attribute Label: Len19
Attribute Definition: Length of nineteenth specimen measured.

Attribute:
Attribute Label: Len2
Attribute Definition: Length of second specimen measured.

Attribute:
Attribute Label: Len20
Attribute Definition: Length of twentieth specimen measured.

Attribute:
Attribute Label: Len3
Attribute Definition: Length of third specimen measured.

Attribute:
Attribute Label: Len4
Attribute Definition: Length of fourth specimen measured.

Attribute:
Attribute Label: Len6
Attribute Definition: Length of sixth specimen measured.

Attribute:
Attribute Label: Len7
Attribute Definition: Length of seventh specimen measured.

Attribute:
Attribute Label: Len8
Attribute Definition: Length of eighth specimen measured.

Attribute:
Attribute Label: Len9
Attribute Definition: Length of ninth specimen measured.

Attribute:
Attribute Label: Measure
Attribute Definition: Method used to capture length of specimens measured in this dataset.

Attribute:
Attribute Label: NODC
Attribute Definition: Numeric code developed by NODC to identify species measured in this dataset

Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.

Attribute:
Attribute Label: SC

Attribute:
Attribute Label: Scientificname
Attribute Definition: Genus and Species identification of the specimens measured in this dataset.

Attribute:
Attribute Label: Sex
Attribute Definition: Sex of the specimen measures in this dataset

Attribute:
Attribute Label: SplitLevel
Attribute Definition: Degree to which the splitting methodology was applied.

Attribute:
Attribute Label: SplitType
Attribute Definition: Methodology used to obtain a subsample of the specimens catch during this sampling effort.

Attribute:
Attribute Label: Tag
Attribute Definition: Tagging methodology used on the specimens measured in this dataset.

Attribute:
Attribute Label: TotalNumber
Attribute Definition: Total number of this specimen captured during this sampling effort.

Attribute:
Attribute Label: Use
Attribute Definition: List of codes indicating the analysis to be performed on the specimens measured in this dataset.

Attribute:
Attribute Label: len5
Attribute Definition: Length of fifth specimen measured.

Attribute:
Attribute Label: spp_code
Attribute Definition: Species code used by FIM for the species measured in this dataset.

Detailed Description:
Entity Type:
Entity Type Label: Chemical Analysis Data Subform
Entity Type Definition: Information captured concerning Chemical Analysis performed on water and sediment samples.

Attribute:

Attribute Label: AnalysisDate
Attribute Definition: Date analysis of sample began.
Attribute:
Attribute Label: Code
Attribute:
Attribute Label: CollectionDate
Attribute Definition: Date sample was collected
Attribute:
Attribute Label: Component
Attribute Definition: Component analysis was performed upon.
Attribute:
Attribute Label: Contact
Attribute Definition: Person responsible for submitting sample.
Attribute:
Attribute Label: Reference
Attribute Definition: Main data key used to link together data from related tables. Created as a "Smart Key" through the concatenation of the sampling date, an "@" symbol, and the station code.
Attribute:
Attribute Label: Result
Attribute Definition: End product of analysis
Attribute:
Attribute Label: SampleLocation
Attribute Definition: Site sample was obtained
Attribute:
Attribute Label: StationName
Attribute Definition: Identifier of site sample was obtained.
Attribute:
Attribute Label: Submit
Attribute Definition: Date sample was submitted for analysis
Attribute:
Attribute Label: Test
Attribute Definition: Analytical test performed upon sample.
Attribute:
Attribute Label: Units
Attribute Definition: Units of measurement used to quantify RESULT.
Overview Description:
Entity and Attribute Overview: Initial Sampling Session Data
Entity and Attribute Detail Citation: Data captured during initial sampling of IMAP site.

Distribution Information

[Section Index](#)

Distributor:

Contact Information:

Contact Person Primary:

Contact Person: Group Metadata Technician

Contact Organization: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)

Contact Position: Metadata Technician

Contact Address:

Address Type: mailing address

Address:

Fish and Wildlife Research Institute 100 Eighth Avenue Southeast

City: St. Petersburg

State or Province: FL

Postal Code: 33701-5095

Country: USA

Contact Voice Telephone: 727-896-8626

Contact Facsimile Telephone: 727-823-0166

Contact Electronic Mail Address: metadata@fwc.state.fl.us

Hours of Service: 8:00 am - 5:00pm EST

Distribution Liability:

This data set is in the public domain, and the recipient may not assert any proprietary rights thereto nor represent it to anyone as other than a FWC-Fish and Wildlife Research Institute produced data set; it is provided "as-is" without warranty of any kind, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose. The user assumes all responsibility for the accuracy and suitability of this data set for a specific application. In no event will the staff of the Fish and Wildlife Research Institute be liable for any damages, including lost profits, lost savings, or other incidental or consequential damages arising from the use of or the inability to use this data set.

Standard Order Process:

Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Approximately ten working days, depending on amount of information requested.

Standard Order Process:
Non-digital Form: paper
Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Approximately ten working days, depending on amount of information requested.

Standard Order Process:
Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Usually within 10 business days, although, complex requests may take longer.

Standard Order Process:
Non-digital Form: paper
Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Usually within 10 business days, although, complex requests may take longer.

Standard Order Process:
Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Usually within 10 business days, although complex requests may take longer.

Standard Order Process:
Non-digital Form: paper
Fees: none
Ordering Instructions: Contact Group Metadata Technician
Turnaround: Usually within 10 business days, although complex requests may take longer.

Metadata Reference Information

[Section Index](#)

Metadata Date: 4/11/2002
Metadata Review Date: 6/18/2002
Metadata Future Review Date:
Metadata Contact:
Contact Information:
Contact Person Primary:
Contact Person: Julian, Marc
Contact Organization: FWC-FWRI (Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute)
Contact Address:
Address Type: mailing and physical address
Address:
Fish and Wildlife Research Institute 100 Eighth Avenue Southeast
City: St. Petersburg
State or Province: FL
Postal Code: 33701-5095
Country: USA
Contact Voice Telephone: 727-896-8626
Contact Facsimile Telephone: 727- 823-0166
Contact Electronic Mail Address: metadata@fwc.state.fl.us
Metadata Standard Name: Content Standard for National Biological Information Infrastructure Metadata
Metadata Standard Version: 1999
Metadata Use Constraints: All data must be credited to Florida Fish and Wildlife Conservation Commission-Fish and Wildlife Research Institute and cite authors
Metadata Security Information:
Metadata Security Classification: Unclassified

[MetaWeb](#) Metadata report generated Wednesday, 08/October/2003

APPENDIX C:

Generalized Station Description and Sampling protocol for IMAP.

The "Regional Stations" (i.e. stations selected within Sampling Units) will carry the following pieces of information

VARIABLE	DESCRIPTION
STATION	Station ID constructed of abbreviated sampling unit, sample year, and sample number
COASTNUM	Coastal 2000 station format
RANLONDD, RANLATDD	Lat, longs of sample sites in decimal degrees
GPSLONDEG, GPSLONMIN; GPSLATDEG, GPSLATMIN	Lat, longs in degrees and minutes format for input into GPS
SAMPLING UNIT	The name of the regional sampling unit (30 sites for each unit sampled)
SAMP_YR	The year in which the station is sampled (1=2000, 2=2001, etc.) - this information is redundant since year is in the station ID.
DEPSITE	Y OR N - If yes, an additional sample kit will be sent out to sample a set of water indicators for the DEP freshwater monitoring program (we are responsible for only seven sites in 2000)
DEPSTA	The corresponding DEP station identifier for the relevant sites. This station id should be noted in the comments portion of the datasheet.
PRIMARY FIELD LAB	Indicates the field lab with primary responsibility for sampling. The allocation of sites for 2001-2004 is tentative and is still being reviewed. The allocation of sites for 2000 is fixed.
COMMENT	Contains relevant comments -e.g. SWFWD sampling 2 TB sites.

The "State Scale Stations" will carry the following pieces of information:

VARIABLE	DESCRIPTION
STATION	Station ID constructed of abbreviated state station type(STR= random, STT=trend, or fixed), sample year, and station number. STT sites will be sampled every year.
COASTNUM	Coastal 2000 station format
LONDD, LATDD	Lat, longs of sample sites in decimal degrees
GPSLONDEG, GPSLONMIN; GPSLATDEG, GPSLATMIN	Lat, longs in degrees and minutes format for input into GPS
TREND_SITE	Identifies a state site as either random or trend - this information is partially redundant with the station ID.
SAMP_YR	The year in which the station is sampled (1=2000, 2=2001, etc.) - this information is partially redundant with the station ID.
QASITE	Y OR N - If yes, an additional grab for sediment contaminants will be collected. We will have three (10%) QA sites each year for contaminants (recall that contaminants are only sampled at the statewide scale)
DEPSTA	The corresponding DEP station identifier for the relevant sites. This station id should be noted in the comments portion of the datasheet.
PRIMARY FIELD LAB	Indicates the field lab with primary responsibility for sampling. The allocation of sites for 2001-2004 is tentative and is still being reviewed. The allocation of sites for 2000 is fixed.

General Reconnaissance and Sampling Issues.

Reconnaissance of stations - the objective of station recon is twofold:

1. Determine if the site is sampleable (e.g. on the water vs. dry land, outside a major shipping lane, etc.) - If the station can be safely sampled for some indicators, but not others, we will retain the station and omit the problem indicators (however, see note below under station relocation)
2. Determine if the site is salt or fresh - this applies primarily to the DEP sites, but if you suspect a non-DEP site is fresh, recon it and get a salinity measurement. If you encounter freshwater non-DEP sites, let Gil or Bob know and they will make a decision regarding indicators to be sampled.

Relocation of stations - you are free to move up to 300 feet to get to a sampleable area. This applies both to "dry-land" type situations and situations where you can sample one indicator but not another. For example, if you are able to take hydrolab measurements, but not benthic grabs due to the presence of an oyster bar, you can move up to 300 feet to get a benthic grab. You do not re-take the hydrolab measurements at the new location, but use the original readings. In the observation box of the benthic grab section on the datasheet, record a new lat/long for the location at which the benthic grabs were taken.

Parameters to be analyzed by DEP Bureau of Labs - please note that the benthic biology, sediment contaminants and additional indicators for the DEP sites are being worked up by DEP in Tally. You will be getting coolers with sampling kits sent to you from Tally for these indicators. The coolers contain sampling bottles, return shipping labels, and a DEP datasheet. You need to fill out the DEP datasheet with location and sample-type information. You will receive detailed protocols for the DEP indicators.