University of Miami
Rosenstiel School of Marine and Atmospheric Science

WATER QUALITY AND BIOLOGICAL MONITORING OF NORTHEAST FLORIDA BAY

By

Trisha Denise Stone

[Restored and transferred to electronic form by Damon J. Gomez (NOAA/RSMAS) in 2002 as part of the Coastal and Estuarine Data/Document Archeology and Rescue (CEDAR) for South Florida. Sponsored by the South Florida Ecosystem Restoration Prediction and Modeling Program. Original stored at the Library, Rosenstiel School Marine and Atmospheric Science, University of Miami. Minor editorial changes were made.]

AN INTERNSHIP REPORT

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Master of Arts

Miami, Florida

May, 1995

UNIVERSITY OF MIAMI

A internship report submitted in partial fulfillment of
the requirements for the degree of
Master of Arts

WATER QUALITY AND BIOLOGICAL MONITORING
OF
NORTHEAST FLORIDA BAY

By

Trisha Denise Stone

Approved:

Dr. Daniel Suman
Chairperson of the Internship
Committee

Dr. Sarah Keene Meltzoff
Professor of Marine
Anthropology

Dr. Larry Brand
Professor of Marine Biology

Abstract

Due to the construction and operation of Canal C-111, in association with other canals and canal structures, the natural hydrology of South Dade County, Florida has been considerably altered. This flood control project dramatically reduced the historical sheetwater and groundwater flow from the wetlands of Taylor Slough into northeast Florida Bay. Everglades National Park (ENP) indicated that C-111 had decreased hydraulic gradients and shortened period of flow through Taylor Slough to downstream estuaries contributing to hypersaline conditions, abrupt salinity changes and a general decline in the natural resources of the wetland and coastal areas of northeast and central areas of the Park. Through the request of ENP, an experimental test program would be initiated by the South Florida Water Management District (SFWMD) to provide a mechanism to field test increased freshwater delivery to the area. As part of the environmental monitoring to be conducted under conditions of the proposed test, the Metro Dade County Department of Environmental Resources Management (DERM), under contract to the SFWMD, began a water quality and biological monitoring project to document any dowstream effects from the changes in water delivery to northeast Florida Bay. This project is the first year in a longterm effort, and DERM's future monitoring techniques will expand on this baseline information. I also include a discussion regarding the approach to future restoration of Florida Bay.

Acknowledgements

I would like to acknowledge the following people for their support and assistance with this internship. From the Metro Dade County Department of Environmental Resources Management, I would like to thank my immediate supervisor, Ramesh Buch, for allowing me to take on the additional job duties of this monitoring project, and Lee Hefty, for his many contributions to this report and for being my brave field partner when faced with the fact we had shark, alligator and crocodile assistants at a few of our monitoring stations! From the Rosenstiel School of Marine and Atmospheric Science I express much gratitude to my graduate commitee: Dr. Larry Brand who agreed to serve as one of my internship advisors and get to know me...again, Dr. Sarah Keene Meltzoff who greatly inspired me throughout my undergraduate and graduate career. and Dr. Daniel Suman who continuously challenged me with new ideas! The person I most wish to thank is Professor Fernando Moreno, for whom my graduate career would not have been possible and who held faith in me and pushed me to succeed!

Preface

The purpose of this report is to fulfill the internship requirement for the Master of Arts degree in Marine Affairs and Policy. While I was employed at the Metropolitan Dade County Department of Environmental Resources Management as a fulltime Biologist I in the Restoration and Enhancement Section, my group was contracted by the South Florida Water Management District to perform water quality and biological monitoring in northeast Florida Bay, Florida. This report summarizes the purpose for this monitoring and discusses the project methods, data, and results of the first year (October 1993 to October 1994) study.

TABLE OF CONTENTS

LIST OF FIGURES AND APPENDICIES

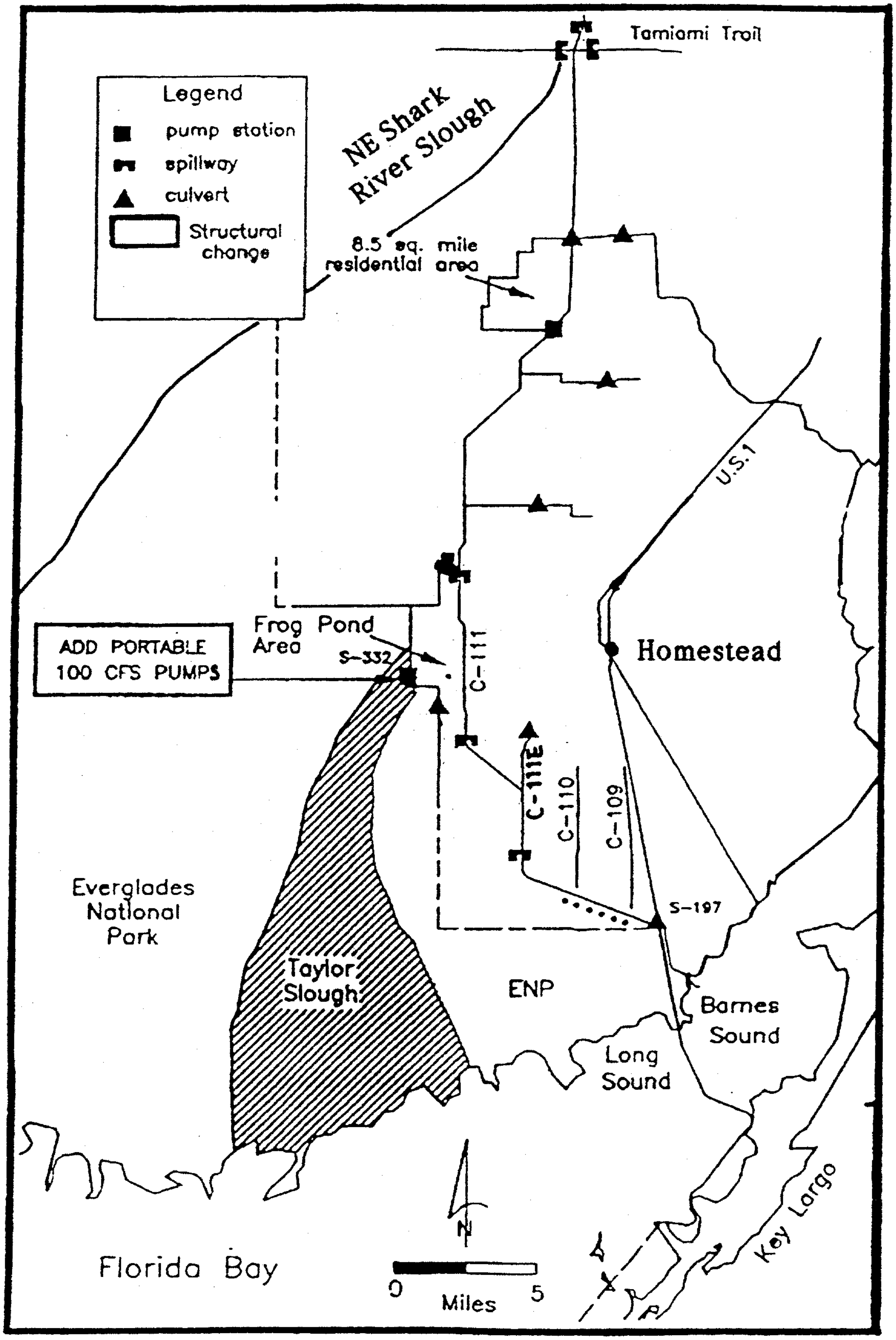
Introduction

Background

The Flood Control Act of 1962, authorized improvements for South Dade County, Florida, which provided for construction of the C-111 Basin: a 97 square mile area located in southeastern Dade County comprising Canals C-111, C-111E, C-109 and C-110 and their associated structures (Carroll, 1986) (Figure 1). These canals were designed to provide drainage to farming, residential, and industrial areas in southern Dade County, generally to the south and west of Homestead. The area drained by the southern portion of C-111 formerly flowed into eastern Florida Bay. In addition, due to rain events, periodic heavy discharges through culvert S-197 in C-111 and opened flood gates allow high volumes of water to be discharged into Barnes Sound, very much contrary to the historical flow pattern of this area (Rozsa, 1993).

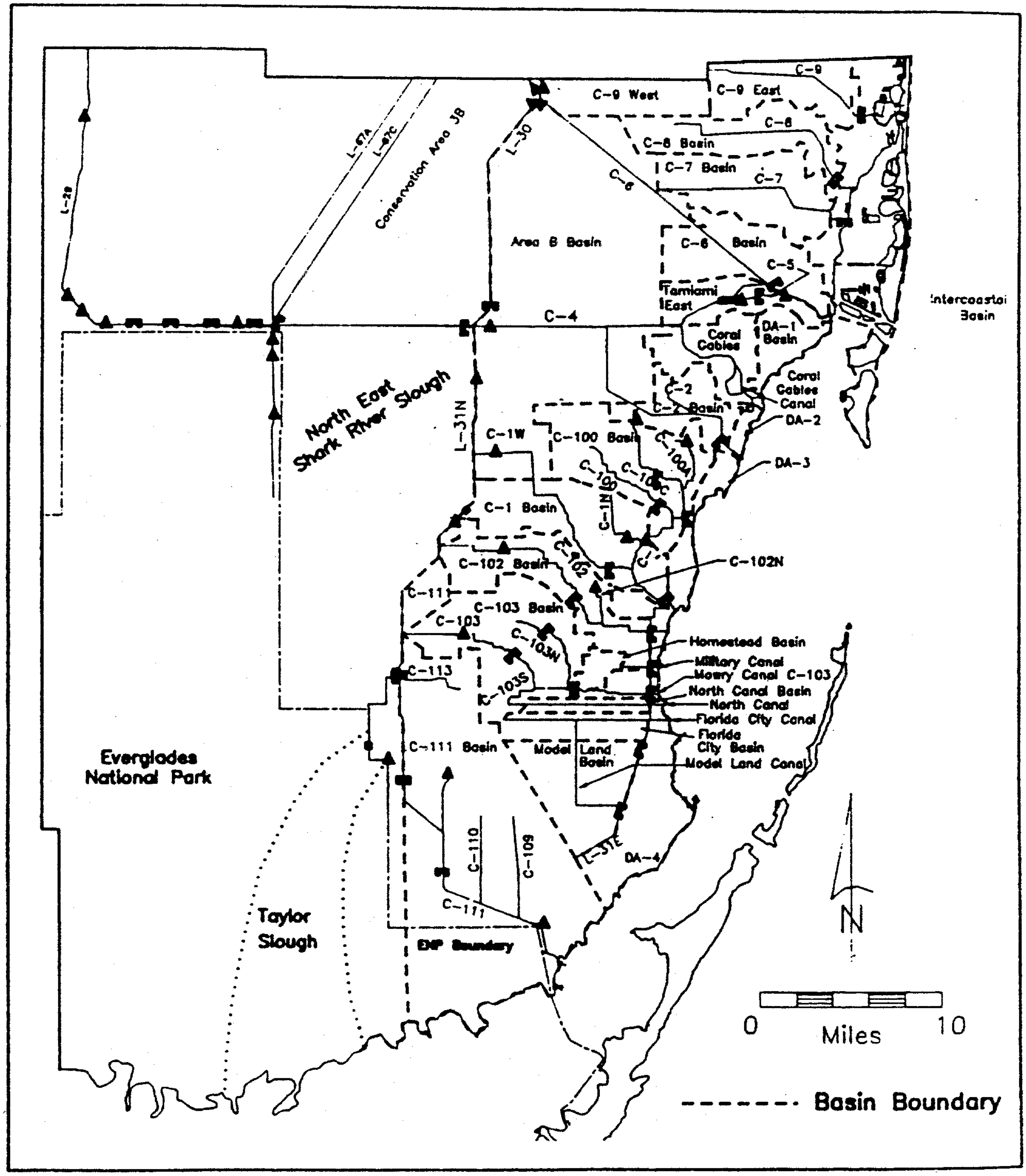
The freshwater inflows to Florida Bay are now largely controlled by the Central and Southern Florida Project (C&SF), whose primary function of flood control, is operated by the South Florida Water Management District (SFWMD). The construction and operation of this complex system of canals (see Figure 2) has brought considerable change in the hydrologic design of Taylor Slough. This slough, encompassing more than 158 square miles of freshwater marsh, extends nearly 20 miles from its upstream end north of agricultural areas to the coastal mangrove fringe along central Florida Bay. Prior to the construction of the C&SF Project in western Dade County, water levels in the Taylor Slough headwaters were 1.5 to 2.0 feet higher than today. These higher water levels kept the northern Taylor Slough marshes flooded for 2 to 3 months each year, and maintained sheet flow and groundwater flow into Florida Bay. The higher water levels also maintained more consistent and

FIGURE 1



C-1 1 1 Canal System

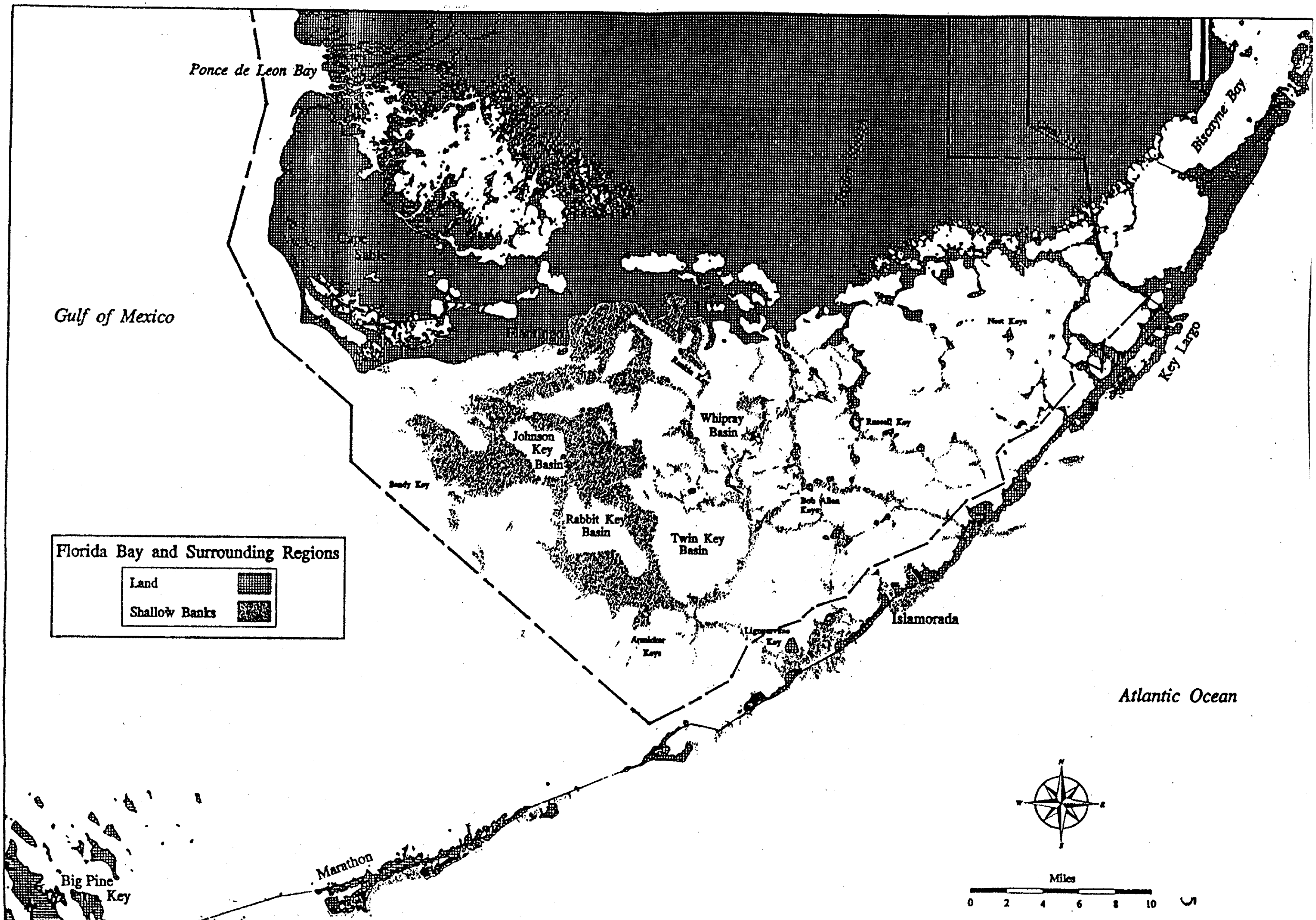
FIGURE 2



South Dade County with Canals, Structures and Major Features gradual salinity fluctuations in the nearshore areas of the Bay (Van Lent, Johnson and Fennema, 1992).

The largest portion of Taylor Slough and its headwaters are located within Everglades National Park (ENP), and they represent vital elements of the Park's hydrologic system. These wetlands contain sawgrass, hardwood hammocks and mangrove forests, all of which are valuable habitat for many aquatic and terrestrial plants and animals. In addition, approximately 85 percent of Florida Bay lies within ENP (Figure 3). Upper Florida Bay has long been recognized as an important nursery area for fish and crustaceans where larvae and juveniles benefit from the protective influence of lower salinities (Carroll, 1986). In addition, the Bay is the habitat of protected marine mammals and a number of threatened and endangered marine species. Furthermore, nutrients and detritus carried by freshwater runoff through the expansive area of wetlands assist in the maintenance of seagrass communities and are food sources for juvenile marine organisms.

In the early 1980's, studies by ENP pointed to decrease in freshwater flows as adversely affecting the life cycle of native plants and wildlife. Further studies indicated the C-111 Canal had reduced hydraulic gradients and shortened periods of flow through Taylor Slough to downstream estuaries contributing to hypersaline conditions and abrupt salinity changes in the downstream areas of Florida Bay (South Florida Water Managment District, 1990). To restore the declining natural resources, ENP felt they must replicate natural water flow by bringing larger amounts of clean water into the marshes in rhythm with the cycle of wet and dry seasons. The Park's goals for these areas were to improve the water delivery systems to mitigate many of the declines in Park resources observed in these basins. Their priority in the eastern portion of



Everglades National Park Boundaries

FIGURE 3

the Park was the restoration of more natural hydroperiods in Taylor Slough as an important wildlife area, and increase freshwater flows through this slough into the central-eastern portion of Florida Bay (Finley, 1989). ENP concluded that the C-111 system must be altered to: 1) retain freshwater runoff longer resulting in a reduction in salinity fluctuations in receiving waters, 2) restore sheetflow over the prairie south of existing farmland, 3) return freshwater contribution to eastern Florida Bay, 4) reduce overdrainage caused by water level steps at canal control structures, 5) restore productivity, habitat values, water treatment and storage functions of impacted wetlands south of the farmed areas, and 6) settle land-use patterns in accordance with flood control and water conservation capabilities (Carroll, 1986). Land use changes since construction of the system, along with a greater understanding of the hydrological needs of ENP resulted in initiatives to improve the existing C-111 system.

In March 1983, because the C&SF Project had greatly altered the hydrology of Taylor Slough and Florida Bay, ENP requested action that would reduce the spatially restricted flood releases of water from the C-111 Basin into the Park (U.S. Army Corps of Engineers, 1993). In response, the U.S. Army Corps of Engineers (COE), with the agreement of the National Park Service and the SFWMD initiated an experimental program, the C-111 Interim Plan. The intention of the experimental program was to provide a mechanism to field test water delivery methods to assess potential impacts on ENP and other parts of the Everglades ecosystem, as well as on the authorized C&SF Project functions of flood control and water supply (Weaver, 1995). In short, the purpose of the proposed test was to improve the design of a permanent solution to the environmental degradation that has resulted from the C&SF

Project. The test would provide field data that would be useful for evaluating alternatives to be included in the C-111 General Reevaluation Report (GRR) and Environmental Impact Statement (EIS). The test objectives were to evaluate methods to restore a more natural hydroperiod to ecosystems within ENP by continuing water deliveries to northeast Shark River Slough (NESRS), increasing water deliveries to Taylor Slough, and reducing large freshwater discharges through S-197 into Barnes Sound.

Prior to initiation, the procedure for each test would be developed and agreed upon by the Corps, ENP and the SFWMD, and operational procedures would be closely coordinated with homeowners and agricultural interests in the developed portion of the East Everglades. The test would be carefully monitored and could be terminated if it resulted in unacceptable impacts and would continue only until sufficient information was obtained to design a permanent solution to the problem of unnatural water flows to Taylor Slough and southeast ENP. The program is being conducted through an iterative testing procedure. The components of the proposed test are to maintain water deliveries to NESRS and to increase discharges at S-332 from the initial 165 cubic feet per second (cfs) up to 800 cfs. The first test would add an additional 100 cfs by use of a portable pump. With this pump, discharges to Taylor Slough would be increased to a total of 265 cfs. Depending on the results obtained, discharges into Taylor Slough would eventually be increased up to a total of 800 cfs during the test. The SFWMD has authorized continuation of the experimental program of water deliveries to ENP until the modifications to the C&SF Project are completed and implemented (U.S. Army Corps of Engineers, 1993).

Additional components of the test include alternative plans, coordination with the public, existing environmental conditions, probable impact of the proposed action on the environment, compliance with environmental requirements, Fish and Wildlife Service coordination, a monitoring plan and an Environmental Assessment (EA). Monitoring of physical , chemical and biological parameters would be conducted to determine the environmental effects of the proposed test. The EA, prepared under the provisions of the National Environmental Policy Act of 1969 (NEPA) determined that the implementation of the test would not result in significant impacts on the quality of the human environment. The assessment concluded that the actions would not adversely affect: 1) overall existing fish and wildlife habitat in the area, 2) any species or critical habitat listed under the Endangered Species Act, 3) authorized purposes of the C&SF Project, or 4) residential and agricultural lands in the area (U.S. Army Corps of Engineers, 1993).

The Taylor Slough Demonstration Project began in July 1993 when the first portable pump was activated at S-332, increasing water delivery to ENP from 165 cfs to 265 cfs. In September 1993 and again in November 1993, an additional portable pump was activated at S-332, increasing the flow to 365 cfs and then to the present 465 cfs. Future efforts involve increasing the flow to 800 cfs by replacing the portable water pumps with a "permanent temporary facility" pump station (Weaver, 1995).

Project Description

To address the issue of water supply to the east Everglades and Florida Bay, the SFWMD proposed that the agency take part in the development of environmental restoration and enhancement alternatives that are included under the Everglades Forever Act. This Act, passed in 1995 by the State of Florida, outlines an extensive restoration plan for the entire Everglades, including Florida Bay (Underwood and Loftin, 1995). As a provision of the C-111 Interim Monitoring and Operating Plan, the SFWMD would implement a water quality and biological monitoring project to determine the downstream effects of the change in water delivery on water quality and epibenthic communities in northeast Florida Bay. In October 1993, under contract to the District, the Metro Dade County Department of Environmental Resources Management (DERM) began the Water Quality and Biological Monitoring Project in northeast Florida Bay (Appendix 1). The goals of this longterm monitoring project are to obtain baseline data on the present status of water quality and existing benthic habitats, and to document any changes due to the increased freshwater flow through Taylor Slough. The data associated with this project is summarized and provided to the SFWMD on a quarterly and an annual basis.

Methods

The SFWMD and DERM generated the 1993/94 C-111/Taylor Slough Water Quality and Biological Monitoring Project (SWIM Contract C-4227) based on methods presently used in longterm monitoring by DERM throughout Biscayne Bay. The Department has been conducting water quality and biological monitoring for the District since 1979 and 1985 respectively.

In July 1993, DERM and the SFWMD performed a reconnaissance of northeast Florida Bay to select monitoring locations expected to be directly influenced by surface water runoff from Taylor Slough. In October 1993, the Department established five monitoring stations in the region of Little Madeira Bay east to U.S. Highway 1, and a sixth station in December 1993 (Figure 4). The Department sampled these stations monthly for water quality and biological characteristics.

DERM biologists performed monthly sampling of the physical water quality parameters which included temperature, dissolved oxygen, pH, conductivity, salinity, redox, and depth, using a calibrated Hydrolab Surveyor III at the bottom, one meter, and the surface. Using a Li-Cor LI-100, the biologists measured underwater photosynthetically active radiation (PAR), taken at the surface and at one foot intervals to the bottom to create a light profile and derive an extinction coefficient. Additionally, the Department collected monthly water samples for color, turbidity, total phosphate phosphorous, nitrate/nitrite nitrogen, ammonia nitrogen, chlorophyll-a/pheophytin, and the trace metals copper, lead, cadmium and zinc. DERM's analytical laboratory performed the water chemistry analysis.

The monthly benthic habitat monitoring involved using SCUBA equipment to make underwater observations along a permanent 50-meter transect

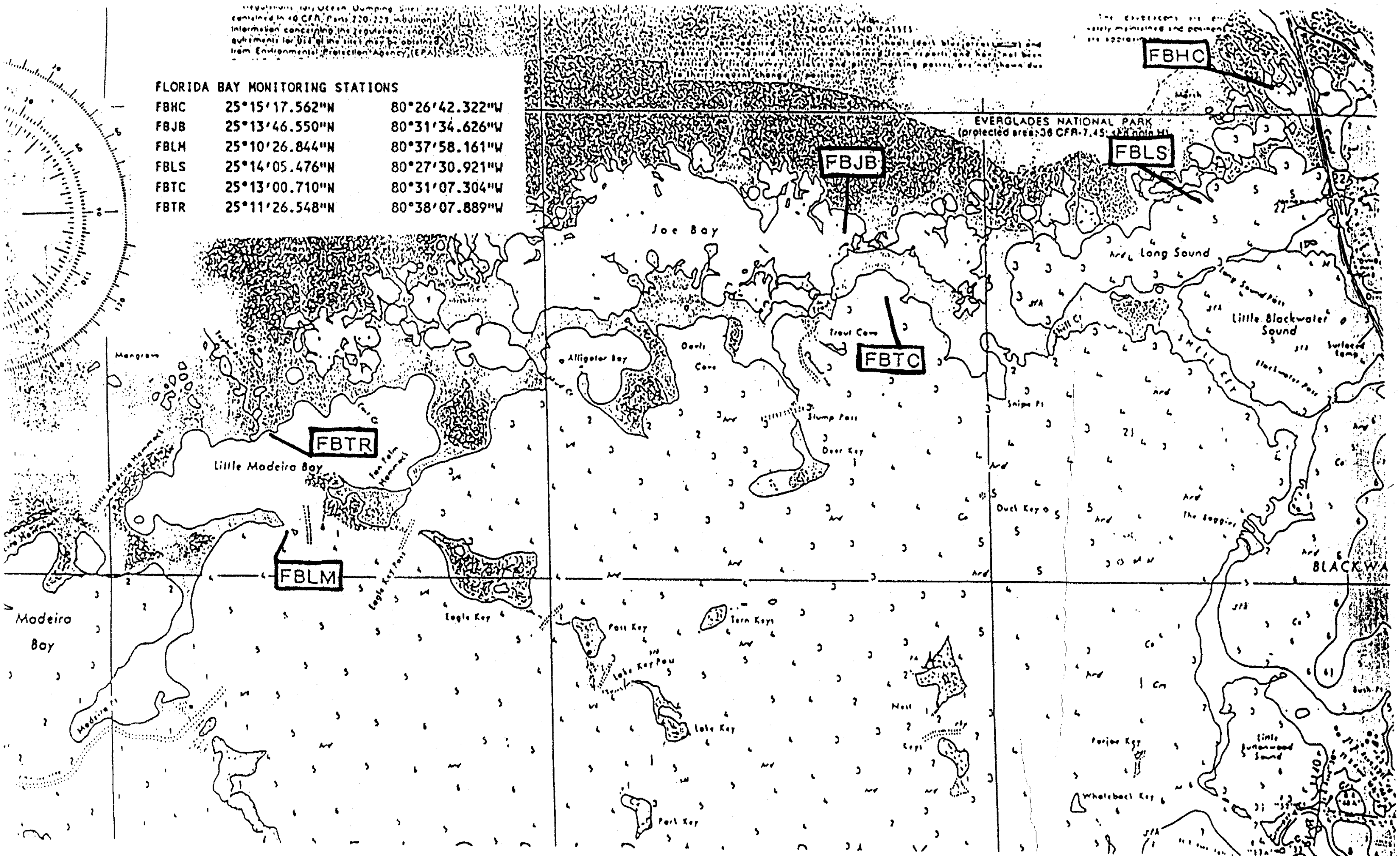


FIGURE 4

C-111\TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING STATIONS

FBHC; (Highway Creek)	FBJB; (Joe Bay)	FBTR; (Taylor River)
FBLS; (Long Sound)	FBTC; (Trout Cove)	FBLM; (Little Madeira Bay)

marked at each end with rebar, concrete blocks, and sub-surface buoys. To assess for the presence and numbers of seagrasses, calcareous algae and noteable invertebrates the biologists established three randomly distributed permanent grid locations along the transect, each marked with rebar at two corners, to employ the use of a portable 1.0 m^2 PVC grid subdivided into 25 equal subunits. The biologists assessed five 0.04 m^2 subunits within the grid. Additionally, the biologists made observations along the length of the 50-meter transect using a Keeson metered tape and the line-intercept method (Orth and Moore, 1983) to determine species composition, relative abundance, seagrass linear cover, and numbers of individuals of noteable benthic organisms. On a quarterly basis the biologists determined the standing crop biomass (Zieman and Wetzel, 1980) at each station by randomly selecting three 1/25 m^2 subunits adjacent to the transect to count seagrass shoots and blades, and collect biomass above the substrate. DERM transported the biomass samples in sealed freezer bags and placed them in a freezer. Before analyzing the seagrass in the laboratory, the biologists thawed and lightly rinsed the samples and selected a representative of ten blades to remove and separate the epibionts by scraping. The Department biologists dried each of the cleaned blades, epibionts, and the remainder of the sample separately in an oven at 60 degrees centigrade for at least eight hours, then weighed each on an analytical balance to the nearest 0.01 g.

All work was performed according to the Quality Assurance Project Plan (QAPP) (Appendix 2)

Data

DERM submitted the monitoring data for the work completed under the contract to the SFWMD, shown in the Appendix 3. The in situ physical water quality measurements are presented in Table 1. The laboratory analysis results for water chemistry are presented in Table 2. The light data with calculated extinction coefficients (K) is shown in Table 3. The seagrass shoot and blade densities are presented for each station in Table 4. The quarterly seagrass biomass results are presented in Table 5. Figures 1-6 graphically represent seagrass shoot density at each station by month. Figures 7-12 graphically show seagrass species composition and percent cover at each station by month. Figures 13-18 graphically represent seagrass biomass by quarter at each station. Figures 19-24 graphically represent seagrass shoot density, water temperature, and bottom salinity by month at each station (Hefty, 1994).

Station Descriptions (from Hefty, 1994)

Highway Creek Station (FBHC) is in extreme northeast Florida Bay in an isolated basin adjacent to U.S. Highway 1. Average water depth is 0.4 meters and bottom sediment is approximately 1.0 meter thick. The composition of the bottom sediment is a very fine mud that easily resuspends when disturbed. The epibenthic community comprises sparse seagrass (Halodule wrightii, Ruppia maritima) and occasional macroalgae (Chara hornemanii), with a small burrowing fish species (unidentified), and members of the genus Marginella. Numerous small gastropod and bivalve shells litter the bottom.

Long Sound Station (FBLS) is in the north-central portion of Long Sound. Average water depth is 1.0 meter, and bottom sediment is approximately 0.35

meters thick. The epibenthic community comprises moderate to sparse seagrass (Thalassia testudinum including occasional sparse Halodule wrightii), macroalgae (Penicillus capita) and occasional sponges, with a small burrowing fish species (unidentified) and numerous snapping shrimp.

Joe Bay Station (FBJB) is in the northeast corner of Joe Bay. Average water depth is 0.8 meters and bottom sediment is approximately 0.4 meters thick. Sediments are very fine and easily resuspended. The epibenthic community comprises moderate to seasonally dense seagrass (Halodule wrightii and Ruppia maritima), with a small burrowing fish species (unidentified).

Trout Cove Station (FBTC) is in the northeast portion of Trout Cove. Average water depth is 0.7 meters and bottom sediment is approximately 0.6 meters thick. The epibenthic community comprises sparse seagrass (Thalassia testudinum), sparse macroalgae (Penicillus capitata), and occasional sponges, with a small burrowing fish species (unidentified) and sediment worms (family Terebellidae).

Taylor River Station (FBTR) is approximately 300 meters from the mouth of Taylor River in Little Madeira Bay. Average water depth is 0.7 meters and bottom sediment is approximately 0.8 meters thick. Bottom sediment comprises moderate to fine grained mud that easily resuspends when disturbed. The epibenthic community comprises sparse to moderate seagrass (Thalassia testudinum and Halodule wrightii) and occasional sponges.

Little Madeira Bay Station (FBLM) is just outside the entrance to the Little Madeira Bay Basin. Average water depth is 1.0 meter and bottom sediment is approximately 0.6 meters thick. The benthic community comprises sparse to moderate seagrass (Thalassia testudinum, and Halodule wrightii), macroalgae

(Penicillus capitata) and occasional sponges, with various other invertebrates including (anemones, nudibranchs, and tube worms).

Discussion

This report summarizes the first year in a longterm monitoring project. DERM cannot interpret the water quality and benthic habitat data as strong information partly due to the fact that is baseline information for use in future analysis. At this time it is impossible to determine a correlation between any cause and effect unless every possible parameter variation is measured. At best we can only link the parameter changes to weather and seasonality. From the numerous variables affecting the C-111 Basin and Taylor Slough, both natural and anthropogenic, it appears the scope for this monitoring is very narrow. This data will never indicate that increased freshwater delivery is causing any specific variable to change. It will only be intuitive at best by indicating water management practices. However, the SFWMD will use this information in combination with data from other monitoring and scientific projects that include the other variables affecting the ENP system. DERM's monitoring parameters will assist improved speculation on the health of the seagrasses. Initially, the monitoring was to begin prior to initiating the test project in July 1993, however due to government bureaucracy and delays from regulatory agencies and public involvement, this occurred by only one month. This project serves as baseline impact assessment monitoring to observe any effects in the changes of increased freshwater flow of C-111 and Taylor Slough.

Future Monitoring

Originally, the 1994/95 Contract modified the existing monitoring methods by expanding the project area and adding elements to the sampling methods that would allow cross referencing of the data collections of this project with similar monitoring efforts conducted in Florida Bay. Changes to the monitoring program were to include the establishment of six additional stations, three stations as southern extensions of the three existing transects and a transect comprising three stations further west of Little Madeira Bay. Other changes would standardize sample analysis and eliminate duplication of efforts in water quality sampling presently conducted by the Florida International University Southeast Environmental Labs (FIU) in Florida Bay that coincide with the locations and parameters also sampled by DERM. DERM would only collect these samples at the monitoring locations not currently sampled by the University. Additionally, the Department would perform semiannual below ground biomass assessments at each station.

Presently, however, the SFWMD and DERM are discussing new ways to create more time efficient methods and improve statistical integrity regarding the monitoring techniques, and DERM continues using the Contract 1993/94 monitoring methods without collecting chemical water quality samples. This monitoring protocol will remain while the monitoring methods are reevaluated.

Possible modifications to the project, currently being discussed, involve changing the monitoring methods entirely. Changes to the project may include monthly monitoring of the individual basins Highway Creek, Long Sound, Little Blackwater Sound, Joe Bay, Alligator Cove, Little Madeira Bay, the annual monitoring of Seven Palm Lake and Terrapin Bay, and possibly coordinating the present DERM monitoring of Manatee Bay and Barnes Sound with this project. Each month and/or year the biologists would determine sampling locations using randomly generated Global Positioning System (GPS) coordinates within a set number of zones within each basin. At each location, four 0.5 m grids will be randomly tossed off the boat for use with the Braun-Blanquet cover and abundance scale (Braun-Blanquet, 1932), to estimate the percent cover of each individual seagrass species. The biologists would perform the original method for biomass determination, take core samples to determine below substrate biomass, and collect the original physical water quality parameters. Additionally, the Department would perform monitoring of the original six stations, twice a year, using the original methods.

Future of Florida Bay

Since 1987, the health of the Florida Bay ecosystem has degraded. To date, these symptoms include extensive losses of seagrass habitat, diminished water clarity, microalgal blooms of increasing intensity and duration and population reductions in economically significant species such as pink shrimp, sponges, lobster and recreational game fish. Possible reasons for the decline include lack of fresh water into the system, regionwide water contamination, pollutants from agriculture, and lack of hurricanes.

Concerns for the massive declines in the health of Florida Bay have forced resource managers and scientists to coordinate efforts to resolve the multi-ecosystem problem. Two important objectives are to develop an understanding of the condition of Florida Bay prior to significant alteration by man and separating anthropogenically generated changes in the Bay from natural system variation. The main objective, however, is to restore Florida Bay to a naturally functioning ecosystem.

To support restoration, a program must be committed to the process of integrating scientific understanding into the management decision making process and must focus on interdisciplinary ecosystem based research

(Armentano et al. 1994). This would involve a combined program of monitoring, research, and modeling. By monitoring we can track critical ecosystem parameters and provide baseline data and model construction. By conducting research, we can develop an understanding of the physical and biological processes regulating the status of the ecosystem, test model predictions and evaluate cause and effect relationships. Additionally, resource managers will use computer simulation models to predict and assess the ecosystem response to change, historical conditions, and to develop management alternatives. Through combined efforts, scientists and managers must determine a solution to balance the needs of wildlife, agriculture and South Florida's six million people (Dewar, 1994).

BIBLIOGRAPHY

Armentano, Thomas V., et al. Florida Bay Science Plan - A science planning document provided to the Interagency Working Group on Florida Bay. Florida, April 1994.

Braun-Blanquet, J. Plant Sociology: the Study of Plant Communities. Transl., rev. and ed. C.D. Fuller and H.S. Conrad. Hafner, London: 1932.

Carroll, Jr., Joseph D. A letter to the District Engineer of the U.S. Army Corps of Engineers, dated August 16, 1986, Vero Beach, Florida.

Dewar, Heather. "Plotting a Future for the River of Grass". The Miami Herald 18 September 1994: 1B-2B.

Finley, Michael V. A letter to Colonel Robert Herndon, District Engineer of the U.S. Army Corps of Engineers, dated March 20, 1989, Dade County, Florida.

Hefty, Lee. Annual report from Metro Dade County Department of Environmental Resources Management, Miami, Florida, to the South Florida Water Management District, November 1994.

Orth, R.J. and K.A. Moore. "Submerged vascular plants: Techniques for analyzing their distribution and abundance". Marine Technology Society Journal. 1983, Vol. 17, No.2, 38-52.

Rozsa, Lori. "Glades Restoration Spawns Another Plan". The Miami Herald 11 July 1993: 6B.

South Florida Water Management District. Monitoring and Operating Plan For C-11 Interim Construction Project. Revision 3, submitted to the Florida Department of Environmental Resources, 16 May 1990.

Underwood, Ellen P. and Jan P. Loftin. "The Everglades: Back to the Future". Florida Water Winter 1995, Vol. 4, No. 1, 14-18.

U.S. Army Corps of Engineers. Experimental Program of Water Deliveries To Everglades National Park Taylor Slough Iteration - Final Environmental Assessment, June 1993.

Van Lent, Thomas J., Robert Johnson, and Robert Fennema. Water Management Practices in Taylor Slough and the Rocky Glades and Flows to Florida Bay. South Florida Research Center, Everglades National Park, 6 November 1992.

Weaver, Cecilia. Water Resource Project Manager, South Florida Water Management District, Telephone interview on the C-111/ Taylor Slough Iteration Project. March 20, 1995.

Zieman, J.C. and R.G. Wetzel. "Methods and rate of productivity in seagrasses". Handbook of Seagrass Biology, Garland STMP Press, New York, 1980: 87-117.

APPENDIX 1

C-111/Taylor Slough Water Quality and Biological Monitoring
Contract C-4227

STATEMENT OF WORK

C-111/Taylor Slough Water Quality and Biological Monitoring

Introduction

The Biscayne Bay SWIM Plan and the Biscayne Bay Management Plan have recognized the need for comprehensive monitoring to detect water quality trends and possible impacts on the health of the Bay ecosystem. This proposed freshwater inflow impact assessment entails surface water and epibenthic habitat quality monitoring in Florida Bay. This project utilizes several of the strategies to address Bay management problems as identified in the Biscayne Bay SWIM Plan.

Specifically, this geographical extension of the existing Bay environmental monitoring efforts shall identify baseline conditions and potential ecosystem changes resultant of the restored freshwater inflow into Taylor Slough.

Project Objectives

Downstream effects shall be examined monthly for three years at six epibenthic habitat and six surface water quality sites in an effort to correlate potential systematic changes to freshwater releases.

In order to maintain database continuity and allow comparative analyses, general field and analytical protocol shall be consistent with procedures followed in the existing routine monitoring programs.

Data shall be reported to the District to be added to the growing databases for these matrices.

Project Methodology

Task 1 - Surface Water Quality Monitoring:

Monthly surface water samples and field measurements shall be collected at six sites in Florida Bay. Analytical parameters quantified shall include color, turbidity, the inorganic nutrients - total phosphate phosphorus, nitrate/nitrite nitrogen, and ammonia nitrogen, chlorophyll-a/pheophytin, and the trace metals copper, lead, cadmium, and zinc. In situ measurements of the water column shall include a photosynthetically active radiation (PAR) profile, pH, dissolved oxygen, salinity, conductivity, temperature, oxidation/reduction potential (ORP), and depth.

Station locations shall be determined following a reconnaissance of the study area shown in Figure 1. Exact site coordinates shall be provided to the District. The results shall be supplied to the District quarterly or upon demand.

The data shall be supplied in both a written and digital form. The digital files shall be supplied on 3.5 inch DOS formatted diskettes in ASCII, Lotus or other compatible format as necessary. The data shall be arranged in a manner specified by the District that facilitates loading the data into the District's database.

Task 2 - Epibenthic Habitat Monitoring:

Monthly monitoring shall be conducted at six bottom stations in the general study area (Figure 1). Exact site locations shall be chosen following a reconnaissance of the study area by District and DERM staff. Station coordinates shall be provided to the District. The following habitat quality parameters shall be subsampled along a transect at each station: Seagrass short shoot and blade density, abundance and diversity of biota, and percent of substrate cover. This shall be accomplished through random subsampling of the subunits in the portable quadrat. Seagrass shall be collected and processed to provide estimates of total standing crop and epibont biomass. Photographs of quadrat stations shall be taken when environmental conditions permit.

The results shall be supplied to the District quarterly or upon demand. The data shall be supplied in both a written and digital form. The digital files shall be supplied on 3.5 inch DOS formatted diskettes in ASCII, Lotus or other compatible format as necessary.

Task 3 - Preparation of a Quality Assurance Project Plan:

A quality assurance project plan shall be submitted to the District.

Deliverables (Tasks 1-3)

Year 1: August 1993 - July 1994	
Quarterly Data Report	October 31, 1993
Quarterly Data Report	January 31, 1994
Quarterly Data Report	April 30, 1994
Annual Summary Report	July 31, 1994
Year 2: August 1994 - July 1995	
Quarterly Data Report	October 31, 1994
Quarterly Data Report	January 31, 1995
Quarterly Data Report	April 30, 1995
Annual Summary Report	July 31, 1995
Year 3: August 1995 - July 1996	
Quarterly Data Report	October 31, 1995
Quarterly Data Report	January 31, 1996
Quarterly Data Report	April 30, 1996
Annual Summary Report	July 31, 1996

Payment Schedule

Quarterly reimbursement requests shall be submitted. Invoiced items shall include actual salary and fringe costs incurred, analytical services and equipment and supplies. Analytical services from the DERM laboratory shall be calculated on a per sample basis according to the schedule (page 3). Copies of actual invoices from the laboratory and copies of invoices for equipment purchases shall be provided as documentation. Payment of invoices shall be contingent upon delivery and acceptance of all products due within the invoiced period.

Per sample costs for the DERM laboratory:

Parameter	Cost/Sample ($)
Color	10
Turbidity	10
Total Phosphate Phosphorus	12
Nitrate/Nitrite Nitrogen	20
Ammonia Nitrogen	20
Chlorophyll-a/Pheophytin	34
Cadmium	30
Copper	30
Lead	30
Zinc	30

Estimated Costs

The total annual amount of reimbursable costs sought under this Statement of Work from the District shall not exceed $70,000.00. Capital equipment that is provided at no charge includes the use of automobiles, trucks, sampling equipment, computer hardware and software and dive gear. The actual costs of boat maintenance and supplies shall be reimbursed up to $8,000.00 per year (this amount is included in the $70,000.00 limit per year).

Contingencies

Every effort shall be made to complete all the tasks as described; however, due to inclement weather conditions or equipment failure, it is recognized that some samples may be missed occassionally under Task 1. Invoices shall include only the costs for samples actually analyzed.

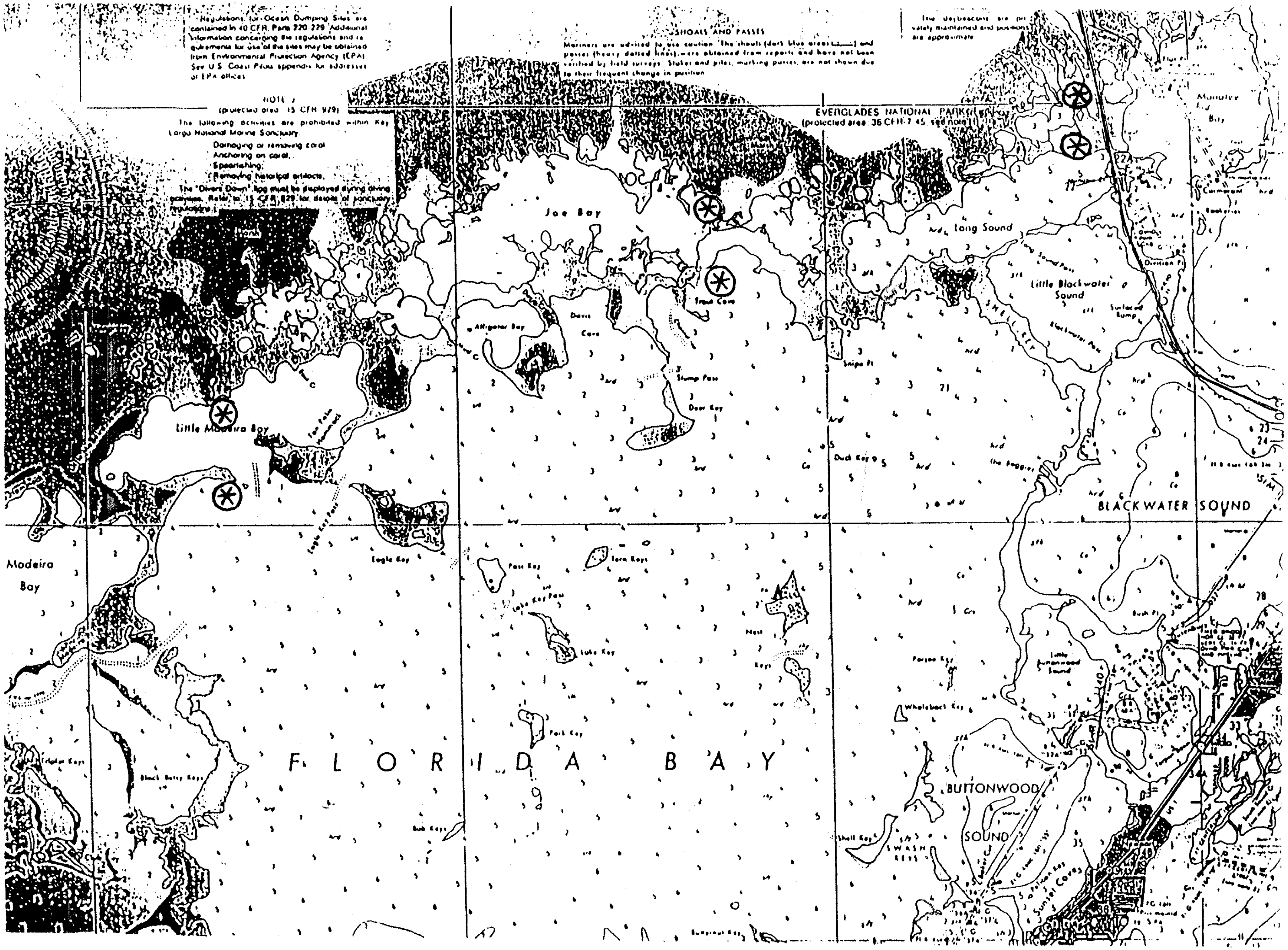


FIGURE 1

⊛ = study sites

APPENDIX 2

C-111/Taylor Slough
Water Quality and Biological Monitoring
Quality Assurance Project Plan

Section 1.0 **TITLE AND DEP APPROVAL PAGE**

Quality Assurance Project Plan

Contract C-4227
Task 3.0

Prepared by:

Dade County Department of Environmental Resources Management
33 S.W. 2nd Avenue, Miami, Florida 33130-1540
(305) 372-6789

Cecelia Weaver Staff Environmental Scientist, SFWMD	6/13/94 (Date)
Maria Loucraft-Manzano Project QA Officer, SFWMD	7/11/94 (Date)
Carlos Espinosa, P.E. Assistant Director, DERM	5/25/94 (Date)
Donna Fries QA Coordinator, DERM	05/25/94 (Date)
Brian Flynn, R&E Section Chief, DERM	5/25/94 (Date)
Ramesh Peter Buch, R&E Section QA Officer, DERM	5/25/94 (Date)

Lee Hefty, R&E Project Manager, DERM	6/9/94 (Date)
Ed Gancher Chief, DERM Laboratory	5/26/94 (Date)
Jana Bares QA Officer, DERM Laboratory	5-26-94 (Date)
Gail Sloane Project Manager, DEP	(Date)
Silvia Labie QA Officer, DEP	(Date)

Section 2.0 **TABLE OF CONTENTS**

QUALITY ASSURANCE ELEMENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

Section 3.0 PROJECT DESCRIPTION

3.1 Site Identification and History

Site Name: Florida Bay, Everglades National Park

Site Address: Florida Bay, Everglades National Park
Homestead, Dade County, FL 33034

3.1.1 Site History

In an effort to address concerns regarding the water supply to the east Everglades and Florida Bay, State and Federal Water managers have increased the flow of freshwater to Taylor Slough through S-332 by approximately 100 cfs. The South Florida Water Management District (SFWMD) has contracted with Metro-Dade County Department of Environmental Resources Management (DERM) to perform monitoring to assess the possible effects this change in water delivery will have on water quality and epibenthic habitat in northeast Florida Bay. The monitoring will provide baseline data on existing benthic communities and current water quality conditions and will document any changes resulting from the increased flow of freshwater through Taylor Slough.

3.1.2 Summary of the Historical Data - See Table 3.1

3.2 Project Scope and Purpose

3.2.1 Purpose of this Project: This plan is being submitted as a requirement of SWIM Contract C-4227 between South Florida Water Management District (SFWMD) and Metropolitan Dade County. Please see sampling and analytical task assignments as noted in Appendix A-1.

3.2.2 Intended End Use of the Data

___ Permit Compliance
___ Feasibility Study
___ Consent Order Compliance
___ Remedial Action
___ Contamination Assessment
_X_ Water Quality Data Base:
(Florida Bay Surface Water Quality and Benthic Habitat Monitoring Data Base)
___ Facility Operating Report

3.2.3 Projected Schedule and Scope of Work

Projected Beginning Date: August 1, 1993

Projected Ending Date: July 31, 1996

Major Project Tasks

Specific Project Activity	Scheduled Date
1. Sampling/analysis (monthly)	August 1, 1993
2. Preparation of progress reports (quarterly)	October 31, 1993

TABLE 3.1
Summary of the Historical Data

New project. There are no historical data for this project prior to this contract

3.3 Project Organization

3.3.1 Project Organization - Sample collection activities will be conducted by the Dade County Department of Environmental Resources Management (DERM). The Laboratory analytical work will be performed by the DERM Laboratory.

Refer to figure 3.1 for the specific organization of this project.

3.3.2 Personnel Modifications or Additions - The following personnel are not included in the CompQAPs of the referenced organizations:

Restoration & Enhancement Section QA Officer
Ramesh Peter Buch

3.4 Project Objectives

3.4.1 Data Quality Objectives

_X_ The data quality objectives for this project are the routine QA targets listed in the laboratory CompQAP.

___ The minimum detection limits to be achieved for this study differ from the routine detection limits specified in the laboratory CompQAP and are included as a part of Table 3.2.

___ The precision and accuracy requirements differ from the routine targets specified in the laboratory CompQAP and are included as a part of Table 3.2.

3.4.2 Proposed Samples for Project

a. See Figure 3.2 for a map of the project site.
b. See Table 3.2 of this Section for a summary of the sampling and analysis activities.

3.4.3 Summary of Matrix Types, Analytical Methods and QA Targets

Field and laboratory analytical measurements are presented in Table 3.2.

FIGURE 3.1
Project Organization

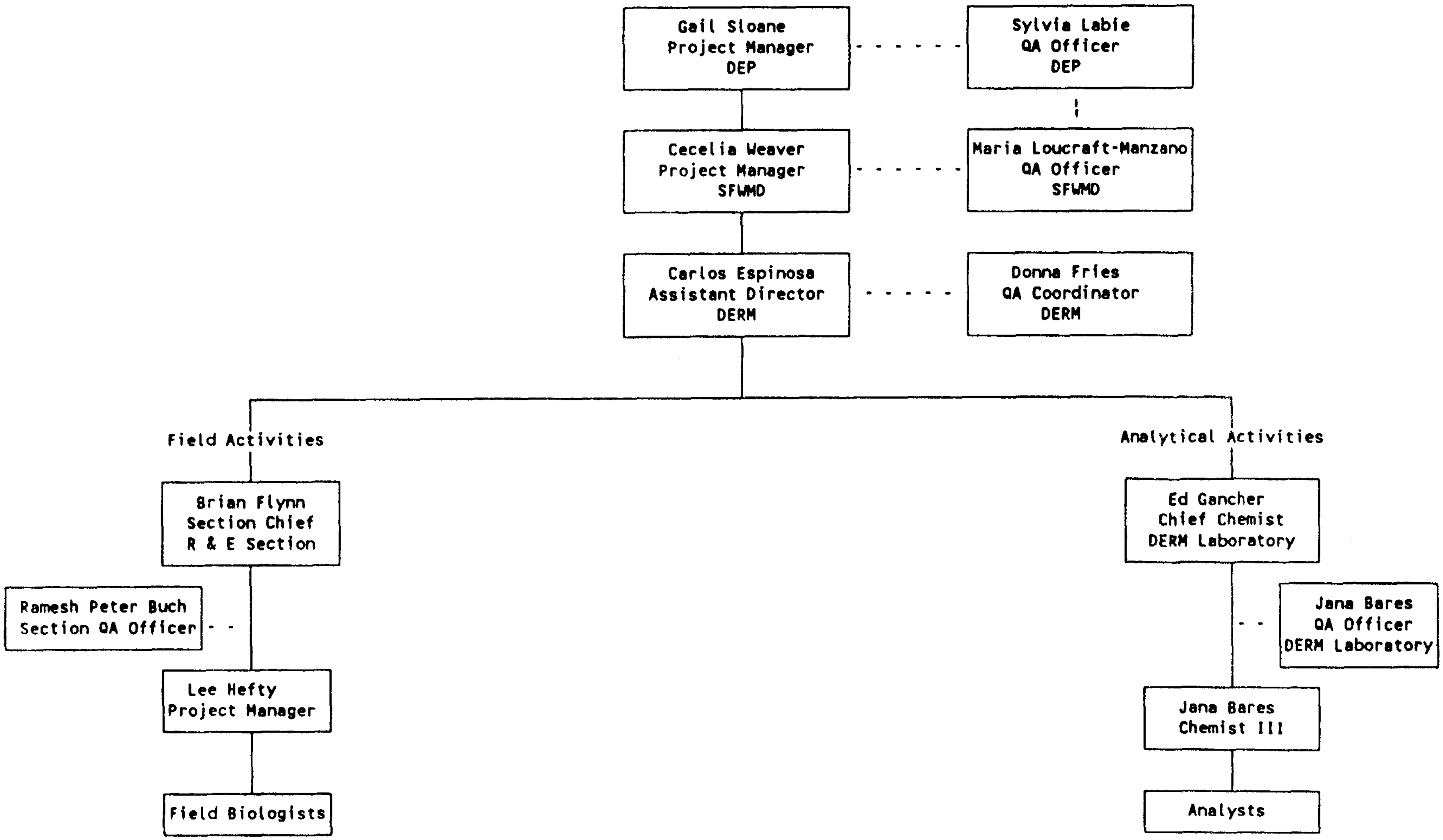
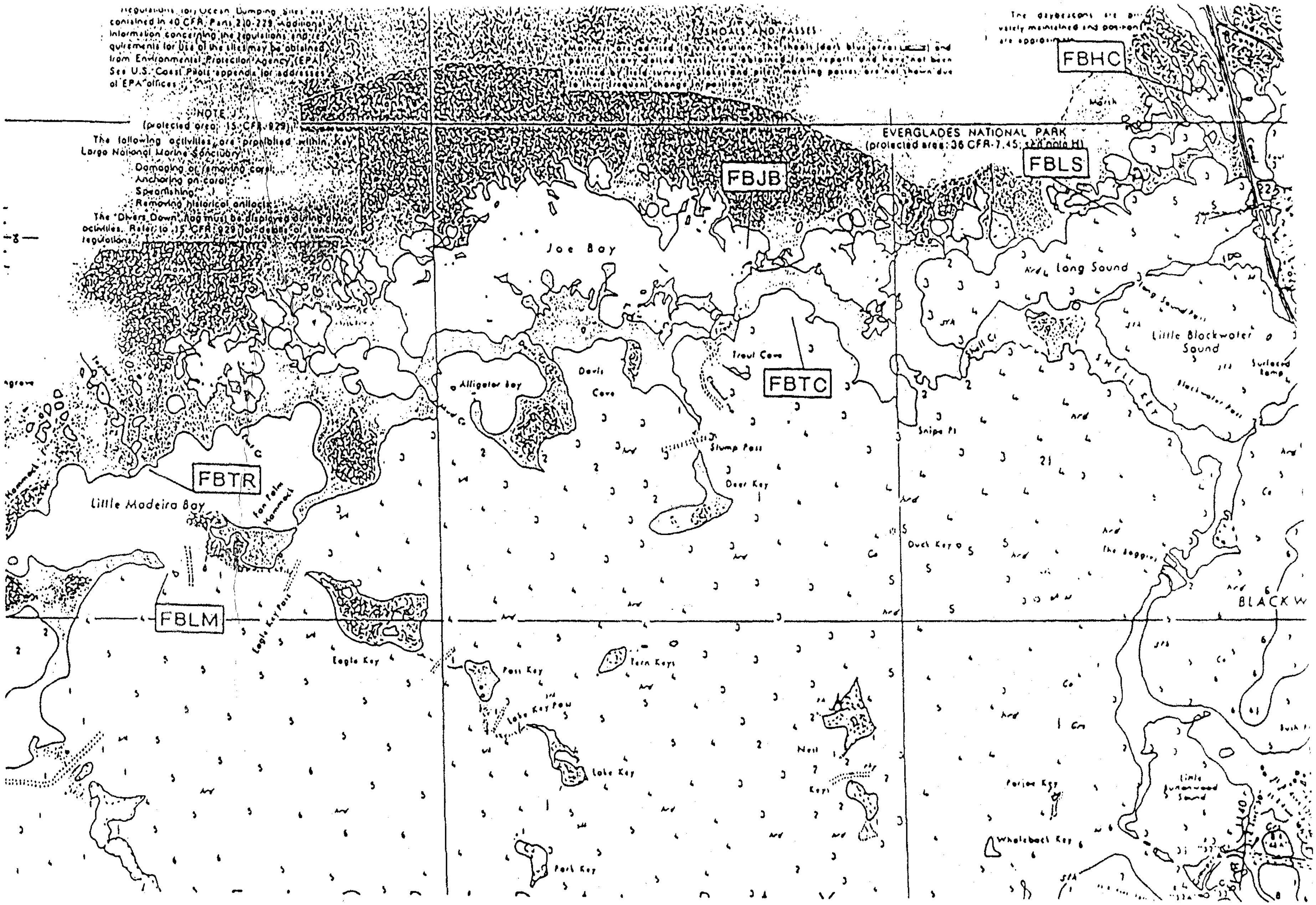


Figure 3.2
Site Map - Florida Bay



C-111\TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING STATIONS

FBHC; (Highway Creek) FBJB; (Joe Bay) FBTR; (Taylor River)
FBLS; (Long Sound) FBTC;(Trout Cove) FBLM; (Little Madeira Bay)

TABLE 3.2
PROPOSED SAMPLES, MATRICES AND ANALYTICAL METHODS FOR THE PROJECT

The standards criteria outlined in DER Rule 17-302 are the detection limit criteria for this project. **The detection limits reported for this project shall at least meet, or be lower than the stated standards.**

FIELD MEASUREMENTS WILL BE PERFORMED BY: the Dade County Department of Environmental Resources Management, whose CompQAP #920035G was approved with annual amendments on 10/21/93.

PARAMETER	METHOD #
Dissolved Oxygen	Field measurement - SM4500-O G
Salinity	Field measurement - SM2520 B
pH	Field measurement - SM4500-H+ B
Redox	Field measurement - n/a
Specific Conductivity	Field measurement - SM2510 A
Temperature	Field measurement - SM2550 B
Depth	Field measurement - n/a
Par	Field measurement - n/a

FIELD SAMPLE COLLECTION ACTIVITIES WILL BE PERFORMED BY THE ABOVE NAMED ORGANIZATION.

LABORATORY ANALYSES WILL BE PERFORMED BY: the Dade County Department of Environmental Resources Management Laboratory, whose CompQAP # is 870238G with annual amendments approved on 07/01/93.

				QUALITY CONTROL SUMMARY					QA TARGETS		
FREQUENCY	SAMPLE MATRIX	SAMPLE SOURCE	# SAMPLES	TB	EB	FD	ANALYTICAL METHOD #	COMPONENT	P	A	MDL
Monthly	Water	Surface water	6	0	2	1	EPA 353.2	Nitrate/Nitrite Nitrogen			
Monthly	Water	Surface water	6	0	2	1	EPA 180.1	Turbidity			
Monthly	Water	Surface water	6	0	2	1	EPA 365.1	Phosphates (total)			
Monthly	Water	Surface water	6	0	2	1	EPA 350.1	Ammonia Nitrogen			
Monthly	Water	Surface water	6	0	2	1	SM10200 H	Chlorophyll			
Monthly	Water	Surface water	6	0	2	1	SM 2120 B	Color			
Monthly	Water	Surface water	6	0	2	1	EPA 213.2	Cadmium[1]			
Monthly	Water	Surface water	6	0	2	1	EPA 220.2	Copper[1]			
Monthly	Water	Surface water	6	0	2	1	EPA 239.2	Lead[1]			
Monthly	Water	Surface water	6	0	2	1	EPA 289.2	Zinc[1]			
Monthly	Benthic Vegetation	Seagrass	6	0	0	0	*	Seagrass Abundance and Diversity			
Quarterly	Benthic Vegetation	Seagrass	18	0	0	0	*	Standing Crop Biomass			

* Analytical Methods: The analytical methods for estimating seagrass abundance and diversity and seagrass standing crop biomass are detailed in the DERM CompQAP #920035G, Section 6.5.8.4b, page 58, revised 10/21/93.

TB - Trip Blank　　MDL - Method Detection Limit　　EB - Equipment Blank
EB - Equipment Blank　　P - Precision　　A - Accuracy

NOTE: 1) S.O.P. for salt water extraction of trace metals included in Appendix A-2.

Section 4.0 FIELD PROCEDURES AND QUALITY CONTROL

This section specifies the protocols and procedures to be used by the Dade County Department of Environmental Resources Management (DERM) field personnel when conducting sampling activities for this project.

4.1 Sampling Equipment

See Table 4.1 for a list of the equipment used for this project.

4.2 Field Activities - See Table 4.2

4.2.1 Sampling protocols for this project that are not specified by the CompQAP specified in Table 4.2 include the following: None

4.2.2 Disposal protocols for handling wastes differ from those specified by the CompQAP. Wastes will be handled according to the following protocols: None

4.3 Field Measurements

Field measurements are listed in Table 3.2 of this QAPP. Field screening measurements that will be made are: None.

TABLE 4.1
PROPOSED SAMPLING EQUIPMENT

The following equipment will be used by the Dade County Department of Environmental Resources Management field personnel for this project. With the exception of the additional equipment, discussions on use and restrictions are included in CompQAP # 920035G updated with annual amendments which were approved 10/21/93.

EQUIPMENT DESCRIPTION	CONSTRUCTION MATERIALS	USE
Purging Equipment		
1. Peristaltic pump	Aluminum casing with stainless steel heads	Purging*
2. Tubing	Silicone rubber	Purging*

* Refer to Table 4.2 of this QAPP, Equipment Decontamination, for specific use of this equipment for purging prior to surface water sample collection.

Sampling Equipment		
1. Peristaltic pump	Aluminum casing with stainless steel heads	Sample collection
2. Tubing	Silicone rubber	Sample Collection

Additional equipment not addressed in the CompQAP includes: None.

Field Measurement Equipment		
1. Hydrolab Surveyor II		Field Measurement
2. Hydrolab Surveyor III		Field Measurement
3. Li-Cor Photosynthetically Active Radiation Datalogger		Field Measurement
4. Flat Quadrat		Field Measurement
5. Measuring Tape		Field Measurement

TABLE 4.2
FIELD ACTIVITIES

The following field protocols will be used by the Dade County Department of Environmental Resources Management. The Comprehensive QA Plan number for this organization is 920035G. The date of the last update approval is 10/21/93.

All protocols, procedures and policies in the above-mentioned document which are pertinent to this Quality Assurance Project Plan will be followed and are summarized below:

	VOCs	Extr. Org.	Metals	Inorg. Anions	Org.	Phys. Prop.	Micro	Other (specify)
Groundwater								
Groundwater (in-place plumbing)								
Potable Water								
Surface Water			X	X	X	X		Chlorophyll
Soil								
Sediment/Sludges								
Automatic Samplers								
Field Filtration								
Wastewater								
Stormwater runoff								
Seagrass								Blade and Shoot Count and
								Biomass Determination

SAMPLE CONTAINERS
Sample containers will be supplied by: the Dade County Department of Environmental Resources Management Laboratory.

_X_Sample containers will be prepreserved by the above-referenced organization and additional acid will be provided[1]; **OR**
___Field organizations will preserve samples on site using protocols outlined in the CompQAP.

NOTE: 1) S.O.P. for salt water extraction of trace metals included in Appendix A-2.

EQUIPMENT DECONTAMINATION

Equipment decontamination will follow protocols outlined in the above-referenced CompQAP. Modifications of the procedures in the above-referenced CompQAP are:

Equipment Category	Modification
1. Pump Tubing:	Due to the nature of the sampling methodology, the existing natural variability of the sampling medium and the results of a data validation study conducted to determine the levels of cross-contamination associated with existing surface water sampling protocol, new tubing will not be used for each site. Instead sample water will be pumped through tubing for one minute prior to sample collection at each site as was done in the data validation study. This modification was addressed in the DERM QAPP #920036S, approved with revisions, August 1993 for the previous contract (C-3259) for this work. Refer to Appendix A-1 in the above-mentioned QAPP for discussion and data relating to the above-mentioned data validation study.

TABLE 4.2 (continued)
FIELD ACTIVITIES

EQUIPMENT SHALL BE PRECLEANED PRIOR TO ON-SITE ARRIVAL

WASTE DISPOSAL

_X_The procedures for handling wastes from equipment cleaning and from sampling are discussed in the above-referenced CompQAP.

___The disposal procedures for handling wastes for this project differ from those outlined in the above referenced CompQAP and are outlined in Section 4.2.2.

Section 5.0 LABORATORY PROCEDURES AND QUALITY CONTROL

The laboratory analyses shall be conducted by the Department of Environmental Resources Management Laboratory. The Comprehensive QA Plan number for this organization is 870238G. The date of the last update approval is 07/01/93.

All protocols, procedures and policies in the above-mentioned document which are pertinent to this Quality Assurance Project Plan shall be followed. The laboratory shall analyze the samples for this project by the methods specified in Table 3.2 of this QAPP.

5.1 Quality Control Checks

The types of laboratory control checks that will be used when analyzing samples for this project are:

Chemical:

_X_ Reagent Blanks
_X_ Duplicate Samples
_X_ Duplicate Matrix Spikes
_X_ Continuing Calibration Standards
_X_ Matrix Spikes
_X_ QC Check Samples
_X_ QC Check Standards

Section 6.0 QUALITY ASSURANCE MANAGEMENT

6.1 Corrective Actions

In addition to corrective actions cited in the approved Comprehensive QA Plans, **ALL INVOLVED PARTIES WILL INITIATE ANY CORRECTIVE ACTION DEEMED NECESSARY BY DEP.**

6.2 Performance and Systems Audits

6.2.1 Field Activities

Specific audits planned for this project are:

Audit Type	Frequency/Date	Description
1. Performance	As deemed necessary	Section QA Officer will perform an audit consisting of field analyses of blind QC samples prepared by the QA Officer or Field Supervisor.
2. Internal System	Annually	Section QA Officer will perform an audit on each field personnel to ensure all procedures including decontamination, documentation, measurements, sample handling, and sample custody are performed correctly.

6.2.2 Laboratory Activities

Specific audits planned for this project are:

Audit Type	Frequency/Date	Description
1. Internal System	Semi-Annually	QA Coordinator will assess the compliance of the lab with the QA activities contained in the CompQAP.
2. Internal Performance	As deemed necessary	QA coordinator will assess the accuracy of the total measurement system using select standard reference materials (SRMs). The analyst who normally performs the analysis will measure the SRM. Usage of the SRMs varies from daily for inorganic parameters to quarterly for select organic parameters.

ALL INVOLVED PARTIES WILL CONSENT TO AUDITS BY FDEP IF DEEMED NECESSARY.

6.3 Quality Assurance Reports

Field Activities	Internal verbal QA Reports will be submitted by the Section QAO to the Division Chief/Section Head quarterly. Written QA Reports will be submitted to the FDEP QAS annually.
Laboratory Activities	QA Reports will be submitted internally to the Laboratory Chief Chemist or Director quarterly. Written QA Reports will be submitted to the FDEP QAS annually.

Note: Frequency must comply with Table IV, Appendix D of the DER Manual for Preparing Quality Assurance Plans or Table 6 of Chapter 17-160, F.A.C., Quality Assurance.

APPENDIX A-1

CONTRACT DESCRIPTIONS OF SAMPLING AND ANALYTICAL PROTOCOL

C-4227

EXHIBIT "A"

STATEMENT OF WORK

C-111/Taylor Slough Water Quality and Biological Monitoring

Introduction

The Biscayne Bay SWIM Plan and the Biscayne Bay Management Plan have recognized the need for comprehensive monitoring to detect water quality trends and possible impacts on the health of the Bay ecosystem. This proposed freshwater inflow impact assessment entails surface water and epibenthic habitat quality monitoring in Florida Bay. This project utilizes several of the strategies to address Bay management problems as identified in the Biscayne Bay SWIM Plan.

Specifically, this geographical extension of the existing Bay environmental monitoring efforts shall identify baseline conditions and potential ecosystem changes resultant of the restored freshwater inflow into Taylor Slough.

Project Objectives

Downstream effects shall be examined monthly for three years at six epibenthic habitat and six surface water quality sites in an effort to correlate potential systematic changes to freshwater releases.

In order to maintain database continuity and allow comparative analyses, general field and analytical protocol shall be consistent with procedures followed in the existing routine monitoring programs.

Data shall be reported to the District to be added to the growing databases for these matrices.

Project Methodology

Task 1 - Surface Water Quality Monitoring:

Monthly surface water samples and field measurements shall be collected at six sites in Florida Bay. Analytical parameters quantified shall include color, turbidity, the inorganic nutrients - total phosphate phosphorus, nitrate/nitrite nitrogen, and ammonia nitrogen, chlorophyll-a/pheophytin, and the trace metals copper, lead, cadmium, and zinc. In situ measurements of the water column shall include a photosynthetically active radiation (PAR) profile, pH, dissolved oxygen, salinity, conductivity, temperature, oxidation/reduction potential (ORP), and depth.

Station locations shall be determined following a reconnaissance of the study area shown in Figure 1. Exact site coordinates shall be provided to the District. The results shall be supplied to the District quarterly or upon demand.

The data shall be supplied in both a written and digital form. The digital files shall be supplied on 3.5 inch DOS formatted diskettes in ASCII, Lotus or other compatible format as necessary. The data shall be arranged in a manner specified by the District that facilitates loading the data into the District's database.

Task 2 - Epibenthic Habitat Monitoring:

Monthly monitoring shall be conducted at six bottom stations in the general study area (Figure 1). Exact site locations shall be chosen following a reconnaissance of the study area by District and DERM staff. Station coordinates shall be provided to the District. The following habitat quality parameters shall be subsampled along a transect at each station: Seagrass short shoot and blade density, abundance and diversity of biota, and percent of substrate cover. This shall be accomplished through random subsampling of the subunits in the portable quadrat. Seagrass shall be collected and processed to provide estimates of total standing crop and epibont biomass. Photographs of quadrat stations shall be taken when environmental conditions permit.

The results shall be supplied to the District quarterly or upon demand. The data shall be supplied in both a written and digital form. The digital files shall be supplied on 3.5 inch DOS formatted diskettes in ASCII, Lotus or other compatible format as necessary.

Task 3 - Preparation of a Quality Assurance Project Plan:

A quality assurance project plan shall be submitted to the District.

Deliverables (Tasks 1-3)

Year 1: August 1993 - July 1994	
Quarterly Data Report	October 31, 1993
Quarterly Data Report	January 31, 1994
Quarterly Data Report	April 30, 1994
Annual Summary Report	July 31, 1994
Year 2: August 1994 - July 1995	
Quarterly Data Report	October 31, 1994
Quarterly Data Report	January 31, 1995
Quarterly Data Report	April 30, 1995
Annual Summary Report	July 31, 1995
Year 3: August 1995 - July 1996	
Quarterly Data Report	October 31, 1995
Quarterly Data Report	January 31, 1996
Quarterly Data Report	April 30, 1996
Annual Summary Report	July 31, 1996

Payment Schedule

Quarterly reimbursement requests shall be submitted. Invoiced items shall include actual salary and fringe costs incurred, analytical services and equipment and supplies. Analytical services from the DERM laboratory shall be calculated on a per sample basis according to the schedule (page 3). Copies of actual invoices from the laboratory and copies of invoices for equipment purchases shall be provided as documentation. Payment of invoices shall be contingent upon delivery and acceptance of all products due within the invoiced period.

Per sample costs for the DERM laboratory:

Parameter	Cost/Sample ($)
Color	10
Turbidity	10
Total Phosphate Phosphorus	12
Nitrate/Nitrite Nitrogen	20
Ammonia Nitrogen	20
Chlorophyll-a/Pheophytin	34
Cadmium	30
Copper	30
Lead	30
Zinc	30

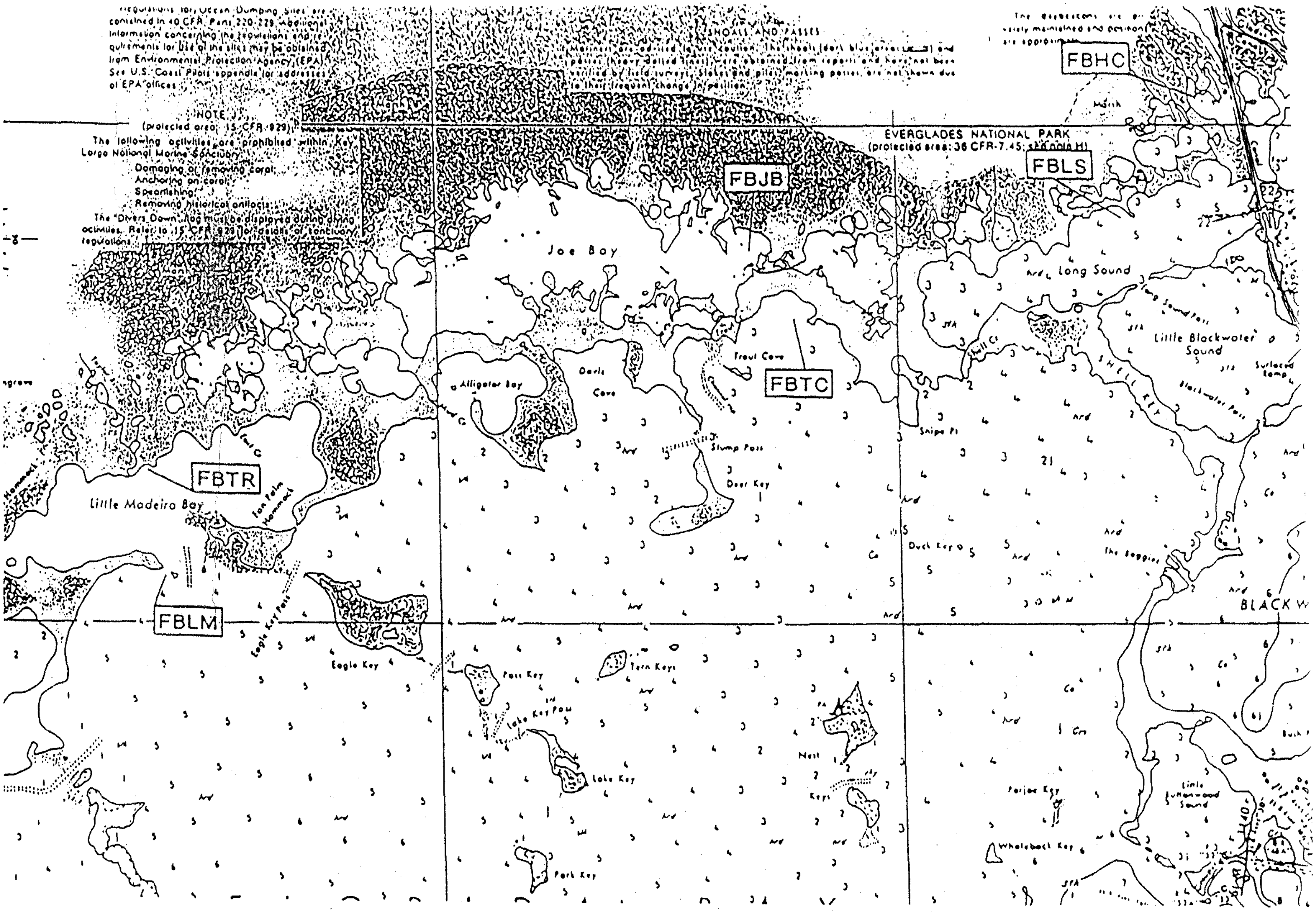
Estimated Costs

The total annual amount of reimbursable costs sought under this Statement of Work from the District shall not exceed $70,000.00. Capital equipment that is provided at no charge includes the use of automobiles, trucks, sampling equipment, computer hardware and software and dive gear. The actual costs of boat maintenance and supplies shall be reimbursed up to $8,000.00 per year (this amount is included in the $70,000.00 limit per year).

Contingencies

Every effort shall be made to complete all the tasks as described; however, due to inclement weather conditions or equipment failure, it is recognized that some samples may be missed occassionally under Task 1. Invoices shall include only the costs for samples actually analyzed.

Figure 3.2
Site Map - Florida Bay



C-111\TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING STATIONS

FBHC; (Highway Creek)
FBLS; (Long Sound)

FBJB; (Joe Bay)
FBTC; (Trout Cove)

FBTR; (Taylor River)
FBLM; (Little Madeira Bay)

APPENDIX A-2

DEPARTMENT OF ENVIRONMENTAL RESOURCES MANAGEMENT LABORATORY
S.O.P. FOR SALT WATER EXTRACTION FOR TRACE METALS

PARAMETER:	Salt Water Freon Extraction for Trace Metals
METHOD:	N/A
DETECTION LIMITS:	Cadmium = 0.08 ug/L Pb = 0.17 ug/L
	Copper = 0.44 ug/L Zn = 12.2 ug/L
DATA REPORTING:	micrograms/liter

1. PRINCIPLE

A rapid carbamate extraction method with pyrrolidinedithiocarbamate and diethyldithiocarbamate is used for the determination of cadmium, copper, lead, and zinc in sea water by graphite furnace atomic absorption. The metal-carbamate complexes are extracted from 500ml of sea water into TF bottles with Freon and back-extracted into 15ml of acidified water. By using this procedure, the metals are transferred to a solution in which their concentrations do not change with time, and which can be easily stored for transportation. The sensitivity is high enough for analysis of open ocean waters.

2. SAMPLING CONTAINER

1-Liter Teflon bottles stored at $4^{O}C$ for up to six months.

3. APPARATUS

(a) Nalgene teflon separatory funnels - 1000ml volume.

(b) HDPE storage bottles - 125ml volume.

(c) Eppendorf pipets

(d) Miscellaneous glassware

4. REAGENTS

(a)	Nitric Acid (HNO_3)	: Trace metal grade
(b)	Freon	: 1,1,2-trichloro-1,2,2-trifluroethane
(c)	0.5M Ammonium Citrate Dibasic Buffer	: Weigh out 56.5475g of ammonium citrate dibasic and dilute to 500ml with Milli-Q water.
(d)	Ammonium Pyrrolidinedithiocarbamate (APDC) and Diethyldithiocarbamic Acid, Diethylammonium Salt (DDTC) - 1% (w/v) each in the same solution	: Weigh out 1.25g of APDC and 1.25g of DDTC. Dissolve in 125ml of Milli-Q water in a clean TFL separatory funnel, add 20 ml of Freon and shake for 3 min. Allow to separate and drain out the Freon. Add another 10ml of Freon and shake for 30 sec. Drain the Freon to the same container. Repeat the 10ml Freon extraction 2-3 times. Use upper layer for carbamate extraction. **Prepare fresh.**

5. PROCEDURE

A. Glassware and container preparation

(1) Soak all glass and plastic containers which have not previously been acid-soaked in 15% HNO_3 for 2 days. Otherwise, soak for 2 days in 1+19 trace level HNO_3 (3.5%).

(2) Rinse 5 times with Milli-Q water. Shake off excess water.

(3) Drain. Let them dry up side down.

(4) Label separatory funnels as 1,2, etc.

B. Buffer Blank Determination

(1) Add 500ml of buffer to a labeled 1-Liter separatory funnel.

(2) Using a 5-ml adjustable automatic pipet, transfer 3ml of APDC-DDTC into funnel and swirl. Save the pipet tip to use throughout the extraction.

(3) Add 20ml of Freon

(4) Shake for 3 minutes, venting through the screw cap, not by venting through the stopcock. **IT IS IMPORTANT TO AVOID TRANSFERRING ANY SALT WATER TO THE STORAGE VIAL.**

(5) Drain Freon into a labeled storage vial, leaving a small quantity of Freon in the separatory funnel.

(6) Add another 10ml of Freon and shake for 30 seconds.

(7) Add this Freon to the same storage vial.

NOTE: When labeling the storage vial make sure to write down the number of the separatory funnel.

(8) Repeat steps (2) through (7) placing both Freon extracts into a new storage vial.

(9) Store the purified buffer in a previously cleaned teflon bottle.

NOTE: The buffer does not have to be re-extracted when used in the future.

C. Total Method Blank Determination

(1) Place 500ml of Milli-Q water into a clean separatory funnel. Record the number of the separatory funnel.

(2) Add 3ml of purified buffer (Step 5.B.). Save the pipet tip to use throughout the extraction.

(3) Add 3ml of APDC-DDTC and swirl.

(4) Add 20ml of Freon and shake for 3 minutes. See 5.B.4.

(5) Drain Freon into a clean, labeled 125-ml storage container.

(6) Add another 10ml of Freon and shake for 30 seconds.

(7) Drain Freon into same vial.

(8) Repeat steps (2) through (7) placing both Freon extracts into a new storage vial.

(9) Store purified water into a previously cleaned sample container.

(10) Save **BLANK** for D.12.

D. Sample Extraction

(1) Pour sample into a 1-liter separatory funnel up to the 500-ml mark. Record the number of the separatory funnel.

(2) Add 3ml of purified buffer and mix by swirling.

(3) Add 3ml of APDC-DDTC and swirl (Resulting pH should be between 5 and 6). If spiking the sample, do so at this point.

(4) Add 20ml of Freon and shake for 3 minutes. See 5.B.4.

(5) Allow the phases to separate and drain the Freon layer (lower organic layer) into a clean, labeled 125-ml storage container.

NOTE: Do not allow any water to enter the stopcock.

(6) Add another 10ml of Freon and shake for 30 seconds.

(7) Allow the phases to separate and drain the Freon layer into the same container.

(8) Drain extracted sample into a 1-liter graduated cylinder and record the extracted volume in ml.

(9) Add 500ul of concentrated HNO_3 to all storage containers, including the blank.

(10) Shake for 20 seconds.

(11) Let stand for at least 5 minutes

(12) Add 15ml of Milli-Q water that was previously purified by extraction (See C.10).

(13) Shake for 20 seconds.

(14) Analyze the top layer using graphite furnace atomic absorption spectrophotometer.

6. NOTES

(a) Do not wash separatory funnels between samples. Rinse them 4 times with Milli-Q water between samples.

(b) At least one duplicate and one spike should be extracted for every set of 10 samples.

7. PREPARATION OF SPIKES

	Stock Std (mg/L)	Vol of Stock Std (ul)	Approximate Spike conc. (ug/L)
Cadmium	1.0	100	0.2
Copper	5.0	100	1.0
Lead	5.0	100	1.0
Zinc	10.0	1,000	20.0

8. CALCULATIONS

(a) Un-corrected Sample Concentration:

$$\frac{(\text{ug/L})\ (\text{mL water used in back-extraction})}{\text{mL sample extracted}} = X$$

Example: $$\frac{65\text{ug/L} \times 15\text{ml water}}{490\text{ ml sample}} = 1.99\text{ug/L} = X$$

(b) Method Blank Correction:

$$\frac{\text{ug/L} \times 15}{500} = B$$

(c) Final sample concentration (in ug/L) = **X - B**

(d) Of spikes:

$$\frac{\text{stock } \left(\frac{\text{mg}}{\text{L}}\right) \times \text{vol of stock used (ul)}}{\text{ml of sample extracted}} = \text{conc. of spike in ug/L}$$

9. REFERENCES

Analytica Chimica Acta, 98 (1978) 47-57.
Elsevier Scientific Publishing Company, Amsterdam

"An Improved Metal Extraction Procedure for the Determination of Trace Metals in Sea Water by Atomic Absorption Spectrometry With Electrothermal Atomization"

APPENDIX 3

Water Quality and Biological Monitoring Data
(data from Hefty, 1994)

TABLE 1

MONTHLY WATER QUALITY OBSERVATIONS
HIGHWAY CREEK STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBHC	10	18	1993	102322	28.24	7.61	0.654	0.3	89.8	6.99	305	0.6	BOTTOM
FBHC	11	8	1993	104339	25.54	7.78	1.134	0.6	94.7	7.71	332	0.6	BOTTOM
FBHC	12	13	1993	110351	16.5	7.87	20.3	12.1	95	8.58	379	0.5	BOTTOM
FBHC	1	10	1994	105119	18.38	8.08	13.4	7.7	96.2	8.6	431	0.3	BOTTOM
FBHC	2	14	1994	113313	24.1	7.86	24.6	14.9	91.7	7.02	370	0.3	BOTTOM
FBHC	3	14	1994	104205	22.31	8.16	8.6	4.8	89.4	7.53	402	0.3	BOTTOM
FBHC	4	11	1994	111048	24.72	8.03	26.3	16	103.6	7.79	441	0.3	BOTTOM
FBHC	5	9	1994	111500	29.89	7.82	12.13	6.9	77.8	5.63	386	0.3	BOTTOM
FBHC	6	13	1994	130250	32.26	8.1	0.749	0.4	89	6.46	357	0.4	BOTTOM
FBHC	7	5	1994	130728	30.67	8.16	4.48	2.5	97.1	7.14	370	0.4	BOTTOM
FBHC	8	8	1994	123244	31.86	7.95	31.2	19.4	87.9	5.72	378	0.5	BOTTOM
FBHC	9	6	1994	124213	30.78	7.96	0.71	0.4	87.2	6.49	350	0.6	BOTTOM
				ANNUAL MEAN	26.27	7.95	12.0	7.2	91.6	7.14	375	0.4	
				STD	5.04	0.16	10.7	6.6	6.2	0.93	37	0.1	
				MAX	32.26	8.16	31.2	19.4	103.6	8.60	441	0.6	
				MIN	16.50	7.61	0.7	0.3	77.8	5.63	305	0.3	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBHC	10	18	1993	102508	28.43	7.58	0.627	0.3	89	6.9	320	0	SURFACE
FBHC	11	8	1993	104439	25.54	7.8	1.119	0.6	94.4	7.69	339	0.1	SURFACE
FBHC	12	13	1993	110519	16.92	7.85	18.2	10.7	90.1	8.15	374	0.2	SURFACE
FBHC	1	10	1994	105239	18.33	8.07	15	8.7	93.6	8.32	426	0.1	SURFACE
FBHC	2	14	1994	113357	24.1	7.86	24.6	14.9	93	7.12	369	0.1	SURFACE
FBHC	3	14	1994	104312	22.27	8.13	4.7	2.6	86.6	7.41	396	0	SURFACE
FBHC	4	11	1994	111230	24.92	8.04	25.7	15.6	87.4	6.56	447	0	SURFACE
FBHC	5	9	1994	111603	28.13	7.77	3.04	1.6	63.3	4.89	375	0	SURFACE
FBHC	6	13	1994	130435	32.28	8.1	0.748	0.4	88.5	6.42	363	0.2	SURFACE
FBHC	7	5	1994	130842	30.65	8.17	4.19	2.3	95.5	7.03	371	0	SURFACE
FBHC	8	8	1994	123355	31.93	7.96	31.4	19.5	86.3	5.61	374	0	SURFACE
FBHC	9	6	1994	124342	30.85	7.97	0.714	0.4	86.9	6.46	355	0.1	SURFACE
				ANNUAL MEAN	26.20	7.94	10.8	6.5	87.9	6.88	376	0.1	
				STD	4.92	0.17	11.0	6.8	8.0	0.95	33	0.1	
				MAX	32.28	8.17	31.4	19.5	95.5	8.32	447	0.2	
				MIN	16.92	7.58	0.6	0.3	63.3	4.89	320	0.0	

TABLE 1 (CON'T)

MONTHLY WATER QUALITY OBSERVATIONS
LONG SOUND STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLS	10	18	1993	133809	29.12	7.57	21.7	13	86.1	6.1	326	1.2	BOTTOM
FBLS	11	8	1993	130525	26.95	7.58	19.7	11.7	88.6	6.57	333	1.1	BOTTOM
FBLS	12	13	1993	133550	18.97	7.92	33.8	21.2	92.8	7.55	332	1.2	BOTTOM
FBLS	1	10	1994	132311	19.57	8.05	33.1	20.7	99.7	8.04	466	0.8	BOTTOM
FBLS	2	14	1994	134416	25.16	7.89	36.4	23	99.5	7.12	363	0.6	BOTTOM
FBLS	3	14	1994	105452	23.45	8.12	25.1	15.3	108.6	8.4	422	0.9	BOTTOM
FBLS	4	11	1994	135745	25.97	8.76	32.6	20.3	105.1	7.54	419	0.8	BOTTOM
FBLS	5	9	1994	130539	29.53	7.74	34.1	21.4	83.2	5.57	428	0.9	BOTTOM
FBLS	6	13	1994	105841	31.27	7.94	27.8	17	88.2	5.88	382	0.9	BOTTOM
FBLS	7	5	1994	105828	29.07	7.94	30.4	18.9	97.5	6.68	388	1	BOTTOM
FBLS	8	8	1994	103247	30.61	7.81	41.8	26.9	83.7	5.33	356	1.1	BOTTOM
FBLS	9	6	1994	103310	31.72	7.56	30	18.5	47	3.08	378	1.1	BOTTOM
				ANNUAL MEAN	26.78	7.91	30.5	19.0	90.0	6.49	383	1.0	
				STD	4.13	0.31	6.0	4.1	15.2	1.39	42	0.2	
				MAX	31.72	8.76	41.8	26.9	108.6	8.40	466	1.2	
				MIN	18.97	7.56	19.7	11.7	47.0	3.08	326	0.6	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLS	10	18	1993	133655	28.82	7.6	20.2	12	87.9	6.29	319	0.9	METER
FBLS	11	8	1993	130630	26.57	7.68	16.4	9.6	89	6.73	333	1	METER
FBLS	12	13	1993	133644	19.02	7.93	33.4	20.9	93.1	7.58	334	1.1	METER
FBLS	9	6	1994	103514	31.79	7.58	28	17.2	41.8	2.76	371	1	METER
				ANNUAL MEAN	26.55	7.70	24.5	14.9	78.0	5.84	339	1.0	
				STD	4.73	0.14	6.6	4.4	21.0	1.84	19	0.1	
				MAX	31.79	7.93	33.4	20.9	93.1	7.58	371	1.1	
				MIN	19.02	7.58	16.4	9.6	41.8	2.76	319	0.9	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLS	10	18	1993	133902	31.56	7.63	11.48	6.5	92.9	6.55	323	0	SURFACE
FBLS	11	8	1993	130858	26.5	7.78	14.14	8.2	95.4	7.28	342	0.1	SURFACE
FBLS	12	13	1993	133753	19.16	7.92	32.7	20.4	92.8	7.56	336	0.2	SURFACE
FBLS	1	10	1994	132445	19.57	8.02	34.1	21.4	98	7.87	461	0	SURFACE
FBLS	2	14	1994	134453	25.16	7.89	36.4	23	98.3	7.04	364	0.2	SURFACE
FBLS	3	14	1994	105616	23.46	8.13	25.1	15.3	107.5	8.31	415	0	SURFACE
FBLS	4	11	1994	135858	26.05	8.77	32.4	20.2	103.5	7.42	413	0	SURFACE
FBLS	5	9	1994	130610	29.55	7.74	34.1	21.4	82.6	5.53	424	0.1	SURFACE
FBLS	6	13	1994	110148	31	7.99	24	14.5	90.7	6.16	376	0.1	SURFACE
FBLS	7	5	1994	105952	29.09	7.95	30.5	18.9	94.9	6.49	387	0	SURFACE
FBLS	8	8	1994	103511	31.01	7.82	40.8	26.1	75.3	4.78	353	0.1	SURFACE
FBLS	9	6	1994	103633	30.16	7.93	24.4	14.8	83.3	5.73	359	0.1	SURFACE
				ANNUAL MEAN	26.86	7.96	28.3	17.6	92.9	6.73	379	0.1	
				STD	4.16	0.27	8.5	5.6	8.7	1.00	40	0.1	
				MAX	31.56	8.77	40.8	26.1	107.5	8.31	461	0.2	
				MIN	19.16	7.63	11.5	6.5	75.3	4.78	323	0.0	

MONTHLY WATER QUALITY OBSERVATIONS
JOE BAY STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBJB	10	20	1993	93547	29.74	7.36	15.3	8.9	41.4	2.97	331	1	BOTTOM
FBJB	11	9	1993	102353	26.52	7.56	8.9	5	82.9	6.45	360	0.9	BOTTOM
FBJB	12	14	1993	112519	19.74	8.04	23.1	13.9	109.3	9.15	401	0.9	BOTTOM
FBJB	1	12	1994	94209	21.88	7.99	21	12.5	78.7	6.37	421	0.5	BOTTOM
FBJB	2	15	1994	110423	21.68	7.8	28.8	17.7	85.9	6.77	365	0.6	BOTTOM
FBJB	3	16	1994	71130	21.19	8.12	8.34	4.7	84.4	7.27	449	0.7	BOTTOM
FBJB	4	13	1994	111319	26.39	8.91	24.7	15	102.6	7.53	395	0.6	BOTTOM
FBJB	5	11	1994	114815	30.22	7.86	30.7	19	91.9	6.16	411	0.7	BOTTOM
FBJB	6	14	1994	111939	31.6	7.88	26.3	16.1	81.9	5.46	376	0.7	BOTTOM
FBJB	7	7	1994	105824	29.59	7.95	27.3	16.8	93	6.38	376	0.8	BOTTOM
FBJB	8	10	1994	104632	31.57	7.74	50.3	33.1	42.7	2.58	367	0.9	BOTTOM
FBJB	9	7	1994	113537	30.47	7.8	13.51	7.8	74.4	5.31	352	0.9	BOTTOM
				ANNUAL MEAN	26.72	7.92	23.2	14.2	80.8	6.03	384	0.8	
				STD	4.27	0.36	10.9	7.4	19.7	1.75	32	0.1	
				MAX	31.60	8.91	50.3	33.1	109.3	9.15	449	1.0	
				MIN	19.74	7.36	8.3	4.7	41.4	2.58	331	0.5	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBJB	10	20	1993	93724	28.79	7.51	7.12	4	59.8	4.5	325	0.8	METER

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBJB	10	20	1993	93918	28.32	7.52	4.59	2.5	73	5.59	330	0	SURFACE
FBJB	11	9	1993	102513	26.53	7.6	8.95	5	80.7	6.27	362	0.1	SURFACE
FBJB	12	14	1993	112653	19.47	8.05	21.9	13.2	106.3	8.98	397	0.1	SURFACE
FBJB	1	12	1994	94315	22.29	7.99	17.9	10.6	81.8	6.65	417	0	SURFACE
FBJB	2	15	1994	110601	21.66	7.82	28.6	17.6	86.3	6.81	363	0.1	SURFACE
FBJB	3	16	1994	71253	20.77	8.14	7.76	4.3	87	7.58	438	0.1	SURFACE
FBJB	4	13	1994	111412	26.39	8.92	24.6	14.9	102.1	7.49	393	0	SURFACE
FBJB	5	11	1994	114944	30.23	7.76	23.8	14.4	71.2	4.9	401	0	SURFACE
FBJB	6	14	1994	112112	31.87	7.84	20.5	12.2	69.3	4.71	375	0	SURFACE
FBJB	7	7	1994	105931	29.61	7.97	27.4	16.8	90.2	6.2	376	0	SURFACE
FBJB	8	10	1994	104748	29.48	7.83	46.5	30.3	75.1	4.78	362	0.1	SURFACE
FBJB	9	7	1994	113700	30.06	7.88	12.26	7	82.1	5.93	349	0	SURFACE
				ANNUAL MEAN	26.39	7.94	20.4	12.4	83.8	6.32	380	0.0	
				STD	4.09	0.34	11.0	7.2	11.1	1.23	29	0.0	
				MAX	31.87	8.92	46.5	30.3	106.3	8.98	438	0.1	
				MIN	19.47	7.52	4.6	2.5	69.3	4.71	330	0.0	

TABLE 1 (CON'T)

MONTHLY WATER QUALITY OBSERVATIONS
TROUT COVE STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBTC	10	25	1993	94157	29.1	7.41	42.5	27.3	90.7	5.91	297	0.8	BOTTOM
FBTC	11	9	1993	135216	27.81	7.47	41.5	26.7	101.2	6.77	383	0.8	BOTTOM
FBTC	12	15	1993	144253	21.12	7.83	43.8	28.3	108.2	8.09	395	0.8	BOTTOM
FBTC	1	12	1994	133013	24.14	7.86	44	28.4	100.4	7.09	416	0.5	BOTTOM
FBTC	2	15	1994	142736	22.78	7.85	47.2	30.7	104.8	7.49	359	0.5	BOTTOM
FBTC	3	16	1994	105505	22.51	8.05	37.9	24.1	107.3	8.02	428	0.6	BOTTOM
FBTC	4	13	1994	91540	25.54	8.88	41.9	26.9	99.7	6.93	405	0.5	BOTTOM
FBTC	5	11	1994	94500	28.56	7.87	46.5	30.3	87.1	5.63	359	0.6	BOTTOM
FBTC	6	14	1994	91230	30.11	7.97	39.2	25	85.4	5.54	378	0.6	BOTTOM
FBTC	7	7	1994	90801	28.54	7.83	43.2	27.9	87.9	5.76	381	0.6	BOTTOM
FBTC	8	10	1994	91416	29.31	7.78	55.7	37	72.3	4.43	371	0.8	BOTTOM
FBTC	9	7	1994	94518	31.06	7.61	48.3	31.6	61.9	3.8	359	0.9	BOTTOM
				ANNUAL MEAN	26.72	7.87	44.3	28.7	92.2	6.29	378	0.7	
				STD	3.20	0.36	4.5	3.3	13.7	1.29	33	0.1	
				MAX	31.06	8.88	55.7	37.0	108.2	8.09	428	0.9	
				MIN	21.12	7.41	37.9	24.1	61.9	3.80	297	0.5	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBTC	10	25	1993	94320	29.04	7.46	42.3	27.2	89.3	5.82	302	0	SURFACE
FBTC	11	9	1993	135346	27.83	7.54	41.5	26.7	101.3	6.77	378	0.1	SURFACE
FBTC	12	15	1993	144407	21.12	7.85	44.2	28.6	107.8	8.05	396	0.1	SURFACE
FBTC	1	12	1994	133148	25.02	7.86	42	27	97.2	6.82	409	-0.1	SURFACE
FBTC	2	15	1994	142853	22.78	7.86	47.2	30.7	103.9	7.42	356	0.1	SURFACE
FBTC	3	16	1994	105651	22.58	8.05	37.8	24	104.2	7.78	420	0	SURFACE
FBTC	4	13	1994	91649	25.54	8.9	42	27	97.9	6.8	398	0	SURFACE
FBTC	5	11	1994	94619	28.68	7.88	46.6	30.3	86.8	5.59	355	0	SURFACE
FBTC	6	14	1994	91410	30.11	7.98	39.2	25	82.5	5.35	375	0.1	SURFACE
FBTC	7	7	1994	90931	28.52	7.86	43.3	28	83.7	5.49	377	0.1	SURFACE
FBTC	8	10	1994	91517	29.08	7.8	55.8	37.1	71.4	4.39	366	0.1	SURFACE
FBTC	9	7	1994	94637	28.23	7.85	31.7	19.7	89.9	6.21	350	0.1	SURFACE
				ANNUAL MEAN	26.54	7.91	42.8	27.6	93.0	6.37	374	0.1	
				STD	2.90	0.34	5.5	4.0	10.4	1.05	30	0.1	
				MAX	30.11	8.90	55.8	37.1	107.8	8.05	420	0.1	
				MIN	21.12	7.46	31.7	19.7	71.4	4.39	302	-0.1	

TABLE 1 (CON'T)

MONTHLY WATER QUALITY OBSERVATIONS
TAYLOR RIVER STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBTR	12	15	1993	103731	20.85	7.94	35.7	22.5	100.7	7.83	342	1	BOTTOM
FBTR	1	11	1994	101241	20.61	7.86	31.7	19.7	95.7	7.6	458	0.6	BOTTOM
FBTR	2	16	1994	112341	22.85	7.85	31.8	19.8	85.6	6.51	380	0.6	BOTTOM
FBTR	3	15	1994	74256	21.02	8.04	30.9	19.2	92	7.28	340	0.6	BOTTOM
FBTR	4	14	1994	111212	26.29	8.86	38.3	24.3	93.1	6.48	392	0.5	BOTTOM
FBTR	5	10	1994	104500	28.63	8.01	43.4	28	88.6	5.79	438	0.7	BOTTOM
FBTR	6	15	1994	114048	30.13	7.99	38.5	24.5	94.6	6.15	373	0.6	BOTTOM
FBTR	7	6	1994	113210	29.06	7.91	45.2	29.3	89.1	5.74	387	0.7	BOTTOM
FBTR	8	9	1994	111828	31.91	7.97	48.9	32	83.4	5.03	364	0.9	BOTTOM
FBTR	9	8	1994	120240	29.81	7.89	37	23.5	98.7	6.5	343	0.9	BOTTOM
				ANNUAL MEAN	26.12	8.03	38.14	24.3	92.2	6.49	382	0.7	
				STD	4.16	0.28	5.79	4.1	5.3	0.83	38	0.2	
				MAX	31.91	8.86	48.90	32.0	100.7	7.83	458	1.0	
				MIN	20.61	7.85	30.90	19.2	83.4	5.03	340	0.5	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBTR	12	15	1993	103858	20.89	7.98	34.7	21.8	97.6	7.62	340	0.2	SURFACE
FBTR	1	11	1994	101557	20.61	7.88	31.6	19.6	94.2	7.49	438	0	SURFACE
FBTR	2	16	1994	112437	22.69	7.86	31.6	19.6	83.2	6.36	377	0.2	SURFACE
FBTR	3	15	1994	74425	21.02	8.06	31	19.2	91.8	7.26	344	0.1	SURFACE
FBTR	4	14	1994	111231	26.31	8.87	38.2	24.3	93.6	6.52	387	0	SURFACE
FBTR	5	10	1994	104547	28.69	8.01	43.3	27.9	86	5.62	430	0.1	SURFACE
FBTR	6	15	1994	114158	30.17	7.98	39	24.8	92.2	5.98	372	0.2	SURFACE
FBTR	7	6	1994	113338	29.11	7.91	45.1	29.3	87.6	5.64	385	0	SURFACE
FBTR	8	9	1994	112003	31.88	7.97	48.9	32	81.1	4.9	359	0.1	SURFACE
FBTR	9	8	1994	120345	29.91	7.89	34.8	21.9	90.9	6.03	343	0.1	SURFACE
				ANNUAL MEAN	26.13	8.04	37.8	24.0	89.8	6.34	378	0.1	
				STD	4.18	0.28	5.9	4.2	4.9	0.85	33	0.1	
				MAX	31.88	8.87	48.9	32.0	97.6	7.62	438	0.2	
				MIN	20.61	7.86	31.0	19.2	81.1	4.90	340	0.0	

MONTHLY WATER QUALITY OBSERVATIONS
LITTLE MADEIRA BAY STATION
OCTOBER 1993- SEPTEMBER 1994

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLM	10	27	1993	121838	28.88	7.56	35.8	22.6	96.8	6.5	355	1.1	BOTTOM
FBLM	11	15	1993	104127	26.67	7.53	37.9	24.1	92.4	6.39	380	1.1	BOTTOM
FBLM	12	15	1993	133650	21.05	7.99	40.2	25.7	110.2	8.39	345	1.2	BOTTOM
FBLM	1	11	1994	133727	21.71	8.05	41	26.3	108.8	8.14	480	0.8	BOTTOM
FBLM	2	16	1994	131726	23.1	7.96	39.4	25.1	111.4	8.18	347	1	BOTTOM
FBLM	3	15	1994	101845	22.15	7.99	39.6	25.3	101.6	7.59	456	0.9	BOTTOM
FBLM	4	14	1994	92500	25.75	8.85	40	25.5	97.3	6.79	393	0.7	BOTTOM
FBLM	5	10	1994	90500	28.7	7.84	45.4	29.5	86.1	5.57	416	0.9	BOTTOM
FBLM	6	15	1994	93616	29.85	7.86	46.5	30.2	83.4	5.27	378	0.8	BOTTOM
FBLM	7	6	1994	92517	29	7.87	49.2	32.2	85.9	5.44	388	0.9	BOTTOM
FBLM	8	9	1994	93525	30.84	7.83	50.8	33.4	69.6	4.25	364	1.2	BOTTOM
FBLM	9	8	1994	93542	29.61	7.78	46	29.9	83.5	5.31	360	1.1	BOTTOM
				ANNUAL MEAN	26.44	7.93	42.7	27.5	93.9	6.49	389	1.0	
				STD	3.42	0.32	4.5	3.3	12.3	1.30	41	0.2	
				MAX	30.84	8.85	50.8	33.4	111.4	8.39	480	1.2	
				MIN	21.05	7.53	35.8	22.6	69.6	4.25	345	0.7	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLM	10	27	1993	122026	28.94	7.6	35.8	22.6	98.3	6.6	352	0.9	METER
FBLM	11	15	1993	104342	26.66	7.63	37.8	24	92	6.37	373	1	METER
FBLM	12	15	1993	133809	21.06	8.01	40.2	25.7	110	8.36	344	1	METER
FBLM	8	9	1994	93640	30.88	7.84	50.7	33.4	65.9	4.02	360	1	METER
FBLM	9	8	1994	93639	29.59	7.8	46	29.9	79	5.03	357	0.9	METER
				ANNUAL MEAN	27.43	7.78	42.1	27.1	89.0	6.08	357	1.0	
				STD	3.46	0.15	5.5	4.0	15.3	1.48	10	0.0	
				MAX	30.88	8.01	50.7	33.4	110.0	8.36	373	1.0	
				MIN	21.06	7.60	35.8	22.6	65.9	4.02	344	0.9	

STATION	MONTH	DAY	YEAR	Time	Temp degC	pH units	SpCond mS/cm	Salin ppt	DO %Sat	DO mg/l	Redox mV	Depth meters	SAMPLE
FBLM	10	27	1993	122138	29.9	7.59	28.8	17.7	94.2	6.4	349	0	SURFAC
FBLM	11	15	1993	104455	26.82	7.68	33.8	21.2	91.5	6.43	370	0.2	SURFAC
FBLM	12	15	1993	133934	21.06	8.03	40.3	25.8	110.9	8.43	344	0.1	SURFAC
FBLM	1	11	1994	133902	21.74	8.04	41	26.3	106.3	7.95	469	0.2	SURFAC
FBLM	2	16	1994	131840	22.78	7.91	37.9	24.1	97.8	7.27	348	0.1	SURFAC
FBLM	3	15	1994	[illegible]2001	22.17	8	39.6	25.3	100.4	7.5	446	0.[illegible]	SURFAC
FBLM	4	14	1994	92751	25.73	8.86	39.2	25	90.8	6.36	390	0	SURFAC
FBLM	5	10	1994	90642	28.5	7.85	45.1	29.2	83.5	5.43	408	0.1	SURFAC
FBLM	6	15	1994	93748	29.83	7.89	46.7	30.4	78.3	4.95	373	0.2	SURFAC
FBLM	7	6	1994	92641	28.89	7.84	47.7	31.1	81.2	5.19	386	0	SURFAC
FBLM	8	9	1994	93738	30.99	7.85	50.8	33.4	65.1	3.96	358	0.1	SURFAC
FBLM	9	8	1994	93741	29.39	7.82	45.3	29.4	80.6	5.16	355	0.1	SURFAC
				ANNUAL MEAN	26.48	7.95	41.4	26.6	90.1	6.25	383	0.1	
				STD	3.49	0.30	5.9	4.2	12.4	1.30	38	0.1	
				MAX	30.99	8.86	50.8	33.4	110.9	8.43	469	0.2	
				MIN	21.06	7.59	28.8	17.7	65.1	3.96	344	0.0	

TABLE 2

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING
SUMMARY OF MONTHLY WATER QUALITY ANALYSIS

HIGHWAY CREEK STATION OCTOBER 1993 - SEPTEMBER 1994

SAMPLE	MONTH	DAY	Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	.001	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
			YEAR											
FBHC	10	18	1993	0.006	0.03	0.02	35	1.88	0.00	0.62	0	0	0	0
FBHC	11	8	1993	0.002	0	0.01	25	1.28	0.27	0.00	0	0	0.2	0
FBHC	12	13	1993	0.003	0	0	25	1.20	0.60	0.19	0	0	0	0
FBHC	1	10	1994	0.007	0	0	30	2.70	1.34	0.25	0	0	0	0
FBHC	2	14	1994	0.004	0	0	25	6.50	1.54	0.15				
FBHC	3	22	1994	0.004	0.12	0.03	25	3.80	0.40	0.25	0	0	0	0
FBHC	4	11	1994	0.007	0.11	0.01	25	26.0	0.84	0.45	0	0	0	0
FBHC	5	9	1994	0.004	0.16	0	30	4.7	0.53	0.18	0	0	0	0
FBHC	6	13	1994	0.003	0	0.02	20	1.7	0.41	0.00	0	0	0	0
FBHC	7	5	1994	0.001	0.08	0.04	20	7.1	0.92	0.29	0	0	0	0
FBHC	8	8	1994	0.006	0	0	36	3.2	1.67	0.07	0	0	0	0
FBHC	9	6	1994	0	0.02	0.02	41	0.7	0.13	0.21	0	0	0	0
			MEAN	0.004	0.043	0.013	28.083	5.061	0.721	0.222	0.000	0.000	0.018	0.000
			STD	0.002	0.056	0.013	6.211	6.616	0.527	0.170	0.000	0.000	0.057	0.000
			MAX	0.007	0.160	0.040	41.000	26.000	1.670	0.620	0.000	0.000	0.200	0.000
			MIN	0.000	0.000	0.000	20.000	0.670	0.000	0.000	0.000	0.000	0.000	0.000

LONG SOUND STATION OCTOBER 1993 - SEPTEMBER 1994

SAMPLE	MONTH	DAY	Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	1	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
			YEAR											
FBLS	10	18	1993	0.006	0.04	0.04	30	7.50	0.00	0.42	0	0	0	0
FBLS	11	8	1993	0.003	0	0.02	30	6.50	1.05	0.02	0	0	0	0
FBLS	12	13	1993	0.007	0	0	15	6.50	0.54	0.35	0	0	0	0
FBLS	1	10	1994	0.001	0	0	15	3.00	0.76	0.15	0	0	0	0
FBLS	2	14	1994	0.003	0	0	10	7.10	1.34	0.25				
FBLS	3	22	1994	0.003	0.02	0.02	15	2.10	0.56	0.15	0	0	0	0
FBLS	4	11	1994	0.004	0.13	0.01	20	29.0	1.00	0.03	0	0	0	0
FBLS	5	9	1994	0.003	0.33	0.03	15	9.3	0.94	0.33	0	0	0	0
FBLS	6	13	1994	0	0.08	0.04	10	3.4	0.53	0.26	0	0	0	0
FBLS	7	5	1994	0.006	0.06	0.03	10	7.3	0.54	0.38	0	0	0	0
FBLS	8	8	1994	0.008	0.07	0.03	38	6.4	0.66	0.24	0	0	0	0
FBLS	9	6	1994	0.002	0.11	0.02	32	1.9	0.85	0.56	0	0	0	0
			MEAN	0.004	0.070	0.020	20.000	7.500	0.731	0.262	0.000	0.000	0.000	0.000
			STD	0.002	0.089	0.014	9.434	6.871	0.327	0.152	0.000	0.000	0.000	0.000
			MAX	0.008	0.330	0.040	38.000	29.000	1.340	0.560	0.000	0.000	0.000	0.000
			MIN	0.000	0.000	0.000	10.000	1.900	0.000	0.020	0.000	0.000	0.000	0.000

TABLE 2 (CON'T)

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING
SUMMARY OF MONTHLY WATER QUALITY ANALYSIS

JOE BAY STATION OCTOBER 1993 - SEPTEMBER 1994

			Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	1	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
SAMPLE	MONTH	DAY	YEAR											
FBJB	10	20	1993	0.008	0.06	0.03	35	6.80	2.10	0.11	0	0	0	0
FBJB	11	9	1993	0.004	0	0.01	40	8.60	2.53	0.80	0	0	0	0
FBJB	12	14	1993	0.011	0	0	20	3.50	1.40	0.33	0	0	0	0
FBJB	1	12	1994	0.006	0	0	20	4.50	1.47	0.17	0	0	0	0
FBJB	2	15	1994	0.005	0	0.01	20	8.90	1.20	0.39				
FBJB	3	22	1994	0.009	0.04	0.06	20	5.00	1.34	0.25	0	0	0	0
FBJB	4	13	1994	0.006	0.04	0.06	10	8.9	0.60	0.19	0	0	0	0
FBJB	5	11	1994	0.003	0.07	0.03	20	6.3	1.34	0.16	0	0	0	0
FBJB	6	14	1994	0.004	0	0.03	25	9.3	1.00	0.40	0	0	0	0
FBJB	7	7	1994	0.009	0.02	0.04	10	4.5	0.49	0.61	0	0	0	0
FBJB	8	10	1994	0.004	0.11	0.01	23	6.0	0.53	0.12	0	0	0	0
FBJB	9	7	1994	0.004	0.17	0.04	39	2.0	0.87	0.30	0	0	0	0
			MEAN	0.006	0.043	0.027	23.500	6.192	1.239	0.319	0.000	0.000	0.000	0.000
			STD	0.002	0.051	0.020	9.456	2.282	0.590	0.200	0.000	0.000	0.000	0.000
			MAX	0.011	0.170	0.060	40.000	9.300	2.530	0.800	0.000	0.000	0.000	0.000
			MIN	0.003	0.000	0.000	10.000	2.000	0.490	0.110	0.000	0.000	0.000	0.000

TROUT COVE STATION OCTOBER 1993 - SEPTEMBER 1994

			Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	1	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
SAMPLE	MONTH	DAY	YEAR											
FBTC	10	25	1993	0.006	0.18	0.03	15	4.40	0.07	0.26	0	0	0	0
FBTC	11	9	1993	0.005	0.11	0.05	20	6.30	0.27	0.11	0	0	0	0
FBTC	12	14	1993	0.003	0	0	30	32.00	0.25	0.19	0	0	0	0
FBTC	1	12	1994	0.001	0	0	25	11.80	0.27	0.11	0	0	0	0
FBTC	2	15	1994	0.003	0	0.02	15	16.50	0.60	0.19				
FBTC	3	22	1994	0.002	0.09	0.02	20	18.80	0.28	0.09	0	0	0	0
FBTC	4	13	1994	0.016	0.15	0	10	4.3	0.27	0.05	0	0	0	0
FBTC	5	11	1994	0	0.08	0	5	5.6	0.27	0.19	0	0	0	0
FBTC	6	14	1994	0	0.07	0.02	10	8.6	0.35	0.23	0	0	0	0
FBTC	7	7	1994	0.003	0.12	0.02	5	7.6	0.25	0.14	0	0	0	0
FBTC	8	10	1994	0.003	0.15	0.02	22	5.9	0.36	0.27	0	0	0	0
FBTC	9	7	1994	0.001	0.19	0.02	34	3.2	0.47	0.42	0	0	0	0
			MEAN	0.004	0.095	0.017	17.583	10.417	0.309	0.188	0.000	0.000	0.000	0.000
			STD	0.004	0.065	0.014	8.921	8.023	0.124	0.096	0.000	0.000	0.000	0.000
			MAX	0.016	0.190	0.050	34.000	32.000	0.600	0.420	0.000	0.000	0.000	0.000
			MIN	0.000	0.000	0.000	5.000	3.200	0.070	0.050	0.000	0.000	0.000	0.000

TABLE 2 (CON'T)

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING
SUMMARY OF MONTHLY WATER QUALITY ANALYSIS

TAYLOR RIVER STATION OCTOBER 1993 - SEPTEMBER 1994

SAMPLE	MONTH	DAY	Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	1	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
			YEAR											
FBTR	12	15	1993	0.002	0	0	20	6.80	0.54	0.25	0	0	0	0
FBTR	1	11	1994	0.002	0	0	20	5.80	0.49	0.10	0	0	0	0
FBTR	2	16	1994	0.003	0.04	0.01	20	13.10	0.36	0.25				
FBTR	3	22	1994	0.004	0.09	0.07	10	9.30	0.40	0.00	0	0	0	0
FBTR	4	14	1994	0.003	0.04	0	10	10.5	0.34	0.37	0	0	0	0
FBTR	5	10	1994	0.002	0.20	0.03	15	22.0	1.67	0.34	0	0	0	0
FBTR	6	15	1994	0	0.03	0.04	20	22.0	0.64	0.21	0	0	0	0
FBTR	7	6	1994	0.005	0.10	0.06	10	36.0	0.40	0.35	0	0	0	0
FBTR	8	9	1994	0.002	0.09	0.02	36	7.0	0.40	0.16	0	0	0	0
FBTR	9	8	1994	0.004	0.11	0.03	75	10.1	0.74	0.29	0	0	0	0
			MEAN	0.003	0.070	0.026	23.600	14.260	0.598	0.232	0.000	0.000	0.000	0.000
			STD	0.001	0.058	0.024	18.645	9.109	0.378	0.112	0.000	0.000	0.000	0.000
			MAX	0.005	0.200	0.070	75.000	36.000	1.670	0.370	0.000	0.000	0.000	0.000
			MIN	0.000	0.000	0.000	10.000	5.800	0.340	0.000	0.000	0.000	0.000	0.000

LITTLE MADEIRA BAY STATION OCTOBER 1993 - SEPTEMBER 1994

SAMPLE	MONTH	DAY	Parameter	T-PO4	NH3-N	NOx-N	A-COLOR	TURB	CHLOR.	PHEO.	Cd	Cu	Pb	Zn
			Method >>	365.2	350.1	353.2	2120B	180.1	10200 H	10200 H	213.2	220.2	239.2	3005
			M.D.L. >>	1	0.02	0.01	5	0.02	n/a	n/a	.1/.08	2/.44	2/.17	3/12.2
			Units >>	mg/L	mg/L	mg/L	pcu	ntu	mg/M3	mg/M3	ug/L	ug/L	ug/L	ug/L
			YEAR											
FBLM	10	27	1993	0.004	0.12	0.03	10	3.60	0.53	0.26	0	0	0	0
FBLM	11	15	1993	0.009	0.09	0.02	20	7.40	0.22	0.25	0	0.65	0	0
FBLM	12	15	1993	0.006	0	0	15	4.10	0.44	0.01	0	0	0	0
FBLM	1	11	1994	0	0.03	0	20	7.70	0.27	0.03	0	0	0	0
FBLM	2	16	1994	0.002	0	0	15	5.90	0.42	0.01				
FBLM	3	22	1994	0.002	0.20	0.04	10	4.80	0.30	0.07	0	0	0	0
FBLM	4	14	1994	0.002	0.02	0.02	5	5.9	0.29	0.12	0	0	0	0
FBLM	5	10	1994	0	0.13	0	5	6.1	0.31	0.00	0	0	0	0
FBLM	6	15	1994	0	0.07	0.03	10	8.0	0.43	0.30	0	0	0	0
FBLM	7	6	1994	0.003	0.12	0.04	5	15.0	0.17	0.14	0	0	0	0
FBLM	8	9	1994	0.004	0.16	0.02	28	6.4	0.25	0.21	0	0	0	0
FBLM	9	8	1994	0.003	0.13	0.03	36	9.9	0.29	0.19	0	0	0	0
			MEAN	0.003	0.089	0.019	14.917	7.067	0.327	0.133	0.000	0.059	0.000	0.000
			STD	0.003	0.063	0.015	9.287	2.921	0.101	0.104	0.000	0.187	0.000	0.000
			MAX	0.009	0.200	0.040	36.000	15.000	0.530	0.300	0.000	0.650	0.000	0.000
			MIN	0.000	0.000	0.000	5.000	3.600	0.170	0.000	0.000	0.000	0.000	0.000

TABLE 3

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING PROJECT
LIGHT DATA

DATE	TIME	STATION	DECK VALUE	BOTTOM DEPTH	SUBM VALUE	RATIO	IMMERS FACTOR	DECK VALUE	CORRDECK -SUB	DEPTH METERS	K	AVG K
931108	1105	FBHC	0.6	1		2						
931108	1107	FBHC	2739	1	1443	0.524	1296					
931108	1107	FBHC	2761	2	1014	0.3989	1296	1465	0.367952	0.3048	-1.20719	-1.20719
931213	1131	FBHC	0.5	1		2						
931213	1132	FBHC	2826	1	1674	0.6036	1152					
931213	1133	FBHC	2079	2	1039	0.5128	1152	927	-0.11406	0.3048	-0.37421	N/A
940314	1049	FBHC	0.3	1		2						
940314	1050	FBHC	2707	1	1966	0.6898	741					ID
940411	1117	FBHC	0.3	1		2						
940411	1118	FBHC	3023	1	1554	0.5278	1469					ID
940509	1118	FBHC	0.3	1		2						
940509	1120	FBHC	2723	1	1573	0.5754	1150					ID
940613	1313	FBHC	0.4	1		2						
940613	1315	FBHC	2710	1	1882	0.6803	828					ID
940705	1315	FBHC	0.4	1		2						
940705	1317	FBHC	2797	1	1510	0.531	1287					ID
940808	1242	FBHC	0.5	1		2						
940808	1243	FBHC	2737	1	2063	0.7109	674					ID
940906	1253	FBHC	0.6	1		2						
940906	1254	FBHC	3033	1	1637	0.5797	1396					ID
931018	1500	FBLS	1.2	1		4						
931018	1500	FBLS	2499	1	107.9	0.04425	2391.1					
931018	1501	FBLS	2503	2	68.72	0.02704	2391.1	111.9	0.487565	0.3048	-1.59962	-1.21049
931018	1501	FBLS	2503	3	59.02	0.02361	2391.1	111.9	0.639729	0.6096	-1.04942	
931018	1502	FBLS	2518	4	51.68	0.02042	2391.1	126.9	0.898329	0.9144	-0.98242	
931108	1331	FBLS	1.2	1		4						
931108	1331	FBLS	2623	1	1508	0.5952	1115					
931108	1331	FBLS	2609	2	1079	0.4178	1115	1494	0.325422	0.3048	-1.06766	-1.08438
931108	1332	FBLS	2633	3	777.4	0.2954	1115	1518	0.669194	0.6096	-1.09776	
931108	1332	FBLS	2648	4	567	0.2222	1115	1533	0.994623	0.9144	-1.08773	
931213	1358	FBLS	1.1	1		4						
931213	1401	FBLS	993.9	1	381	0.3837	612.9					
931213	1402	FBLS	995.4	2	329.5	0.326	612.9	382.5	0.149152	0.3048	-0.48934	-0.71236
931213	1402	FBLS	997	3	248.3	0.2544	612.9	384.1	0.436265	0.6096	-0.71566	
931213	1402	FBLS	1001	4	165.5	0.1799	612.9	388.1	0.852292	0.9144	-0.93208	
940314	1316	FBLS	0.9	1		3						
940314	1321	FBLS	1828	1	943.4	0.5362	884.6					
940314	1321	FBLS	1684	2	724.2	0.4461	884.6	799.4	0.098794	0.3048	-0.32413	-0.34816
940314	1321	FBLS	1628	3	592.5	0.383	884.6	743.4	0.226883	0.6096	-0.37218	
940411	1354	FBLS	0.8	1		3						
940411	1355	FBLS	3325	1	2520	0.7679	805					
940411	1355	FBLS	2648	2	1212	0.462	805	1843	0.419123	0.3048	-1.37507	-1.37624
940411	1355	FBLS	2180	3	593.8	0.2726	805	1375	0.839666	0.6096	-1.37741	
940509	1310	FBLS	0.8	1		2						
940509	1311	FBLS	2923	1	1610	0.4576	1313					
940509	1312	FBLS	2899	2	1100	0.3786	1313	1586	0.365905	0.3048	-1.20048	-1.20048
940613	1105	FBLS	1	1		6						
940613	1105	FBLS	2700	1	1542	0.5903	1158					
940613	1106	FBLS	2698	2	1333	0.5119	1158	1540	0.14435	0.3048	-0.47359	-0.57369
940613	1106	FBLS	2713	3	595.6	0.2586	1158	1555	0.959662	0.6096	-1.57425	
940613	1107	FBLS	2715	4	1893	0.6859	1158	1557	-0.1954	0.9144		
940613	1107	FBLS	2687	5	1348	0.5573	1158	1529	0.125992	1.2192	-0.10334	
940613	1107	FBLS	2705	6	1243	0.458	1158	1547	0.21879	1.524	-0.14356	
940705	1110	FBLS	0.8	1		3						
940705	1119	FBLS	1095	1	488.5	0.4443	606.5					
940705	1119	FBLS	1103	2	351.5	0.3566	606.5	496.5	0.345374	0.3048	-1.13312	-1.16342
940705	1119	FBLS	1116	3	246.1	0.2406	606.5	509.5	0.727692	0.6096	-1.19372	
940808	1045	FBLS	1	1		3						
940808	1046	FBLS	2676	1	1955	0.7296	721					
940808	1046	FBLS	2667	2	1484	0.5711	721	1946	0.271035	0.3048	-0.88922	-0.85603
940808	1046	FBLS	2663	3	1176	0.4665	721	1942	0.5016	0.6096	-0.82283	
940906	1046	FBLS	1			3						
940906	1049	FBLS	2728	1	1716	0.6368	1012					
940906	1050	FBLS	2688	2	1399	0.5124	1012	1676	0.180652	0.3048	-0.59269	-0.64169
940906	1053	FBLS	2758	3	1146	0.4055	1012	1746	0.42105	0.6096	-0.6907	

TABLE 3 (CON'T)

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING PROJECT
LIGHT DATA

DATE	TIME	STATION	DECK VALUE	BOTTOM DEPTH	SUBM VALUE	RATIO	IMMERS FACTOR	DECK VALUE	CORRDECK -SUB	DEPTH METERS	K	AVG K
931020	1100	FBJB	1.1	1		3						
931020	1100	FBJB	3113	1	1570	0.509	1543					
931020	1101	FBJB	3112	2	949.1	0.3014	1543	1569	0.50268	0.3048	-1.64921	-1.54701
931020	1101	FBJB	3153	3	667.3	0.2085	1543	1610	0.88075	0.6096	-1.4448	
931109	1047	FBJB	0.9	1		4						
931109	1049	FBJB	967.4	1	322.3	0.3142	645.1					
931109	1050	FBJB	962.6	2	206.3	0.2286	645.1	317.5	0.431146	0.3048	-1.41452	-1.50409
931109	1050	FBJB	1008	3	127.9	0.1358	645.1	362.9	1.042879	0.6096	-1.71076	
931109	1050	FBJB	1516	4	245	0.1405	645.1	870.9	1.268269	0.9144	-1.387	
931214	1150	FBJB	1	1		3						
931214	1151	FBJB	2563	1	1197	0.4783	1366					
931214	1151	FBJB	2549	2	913.1	0.364	1366	1183	0.258963	0.3048	-0.84962	-0.62532
931214	1152	FBJB	2539	3	918.6	0.3478	1366	1173	0.244469	0.6096	-0.40103	
940316	938	FBJB	0.7	1		2						
940316	939	FBJB	2518	1	1453	0.5765	1065					
940316	939	FBJB	2508	2	967.5	0.4755	1065	1443	0.399764	0.3048	-1.31156	-1.31156
940413	1118	FBJB	0.6	1		2						
940413	1119	FBJB	3065	1	1932	0.6165	1133					ID
940511	1150	FBJB	0.7	1		2						
940511	1151	FBJB	2593	1	1308	0.5082	1285					
940511	1151	FBJB	2606	2	1161	0.453	1285	1321	0.129107	0.3048	-0.42358	-0.42358
940614	1126	FBJB	0.7	1		2						
940614	1127	FBJB	3223	1	1713	0.5598	1510					
940614	1127	FBJB	3205	2	1070	0.3504	1510	1695	0.460024	0.3048	-1.50927	-1.50927
940707	1106	FBJB	0.8	1		2						
940707	1108	FBJB	2696	1	1744	0.6476	952					
940707	1108	FBJB	2678	2	1312	0.5194	952	1726	0.274254	0.3048	-0.89978	-0.89978
940810	1058	FBJB	0.9	1		2						
940810	1058	FBJB	3000	1	1620	0.5369	1380					
940810	1058	FBJB	2827	2	1247	0.4509	1380	1447	0.148752	0.3048	-0.48803	-0.48803
940907	1150	FBJB	0.9	1		3						
940907	1151	FBJB	2615	1	931.9	0.3253	1683.1					
940907	1152	FBJB	2581	2	666.7	0.2679	1683.1	897.9	0.297719	0.3048	-0.97677	-0.93149
940907	1152	FBJB	2571	3	517.3	0.2163	1683.1	887.9	0.540236	0.6096	-0.88621	
931025	1105	FBTC	0.8	1		2						
931025	1107	FBTC	2791	1	1774	0.642	1017					
931025	1108	FBTC	1571	2	666.3	0.451	1017	554	-0.18458	0.3048	-0.60556	N/A
931109	1415	FBTC	0.8	1		3						
931109	1417	FBTC	1017	1	472.2	0.4531	544.8					
931109	1417	FBTC	1005	2	355.9	0.3607	544.8	460.2	0.257011	0.3048	-0.84321	-0.69387
931109	1417	FBTC	1016	3	338.1	0.3327	544.8	471.2	0.331941	0.6096	-0.54452	
931215	1509	FBTC	0.8	1		3						
931215	1511	FBTC	2526	1	1432	0.5962	1094					
931215	1511	FBTC	2524	2	679.2	0.2708	1094	1430	0.744514	0.3048	-2.44263	-1.99375
931215	1511	FBTC	2506	3	550.6	0.2155	1094	1412	0.941754	0.6096	-1.54487	
940316	1323	FBTC	0.7	1		2						
940316	1324	FBTC	2682	1	2570	0.9921	112					
940316	1324	FBTC	2699	2	2151	0.8214	112	2587	0.184566	0.3048	-0.60553	-0.60553
940413	920	FBTC	0.5	1		2						
940413	920	FBTC	1367	1	795.9	0.5909	571.1					ID
940511	950	FBTC	0.6	1		2						
940511	951	FBTC	2421	1	1714	0.6963	707					
940511	951	FBTC	2415	2	1557	0.6306	707	1708	0.092562	0.3048	-0.30368	-0.30368
940614	918	FBTC	0.6	1		2						
940614	919	FBTC	2587	1	1704	0.6538	883					
940614	919	FBTC	2595	2	1298	0.5174	883	1712	0.276838	0.3048	-0.90826	-0.90826
940707	916	FBTC	0.7	1		2						
940707	916	FBTC	2488	1	1671	0.6791	817					
940707	917	FBTC	2483	2	1230	0.5056	817	1666	0.303411	0.3048	-0.99544	-0.99544
940810	923	FBTC	0.9	1		3						
940810	924	FBTC	783.6	1	479	0.5988	304.6					
940810	924	FBTC	784.2	2	478.6	0.6039	304.6	479.6	0.002087	0.3048	-0.00685	-0.16608
940810	925	FBTC	789.9	3	398	0.5035	304.6	485.3	0.198315	0.6096	-0.32532	
940907	956	FBTC	0.8	1		2						
940907	958	FBTC	961.1	1	390.2	0.4029	570.9					
940907	958	FBTC	956.3	2	337.3	0.362	570.9	385.4	0.133309	0.3048	-0.43737	-0.43737

TABLE 3 (CON'T)

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING PROJECT
LIGHT DATA

DATE	TIME	STATION	DECK VALUE	BOTTOM DEPTH	SUBM VALUE	RATIO	IMMERS FACTOR	DECK VALUE	CORRDECK -SUB	DEPTH METERS	K	AVG K
931215	1101	FBTR	1	1		3						
931215	1101	FBTR	2524	1	1454	0.6129	1070					
931215	1102	FBTR	2430	2	1308	0.5121	1070	1360	0.038985	0.3048	-0.12791	-0.4377
931215	1102	FBTR	2469	3	887	0.3641	1070	1399	0.455668	0.6096	-0.74749	
940315	1010	FBTR	0.6	1		2						
940315	1011	FBTR	2570	1	2003	0.7717	567					
940315	1011	FBTR	2562	2	1400	0.5706	567	1995	0.354172	0.3048	-1.16198	-1.16198
940414	1119	FBTR	0.5	1		2						
940414	1120	FBTR	2738	1	2213	0.8292	525					ID
940510	1049	FBTR	0.7	1		2						
940510	1051	FBTR	2773	1	2438	0.869	335					
940510	1052	FBTR	2770	2	1455	0.5425	335	2435	0.514941	0.3048	-1.68944	-1.68944
940615	1149	FBTR	0.5	1		2						
940615	1150	FBTR	2796	1	2340	0.8382	456					
940615	1150	FBTR	2789	2	1403	0.5291	456	2333	0.508542	0.3048	-1.66845	-1.66845
940706	1141	FBTR	0.9	1		2						
940706	1142	FBTR	3527	1	3023	0.8629	504					
940706	1142	FBTR	3521	2	1686	0.5784	504	3017	0.581904	0.3048	-1.90913	-1.90913
940809	1129	FBTR	0.9	1		2						
940809	1129	FBTR	2766	1	2372	0.8463	394					
940809	1130	FBTR	2758	2	1850	0.7037	394	2364	0.245169	0.3048	-0.80436	-0.80436
940908	1219	FBTR	1	1		2						
940908	1223	FBTR	1030	1	455	0.4428	575					
940908	1223	FBTR	1012	2	337.1	0.3365	575	437	0.259554	0.3048	-0.85155	-0.85155
931027	1337	FBLM	1.2	1		3						
931027	1342	FBLM	1183	1	547.6	0.4695	635.4					
931027	1342	FBLM	1181	2	458	0.3848	635.4	545.6	0.175017	0.3048	-0.5742	-0.68716
931027	1342	FBLM	1231	3	365.7	0.2983	635.4	595.6	0.487756	0.6096	-0.80012	
931115	1059	FBLM	1.1	1		3						
931115	1109	FBLM	2765	1	1920	0.7137	845					
931115	1109	FBLM	2777	2	1447	0.5133	845	1932	0.289063	0.3048	-0.94837	-1.05414
931115	1110	FBLM	2782	3	955.1	0.3507	845	1937	0.70708	0.6096	-1.15991	
931215	1405	FBLM	1.2	1		3						
931215	1421	FBLM	1882	1	1120	0.2002	762					
931215	1422	FBLM	1300	2	576.5	0.03414	762	538	-0.06912	0.3048	-0.22676	-0.03097
931215	1422	FBLM	1443	3	615.9	0.0127	762	681	0.100478	0.6096	-0.16483	
940315	1239	FBLM	0.9	1		3						
940315	1247	FBLM	2638	1	2489	0.9655	149					
940315	1247	FBLM	2629	2	2335	0.9007	149	2480	0.060247	0.3048	-0.19766	-0.20718
940315	1248	FBLM	2646	3	2188	0.8391	149	2497	0.132102	0.6096	-0.2167	
940414	929	FBLM	0.7	1		2						
940414	929	FBLM	1916	1	1236	0.6445	680					
940414	930	FBLM	1709	2	732.6	0.4223	680	1029	0.339743	0.3048	-1.11464	-1.11464
940510	923	FBLM	0.9	1		3						
940510	924	FBLM	2264	1	1578	0.6972	686					
940510	924	FBLM	2274	2	1330	0.5814	686	1588	0.177296	0.3048	-0.58168	-0.55904
940510	925	FBLM	2260	3	1135	0.4944	686	1574	0.326987	0.6096	-0.5364	
940615	943	FBLM	0.8	1		3						
940615	944	FBLM	2521	1	1836	0.7368	685					
940615	944	FBLM	2530	2	1285	0.539	685	1845	0.361721	0.3048	-1.18675	-1.11991
940615	944	FBLM	2524	3	967.8	0.398	685	1839	0.641952	0.6096	-1.05307	
940706	934	FBLM	0.9	1		3						
940706	935	FBLM	1728	1	998.1	0.5944	729.9					
940706	935	FBLM	1510	2	600.5	0.4046	729.9	780.1	0.261659	0.3048	-0.85846	-0.89937
940706	935	FBLM	1633	3	509.1	0.3272	729.9	903.1	0.573189	0.6096	-0.94027	
940809	945	FBLM	1.1	1		3						
940809	946	FBLM	2194	1	1617	0.7345	577					
940809	946	FBLM	2203	2	1347	0.6308	577	1626	0.188243	0.3048	-0.6176	-0.64637
940809	946	FBLM	2222	3	1090	0.5143	577	1645	0.411563	0.6096	-0.67514	
940908	946	FBLM	1.1	1		3						
940908	948	FBLM	529	1	190.3	0.3615	338.7					
940908	948	FBLM	526.4	2	142.4	0.267	338.7	187.7	0.276205	0.3048	-0.90618	-0.92337
940908	948	FBLM	527.3	3	106.3	0.2072	338.7	188.6	0.573363	0.6096	-0.94056	

TABLE 4

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING
SEAGRASS SHOOT AND BLADE DENSITY

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBHC	10	1993	0	0	0	0	0	0	0	0	**261	**144	**261	**144
FBHC	11	1993	0	0	0	0	0	0	0	0	83	83	233	103
FBHC	12	1993	0	0	0	0	0	0	0	0	72	72	58	51
FBHC	1	1994	0	0	0	0	0	0	0	0	93	88	123	65
FBHC	2	1994	0	0	0	0	0	0	0	0	35	24	65	29
FBHC	3	1994	0	0	0	0	0	0	0	0	83	83	208	108
FBHC	4	1994	0	0	0	0	0	0	0	0	82	82	97	58
FBHC	5	1994	0	0	0	0	0	0	0	0	62	50	140	56
FBHC	6	1994	0	0	0	0	0	0	0	0	87	70	152	77
FBHC	7	1994	0	0	0	0	0	0	0	0	135	130	272	122
FBHC	8	1994	0	0	0	0	0	0	0	0	100	83	125	40
FBHC	9	1994	0	0	0	0	0	0	0	0	57	47	333	35

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBLS	10	1993	190	75	432	169	0	0	0	0	117	117	0	0
FBLS	11	1993	173	41	437	109	0	0	0	0	197	135	0	0
FBLS	12	1993	185	30	418	59	0	0	0	0	107	69	0	0
FBLS	1	1994	190	56	422	121	0	0	0	0	128	98	0	0
FBLS	2	1994	135	51	380	166	0	0	0	0	92	60	0	0
FBLS	3	1994	217	98	567	239	0	0	0	0	120	83	0	0
FBLS	4	1994	165	65	420	175	0	0	0	0	108	70	0	0
FBLS	5	1994	190	78	492	212	0	0	0	0	98	70	0	0
FBLS	6	1994	218	74	613	188	0	0	0	0	192	142	0	0
FBLS	7	1994	278	98	763	252	0	0	0	0	173	147	0	0
FBLS	8	1994	270	88	727	217	0	0	0	0	197	165	0	0
FBLS	9	1994	248	74	697	175	0	0	0	0	155	150	0	0

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBJB	10	1993	0	0	0	0	0	0	0	0	1227	634	2220	1164
FBJB	11	1993	0	0	0	0	0	0	0	0	688	437	2320	1025
FBJB	12	1993	0	0	0	0	0	0	0	0	1178	692	2368	1124
FBJB	1	1994	0	0	0	0	0	0	0	0	940	514	3182	1029
FBJB	2	1994	0	0	0	0	0	0	0	0	897	463	1175	478
FBJB	3	1994	0	0	0	0	0	0	0	0	630	389	1410	606
FBJB	4	1994	0	0	0	0	0	0	0	0	1187	372	1047	425
FBJB	5	1994	0	0	0	0	0	0	0	0	800	367	452	159
FBJB	6	1994	0	0	0	0	0	0	0	0	742	258	220	101
FBJB	7	1994	0	0	0	0	0	0	0	0	877	121	20	3
FBJB	8	1994	0	0	0	0	0	0	0	0	597	217	12	9
FBJB	9	1994	0	0	0	0	0	0	0	0	575	232	0	0

** Indicates combined value of Halodule and Ruppia shoots

TABLE 4 (CON'T)

C-111/TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING
SEAGRASS SHOOT AND BLADE DENSITY

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBTC	10	1993	305	79	620	156	0	0	0	0	0	0	0	0
FBTC	11	1993	243	32	517	53	0	0	0	0	0	0	0	0
FBTC	12	1993												
FBTC	1	1994	275	19	465	19	0	0	0	0	0	0	0	0
FBTC	2	1994	193	27	393	48	0	0	0	0	0	0	0	0
FBTC	3	1994	257	38	598	82	0	0	0	0	0	0	0	0
FBTC	4	1994	278	37	713	79	0	0	0	0	0	0	0	0
FBTC	5	1994	283	42	758	90	0	0	0	0	0	0	0	0
FBTC	6	1994	243	39	613	71	0	0	0	0	0	0	0	0
FBTC	7	1994	255	46	562	91	0	0	0	0	0	0	0	0
FBTC	8	1994	243	34	513	62	0	0	0	0	2	2	0	0
FBTC	9	1994	250	18	532	36	0	0	0	0	2	2	0	0

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBTR	10	1993												
FBTR	11	1993												
FBTR	12	1993	457	83	1048	139	0	0	0	0	7	3	0	0
FBTR	1	1994	198	12	593	39	0	0	0	0	12	6	0	0
FBTR	2	1994	368	51	958	70	0	0	0	0	18	18	0	0
FBTR	3	1994	422	75	1087	172	0	0	0	0	3	3	0	0
FBTR	4	1994	443	44	1192	172	0	0	0	0	5	3	0	0
FBTR	5	1994	278	9	748	39	0	0	0	0	5	5	0	0
FBTR	6	1994	342	98	915	295	0	0	0	0	0	0	0	0
FBTR	7	1994	358	90	1075	242	0	0	0	0	2	2	0	0
FBTR	8	1994	487	112	1370	302	0	0	0	0	5	3	0	0
FBTR	9	1994	410	116	1180	299	0	0	0	0	12	7	0	0

			Thalassia testudinum				Syringodium filiforme				Halodule wrightii		Ruppia maritima	
STATION	MONTH	YEAR	Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2(stderr)		Blades/m2(stderr)		Shoots/m2	stderr	Shoots/m2	(stderr)
FBLM	10	1993	445	43	885	135	0	0	0	0	0	0	0	0
FBLM	11	1993	337	27	653	108	0	0	0	0	0	0	0	0
FBLM	12	1993	287	63	517	107	0	0	0	0	0	0	0	0
FBLM	1	1994	297	31	488	58	0	0	0	0	0	0	0	0
FBLM	2	1994	358	35	672	92	0	0	0	0	13	11	0	0
FBLM	3	1994	332	91	722	235	0	0	0	0	5	5	0	0
FBLM	4	1994	335	13	792	25	0	0	0	0	0	0	0	0
FBLM	5	1994	317	9	812	31	0	0	0	0	0	0	0	0
FBLM	6	1994	348	26	853	31	0	0	0	0	0	0	0	0
FBLM	7	1994	398	9	957	20	0	0	0	0	2	2	0	0
FBLM	8	1994	357	27	832	74	0	0	0	0	2	2	0	0
FBLM	9	1994	365	50	748	119	0	0	0	0	17	12	0	0

TABLE 5

C-111\TAYLOR SLOUGH WATER QUALITY AND BIOLOGICAL MONITORING

SEAGRASS BIOMASS

STATION	DATE	Y mean MEAN	Y TOTAL BIMAS/m2 g/m2	E/(E+BL)	EPI FRACTION	X TOTAL EST. EPI g/m2	EPI % OF TOTAL
FBHC	12/93	0.40	9.88	0.61	0.43	3.62	36.64
FBHC	3/94	0.05	1.30	0.04	0.00	0.03	2.11
FBHC	6/94	0.02	0.47	0.00	0.00	0.00	0.00
FBHC	9/94	0.17	4.28	0.18	0.03	0.54	12.56
FBLS	12/93	0.73	18.24	0.25	0.18	3.38	18.53
FBLS	3/94	0.68	17.05	0.07	0.06	1.10	6.48
FBLS	6/94	1.31	32.84	0.01	0.01	1.92	5.84
FBLS	9/94	1.11	27.75	0.03	0.04	0.69	2.49
FBJB	12/93	0.72	17.93	0.04	0.02	0.73	4.08
FBJB	3/94	0.70	17.60	0.11	0.11	1.23	7.00
FBJB	6/94	0.56	13.97	0.01	0.00	0.34	2.47
FBJB	9/94	0.09	2.29	0.21	0.03	0.44	19.29
FBTC	12/93						
FBTC	3/94	0.71	17.70	0.03	0.01	1.04	5.85
FBTC	6/94	0.59	14.84	0.02	0.02	0.46	3.07
FBTC	9/94	0.51	12.84	0.07	0.02	1.53	11.89
FBTR	12/93	0.78	19.38	0.08	0.08	1.25	6.46
FBTR	3/94	1.08	27.02	0.10	0.09	1.67	6.19
FBTR	6/94	1.45	36.26	0.02	0.04	0.55	1.52
FBTR	9/94	1.33	33.28	0.06	0.05	1.65	4.95
FBLM	12/93	0.34	8.60	0.06	0.02	0.66	7.70
FBLM	3/94	0.64	16.03	0.38	0.26	4.77	29.78
FBLM	6/94	0.49	12.35	0.20	0.13	2.47	19.99
FBLM	9/94	0.37	9.17	0.13	0.04	1.19	13.03

HIGHWAY CREEK STATION

SEAGRASS SHOOT DENSITY

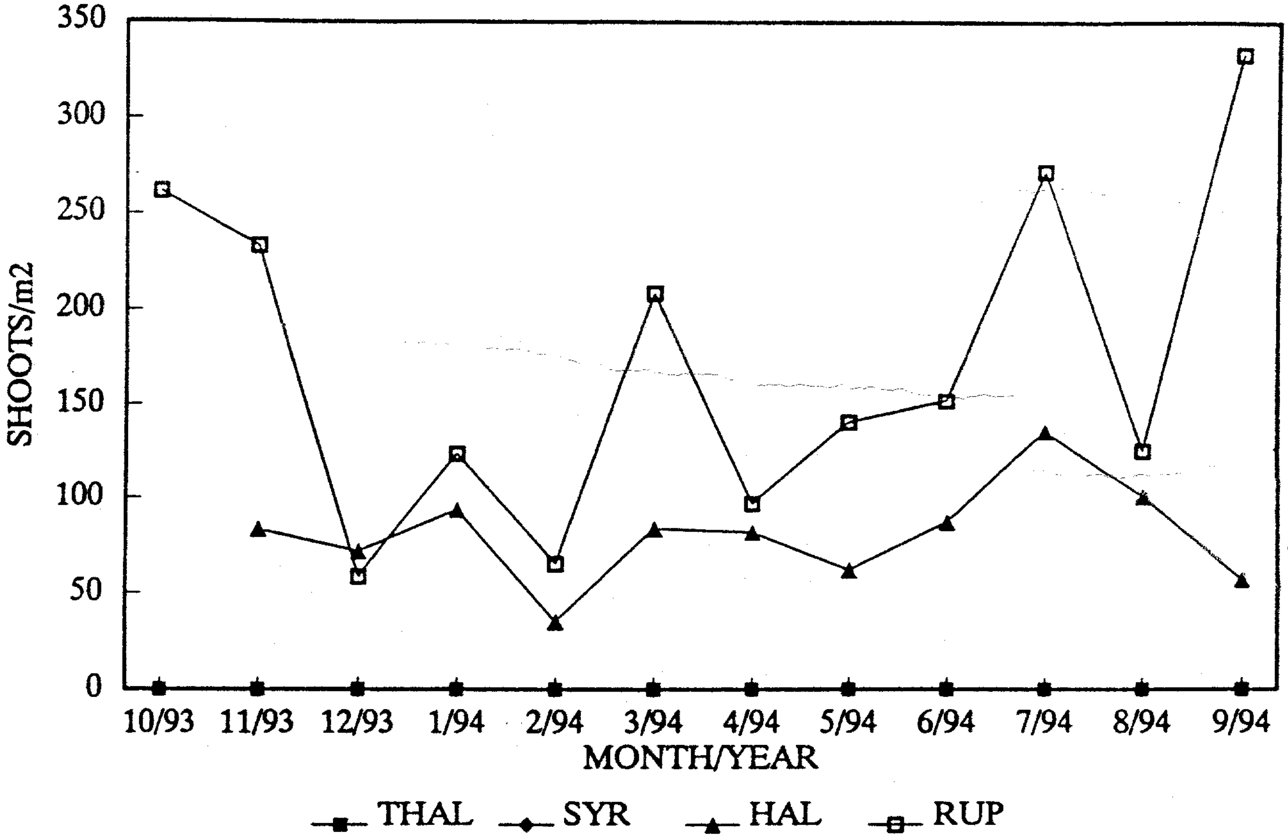


FIGURE 1

LONG SOUND STATION

SEAGRASS SHOOT DENSITY

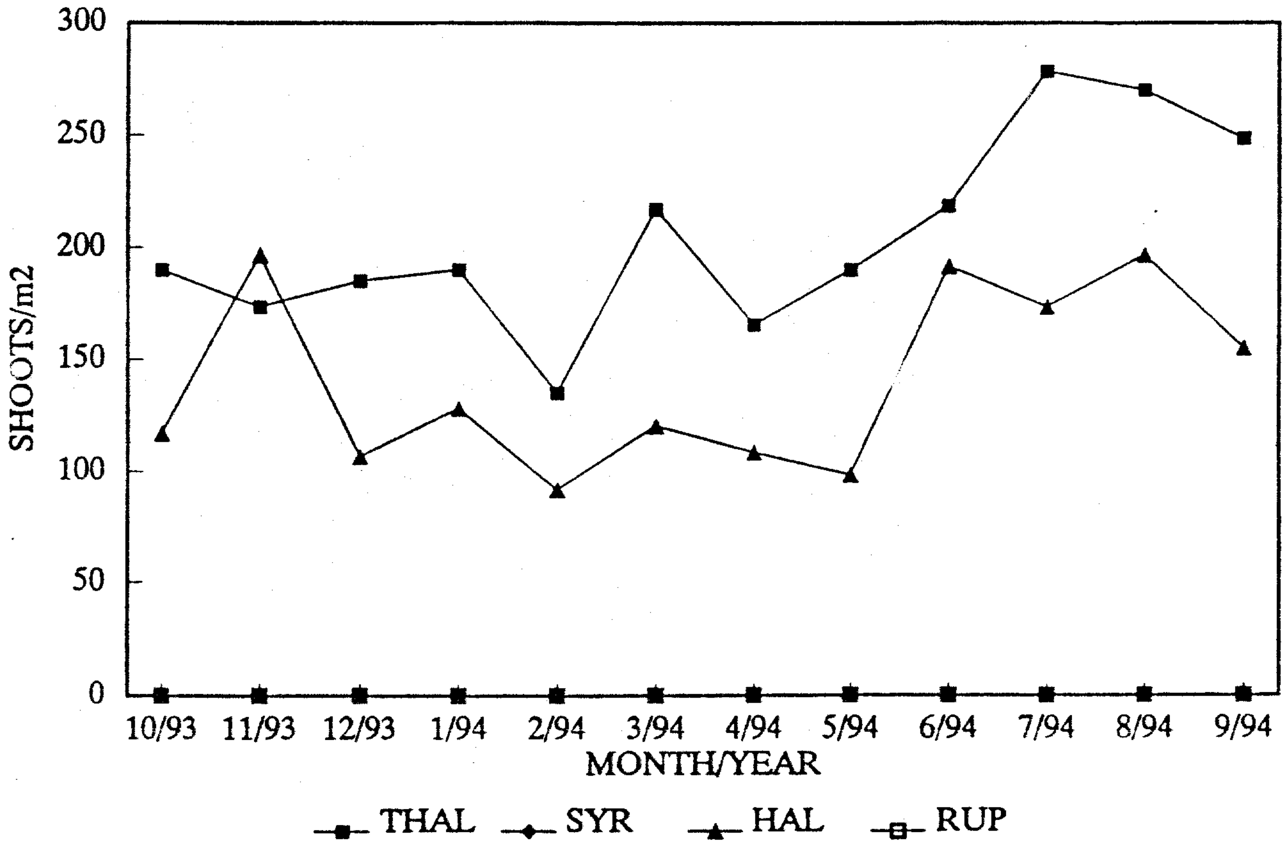


FIGURE 2

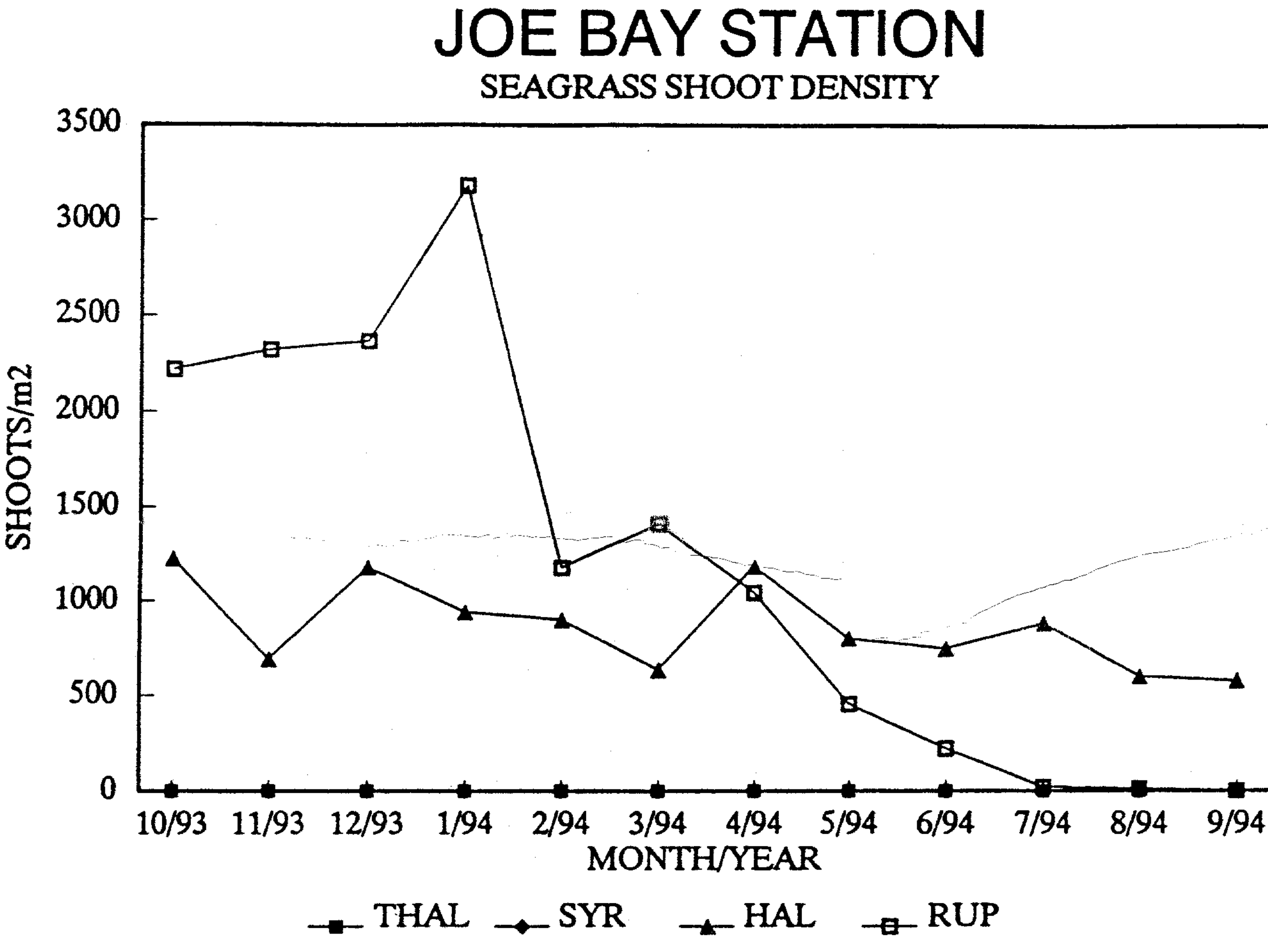


FIGURE 3

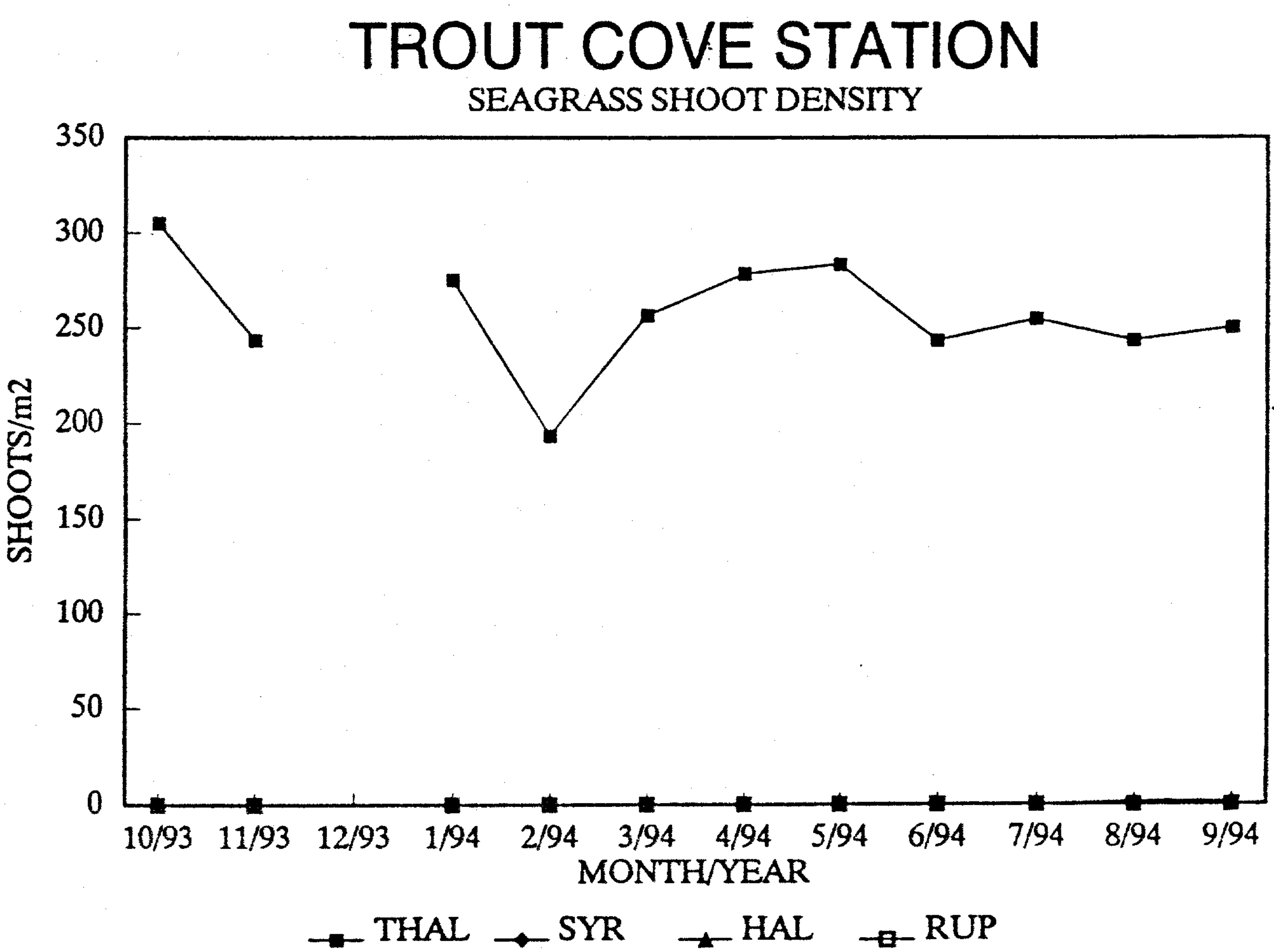


FIGURE 4

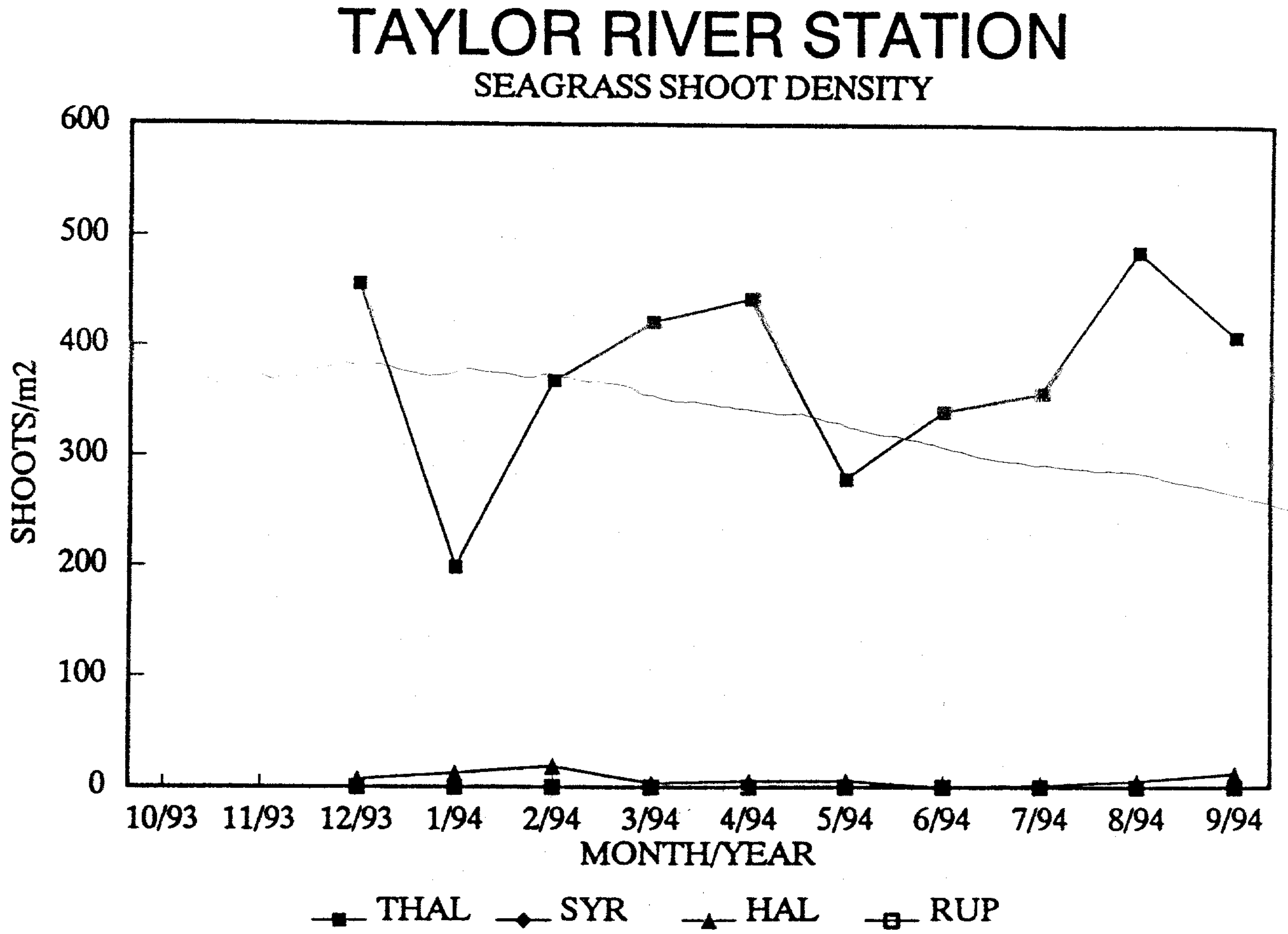


FIGURE 5

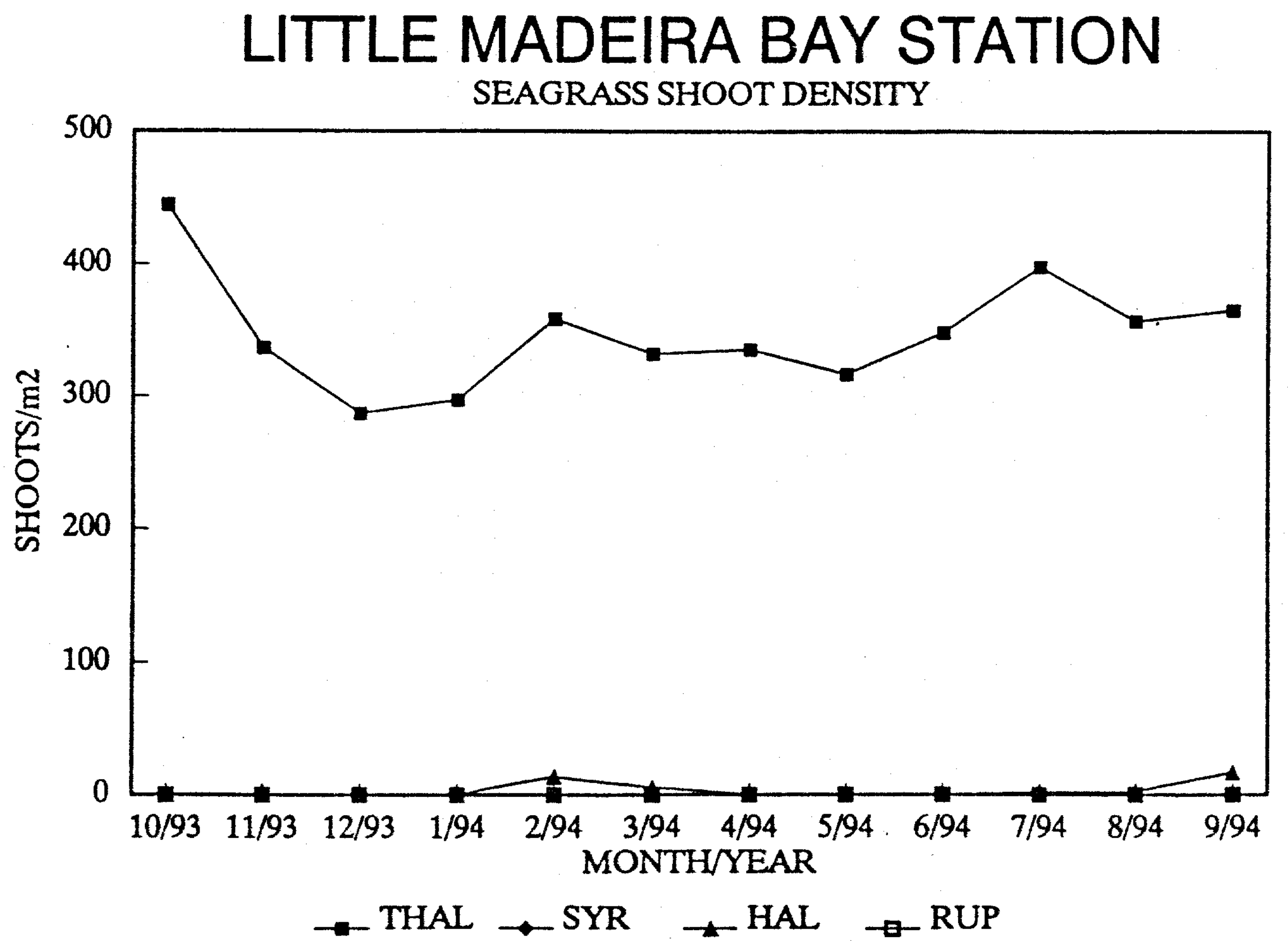


FIGURE 6

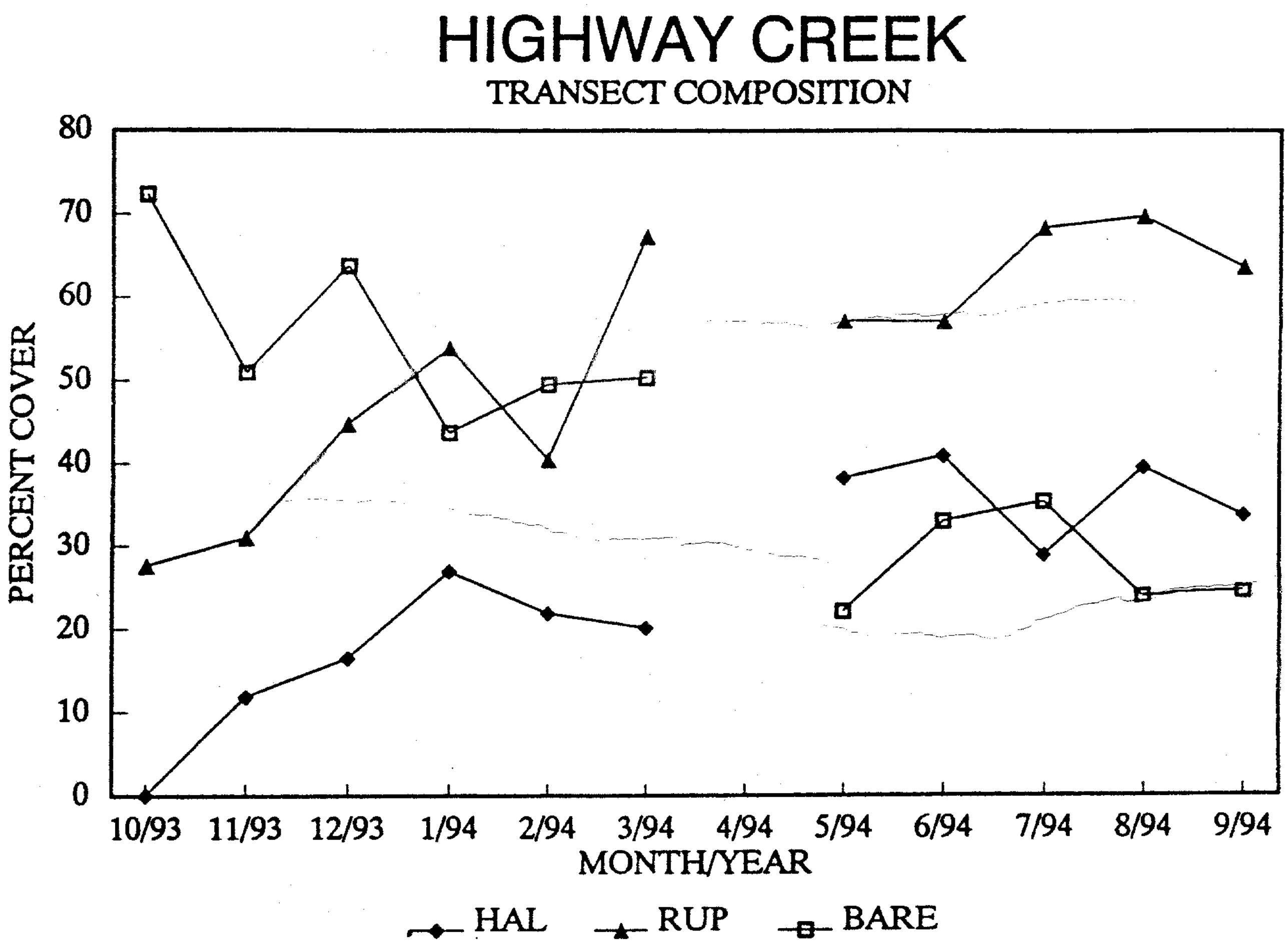


FIGURE 7

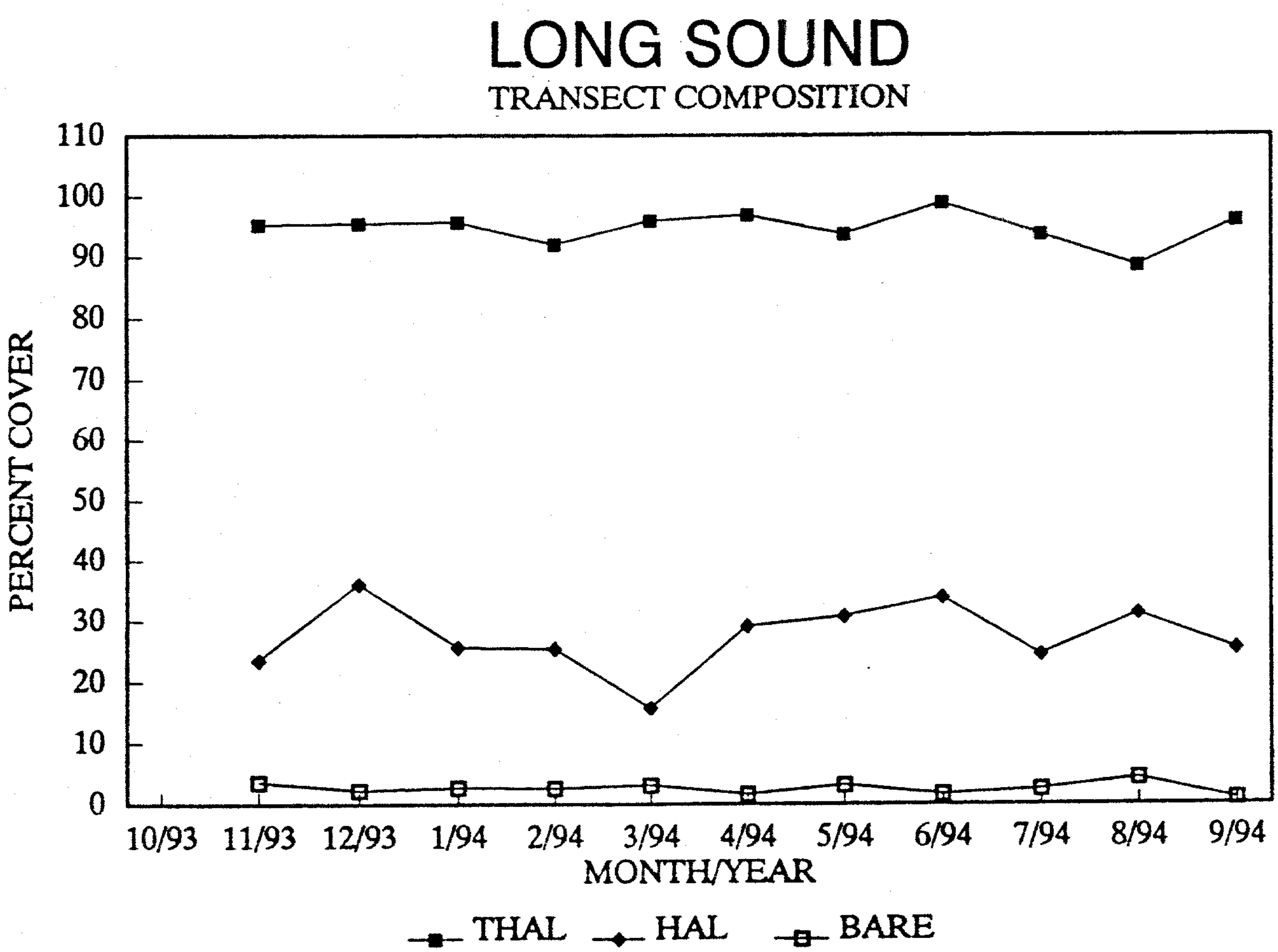


FIGURE 8

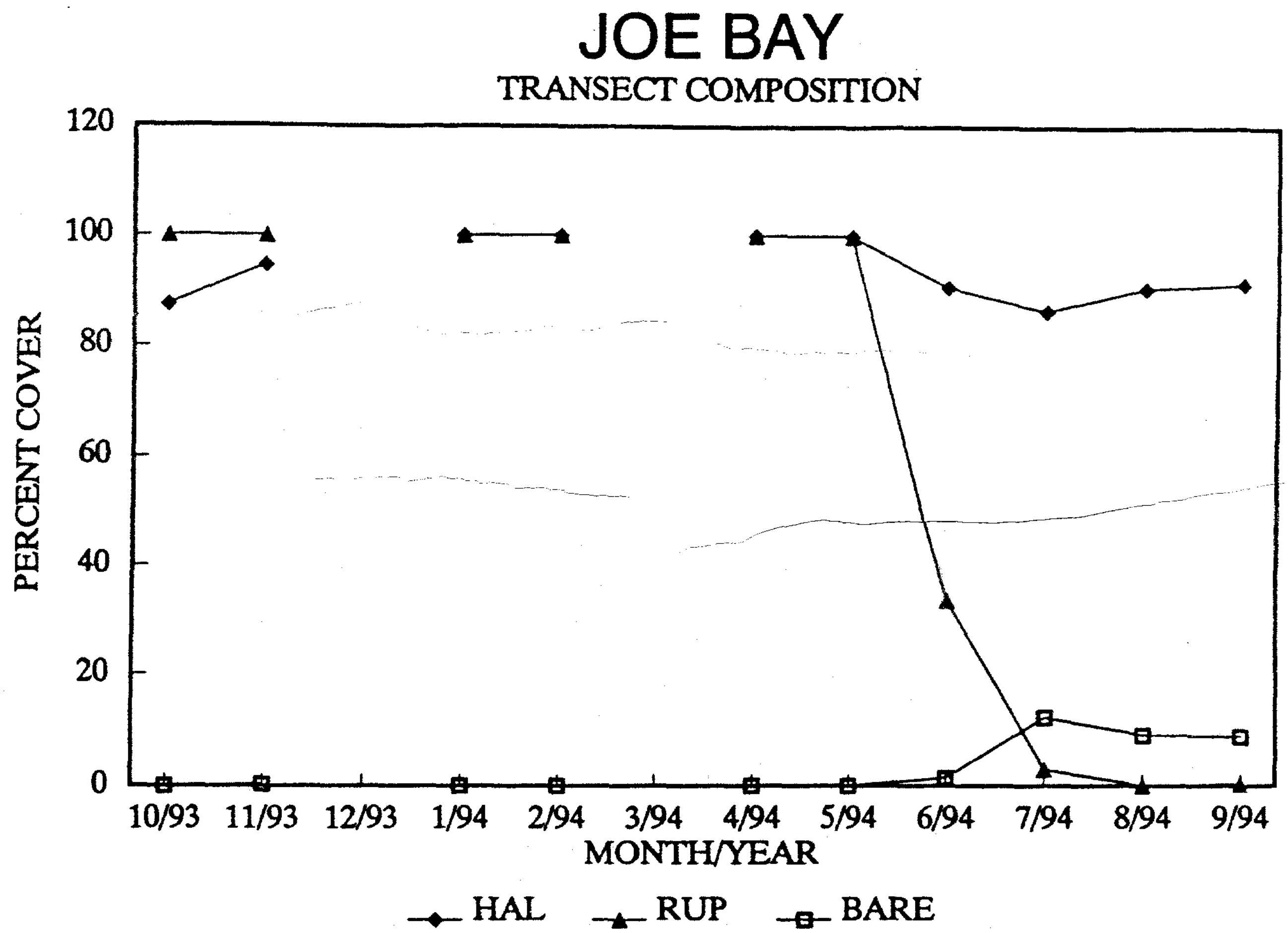


FIGURE 9

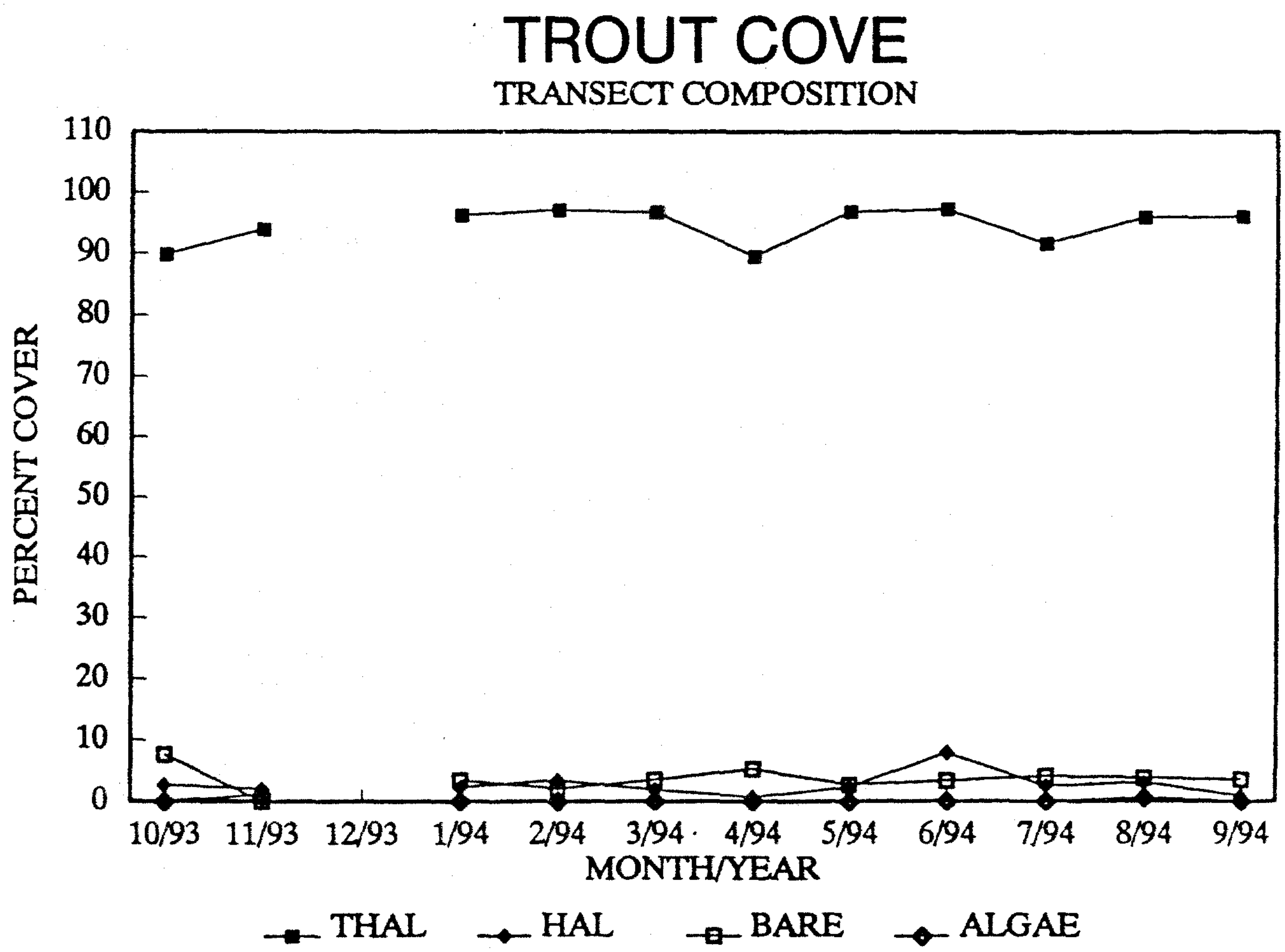


FIGURE 10

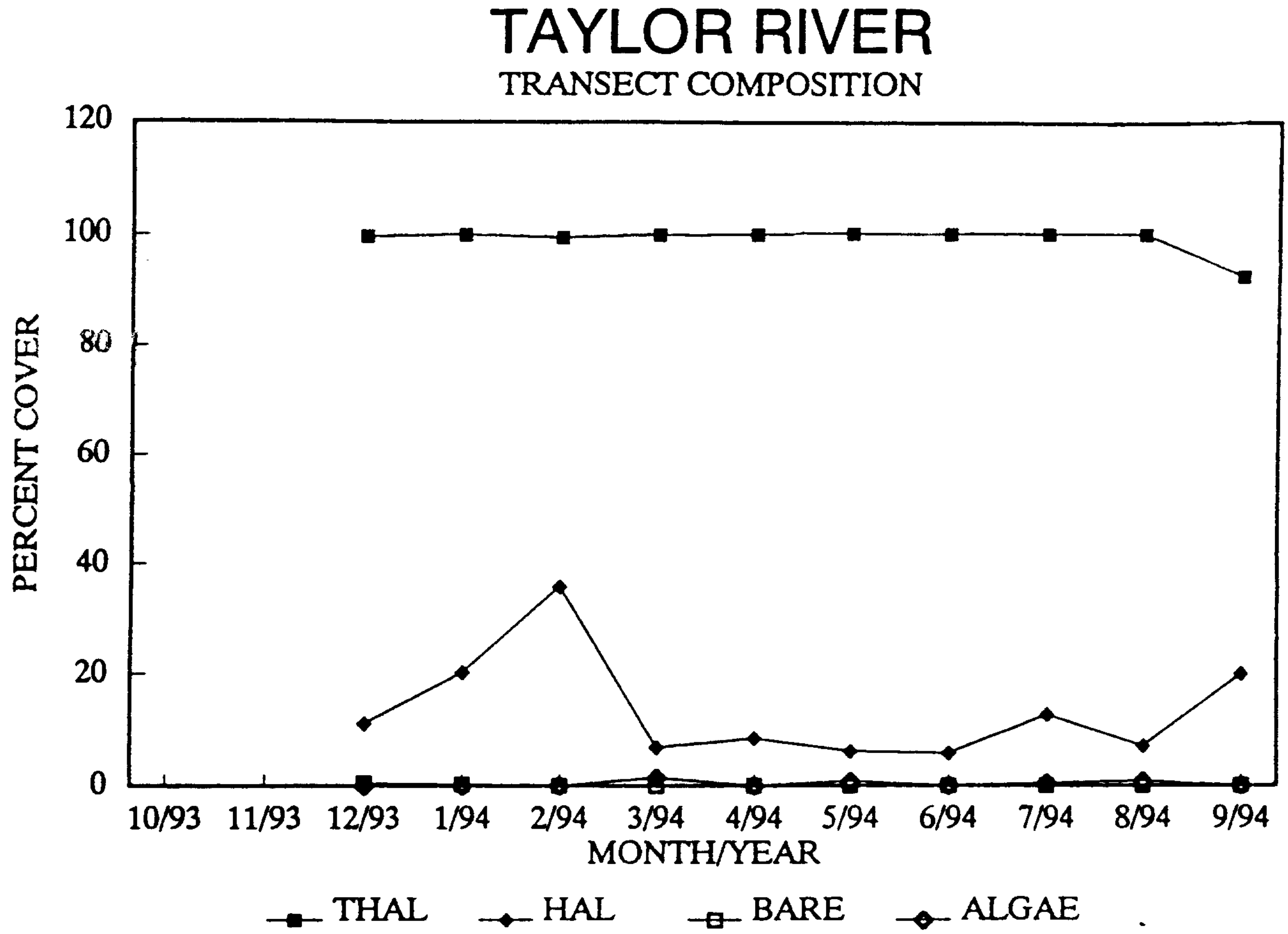


FIGURE 11

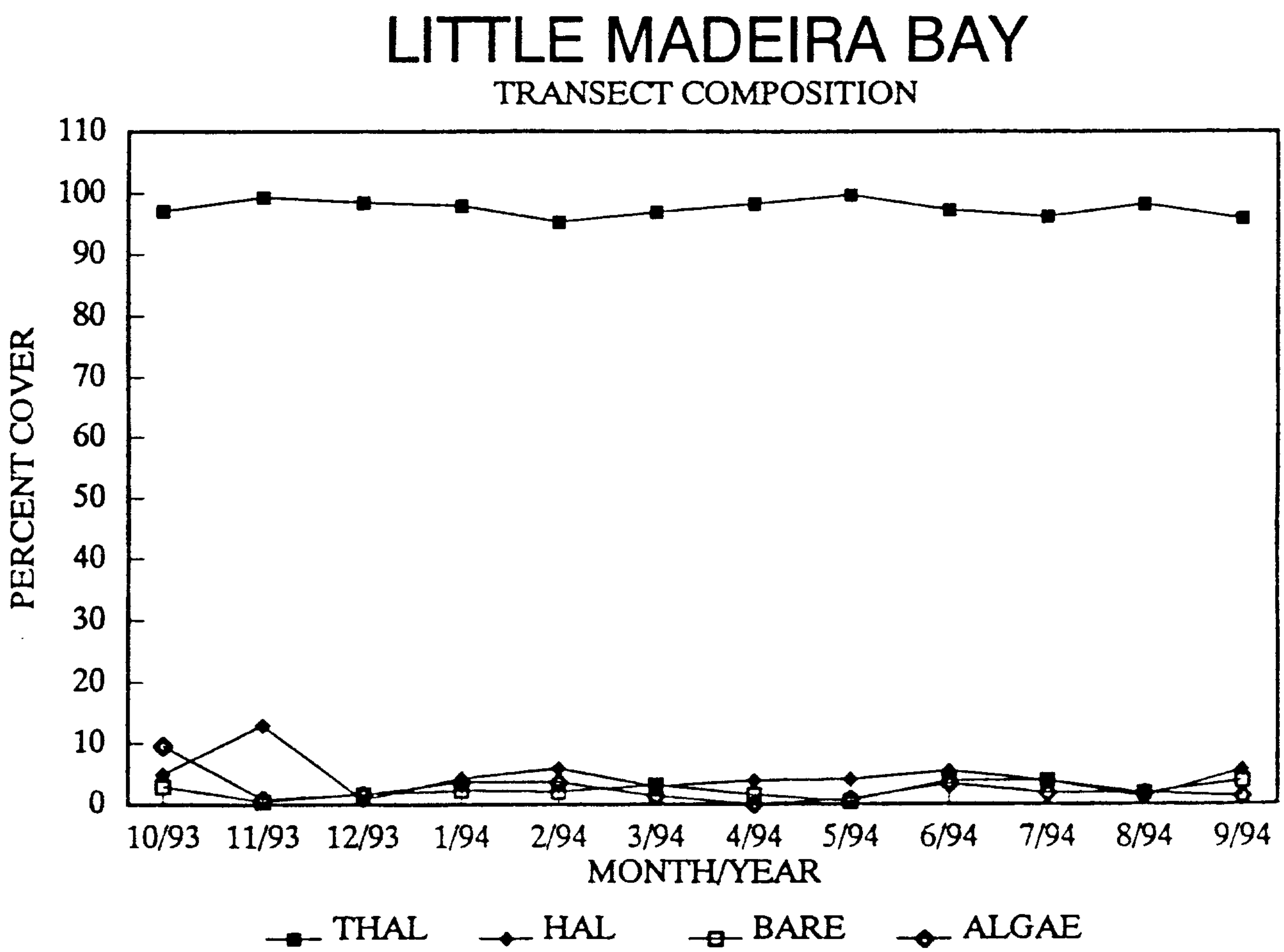


FIGURE 12

HIGHWAY CREEK

SEAGRASS BIOMASS

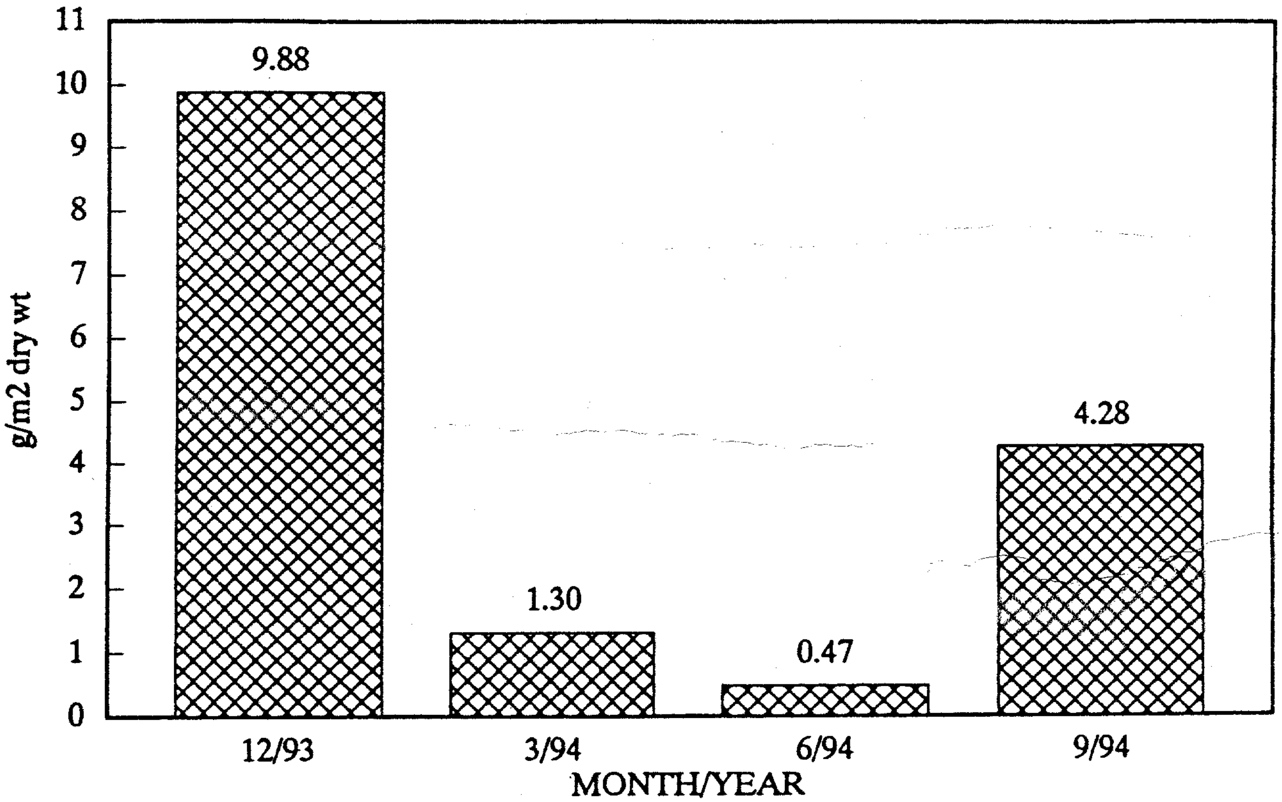


FIGURE 13

Sample Composition: Halodule, Ruppia

LONG SOUND

SEAGRASS BIOMASS

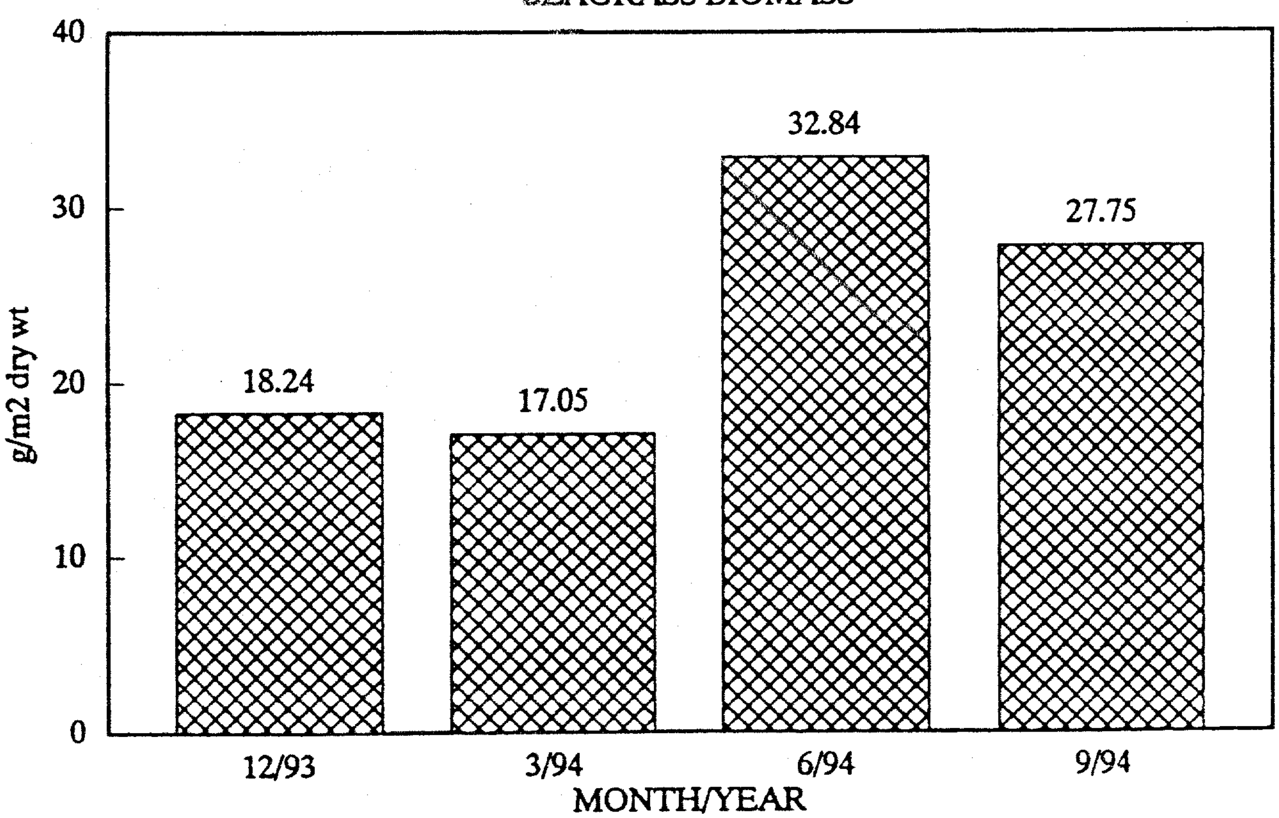
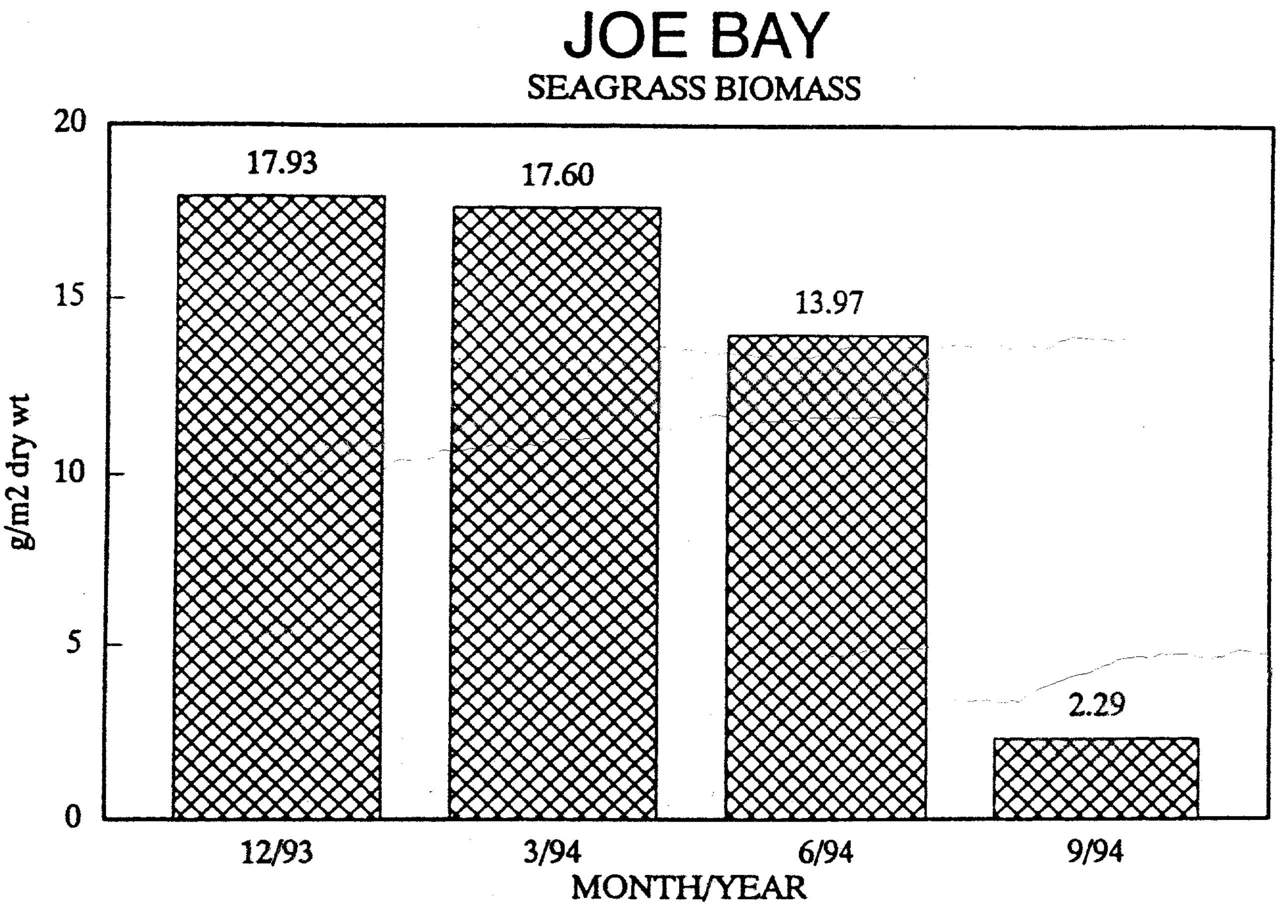


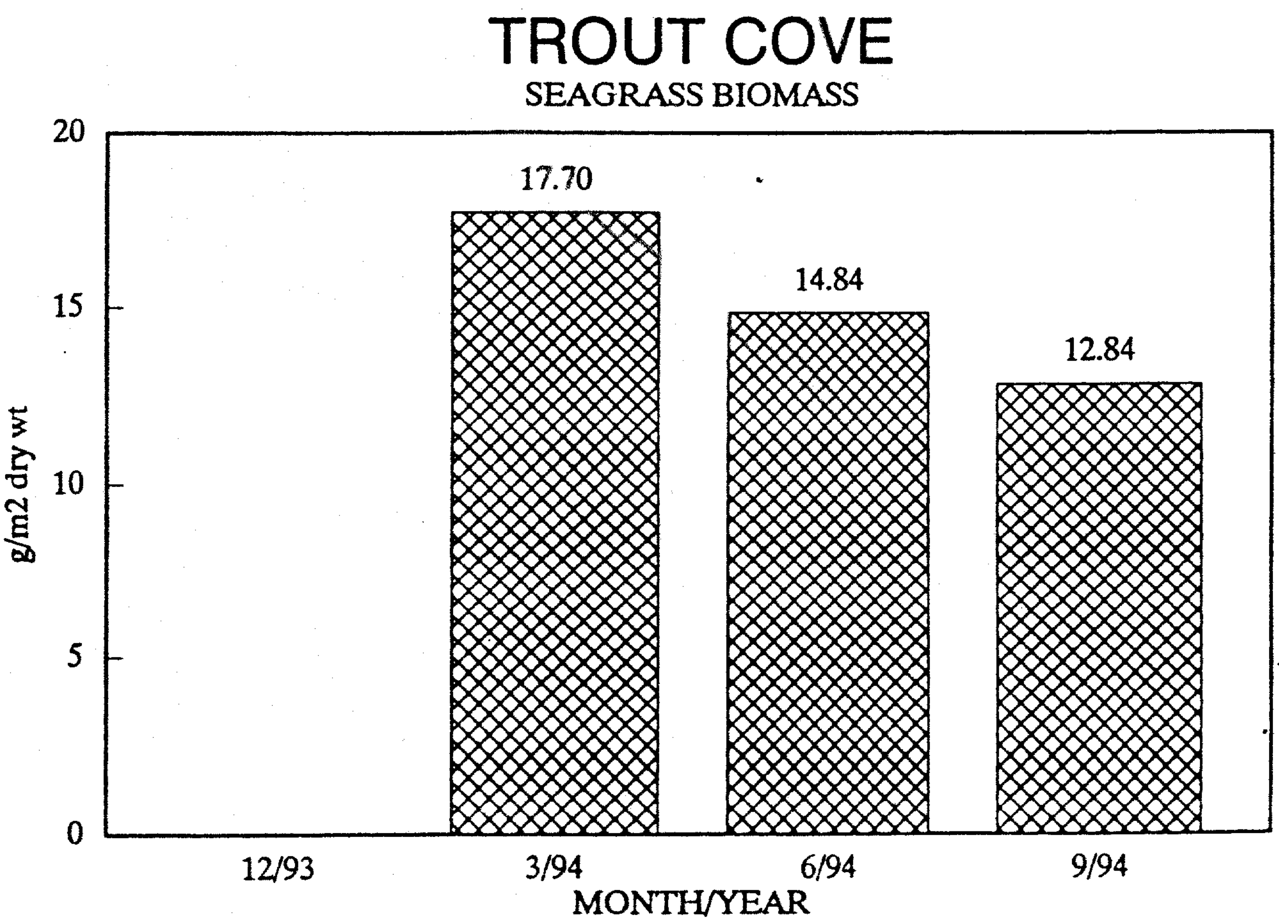
FIGURE 14

Sample Composition: Thalassia, Halodule



Sample Composition: Halodule, Ruppia

FIGURE 15



Sample Composition: Thalassia

FIGURE 16

TAYLOR RIVER

SEAGRASS BIOMASS

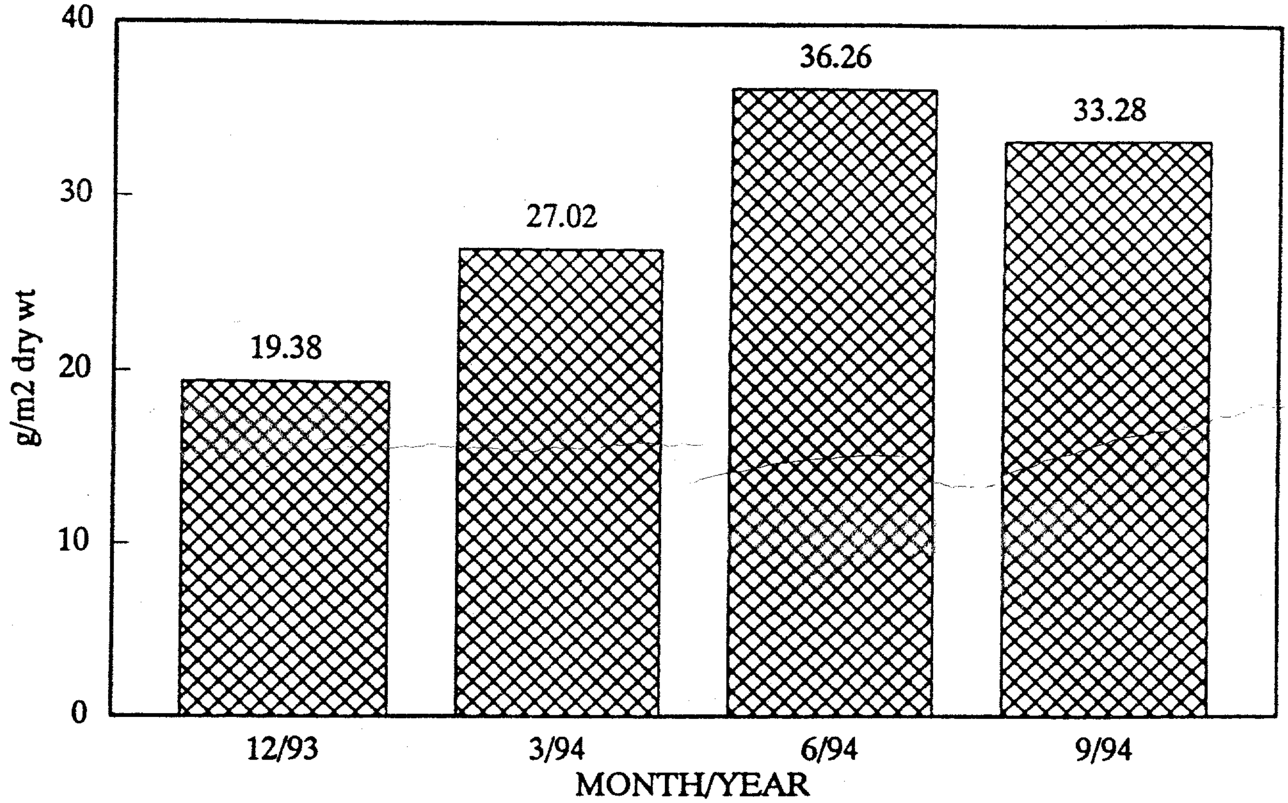


FIGURE 17

Sample Composition: Thalassia, Halodule

LITTLE MADEIRA BAY

SEAGRASS BIOMASS

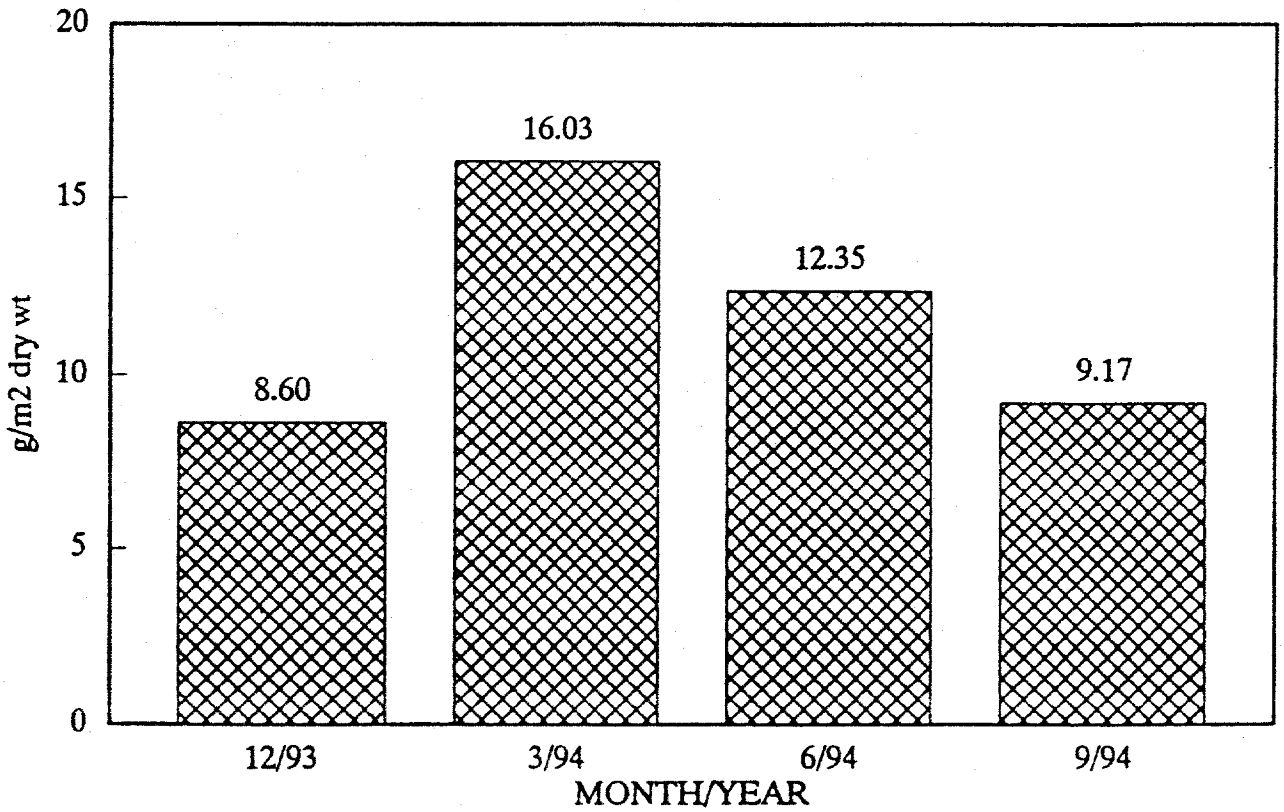


FIGURE 18

Sample Composition: Thalassia, Halodule

HIGHWAY CREEK STATION

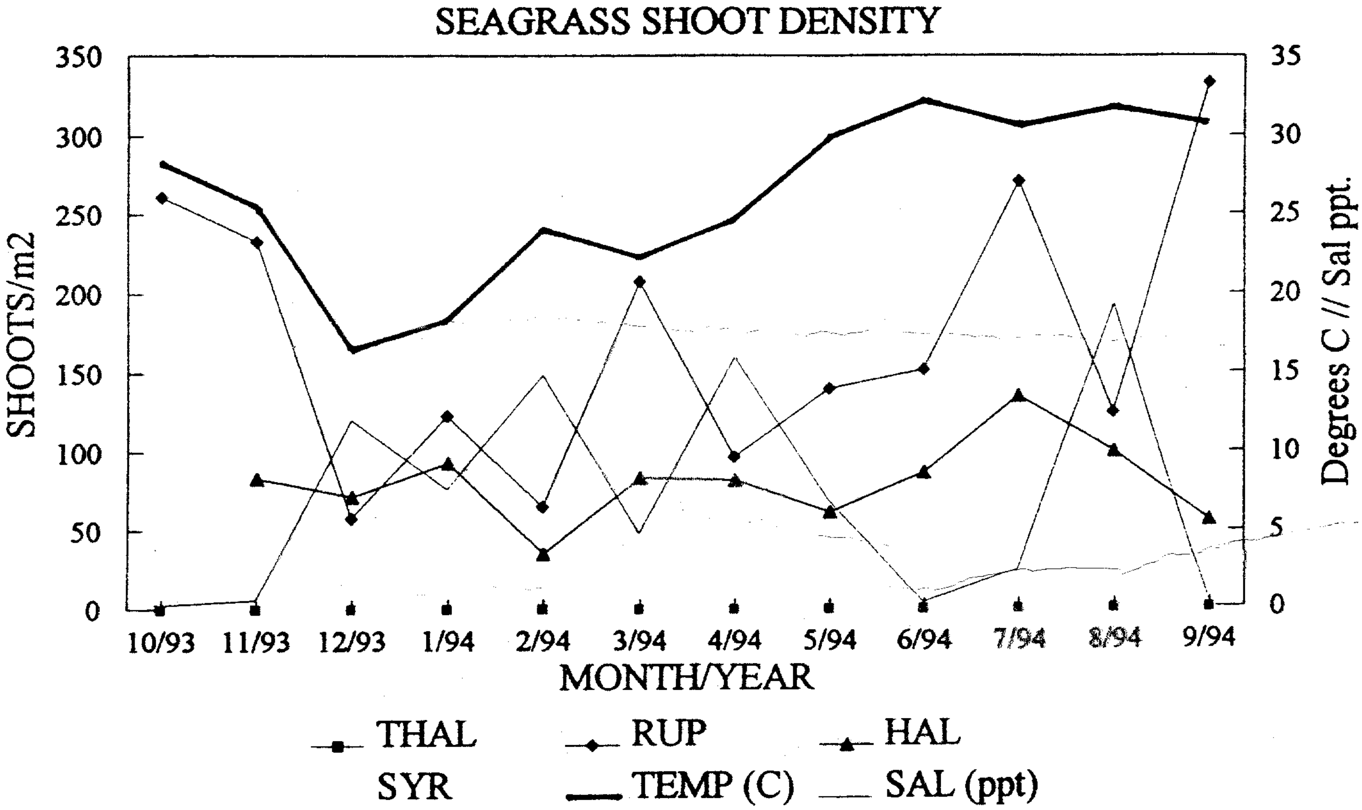


FIGURE 19

LONG SOUND STATION

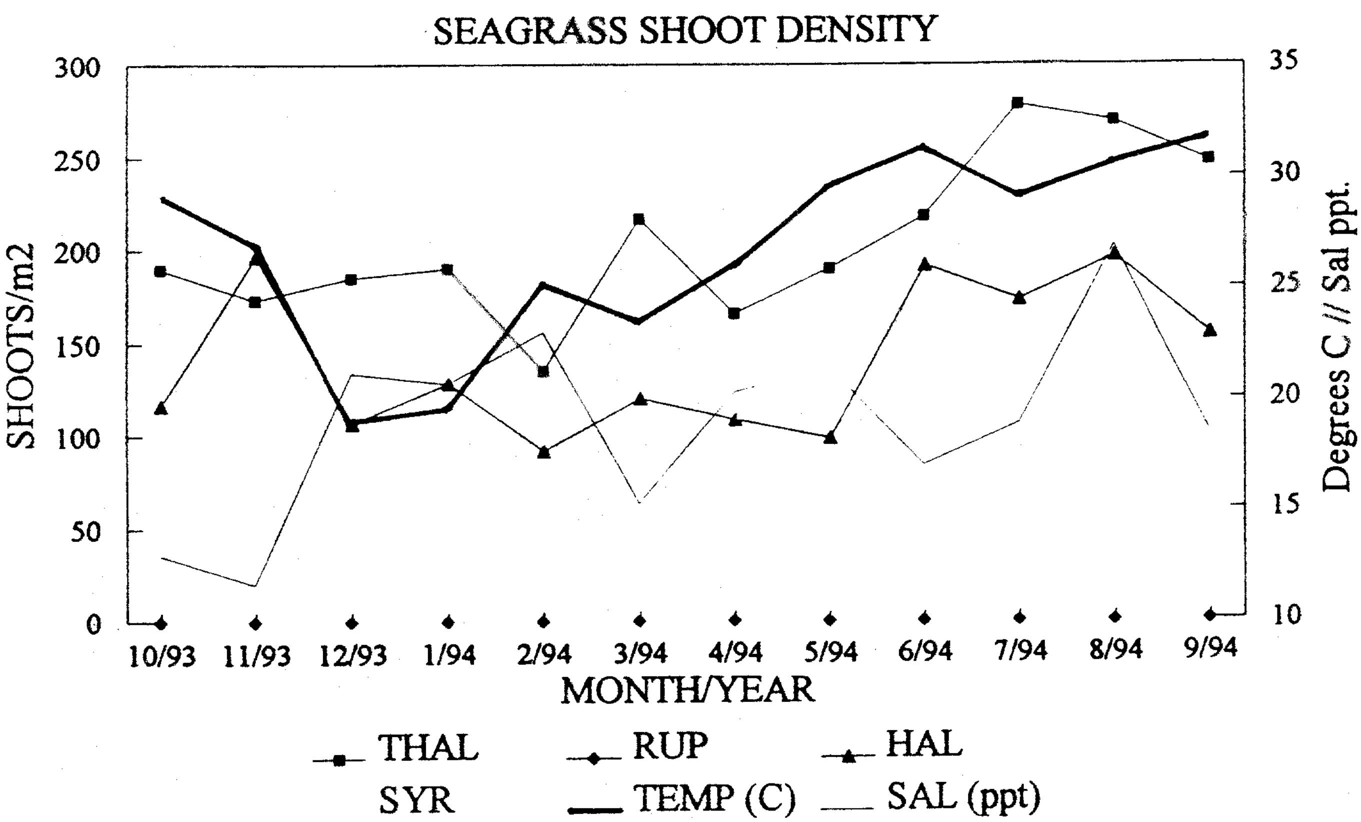


FIGURE 20

JOE BAY STATION

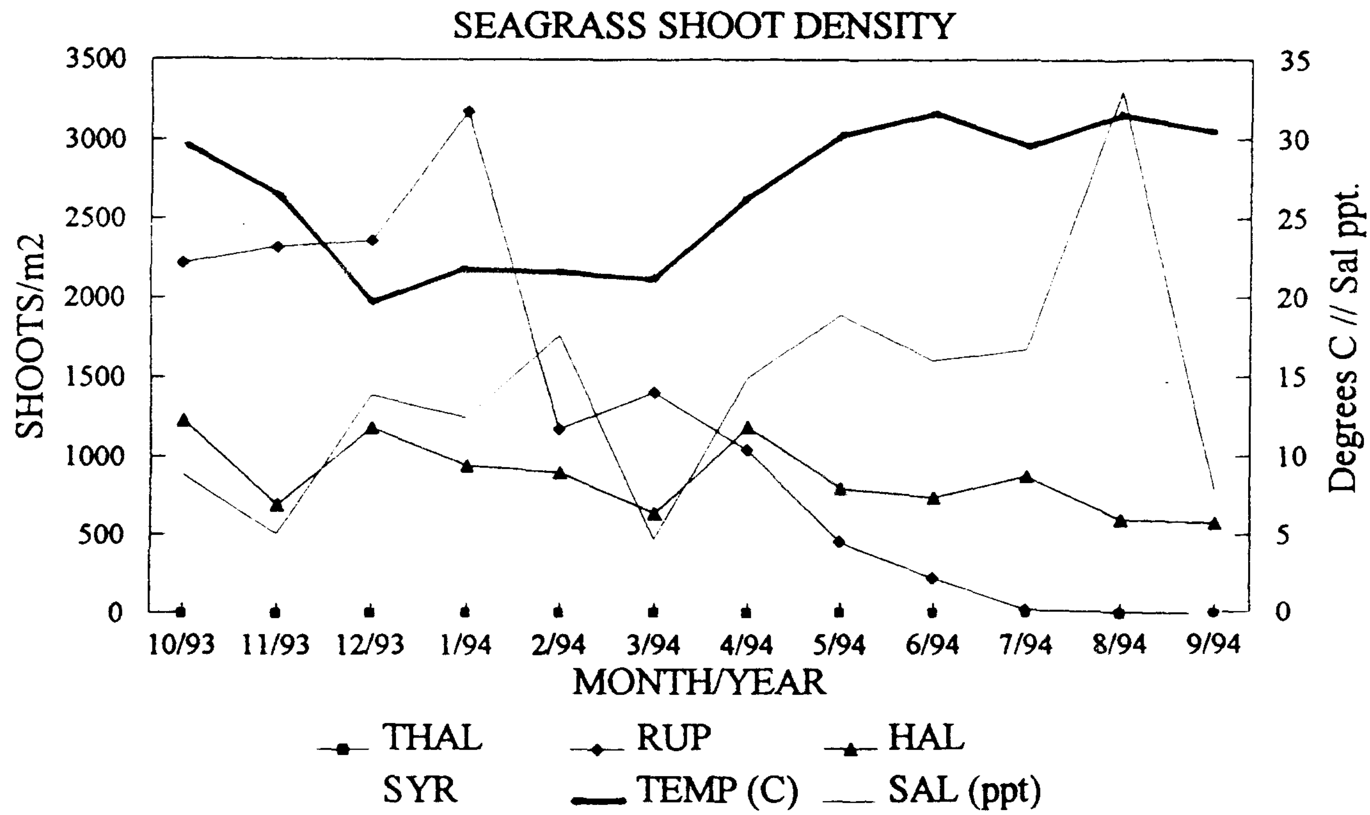


FIGURE 21

TROUT COVE STATION

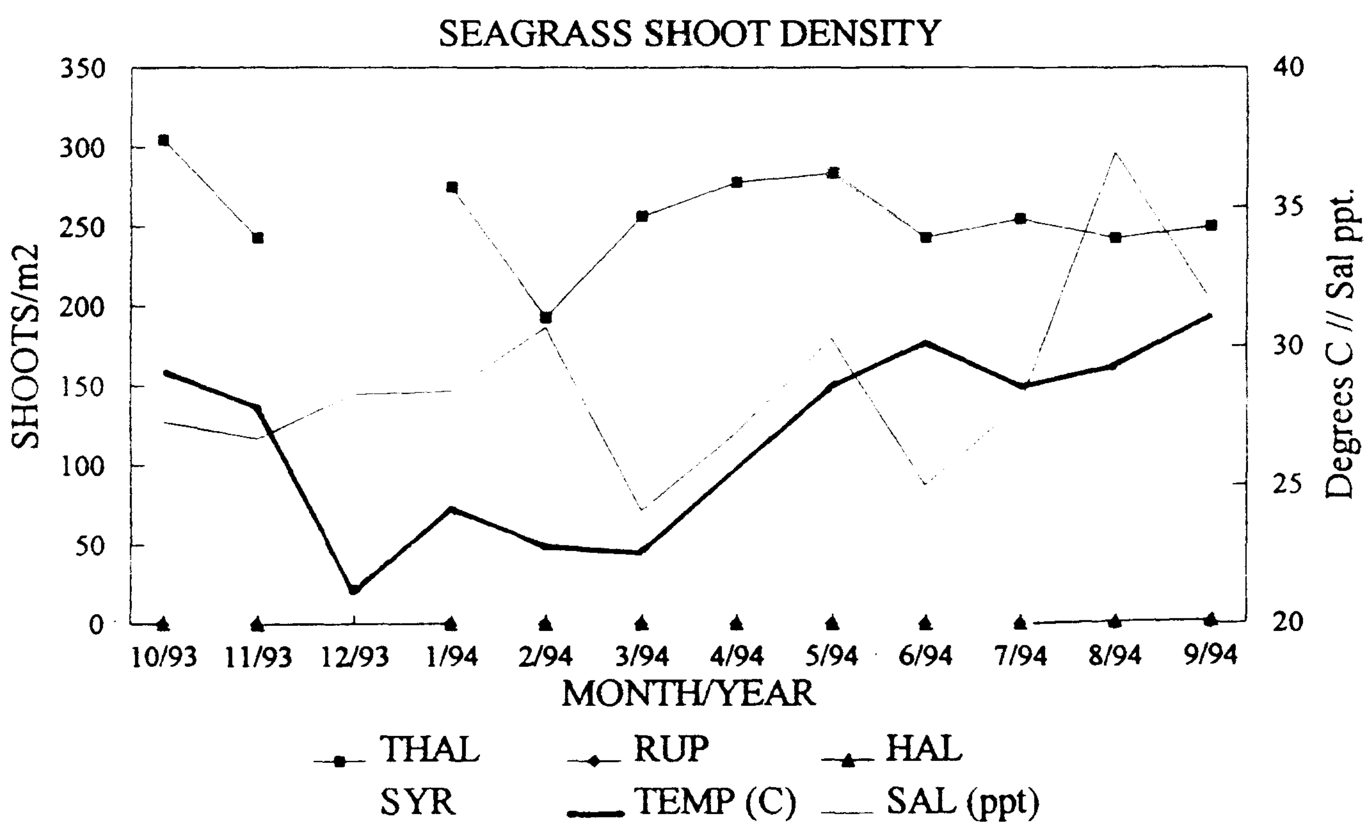


FIGURE 22

TAYLOR RIVER STATION

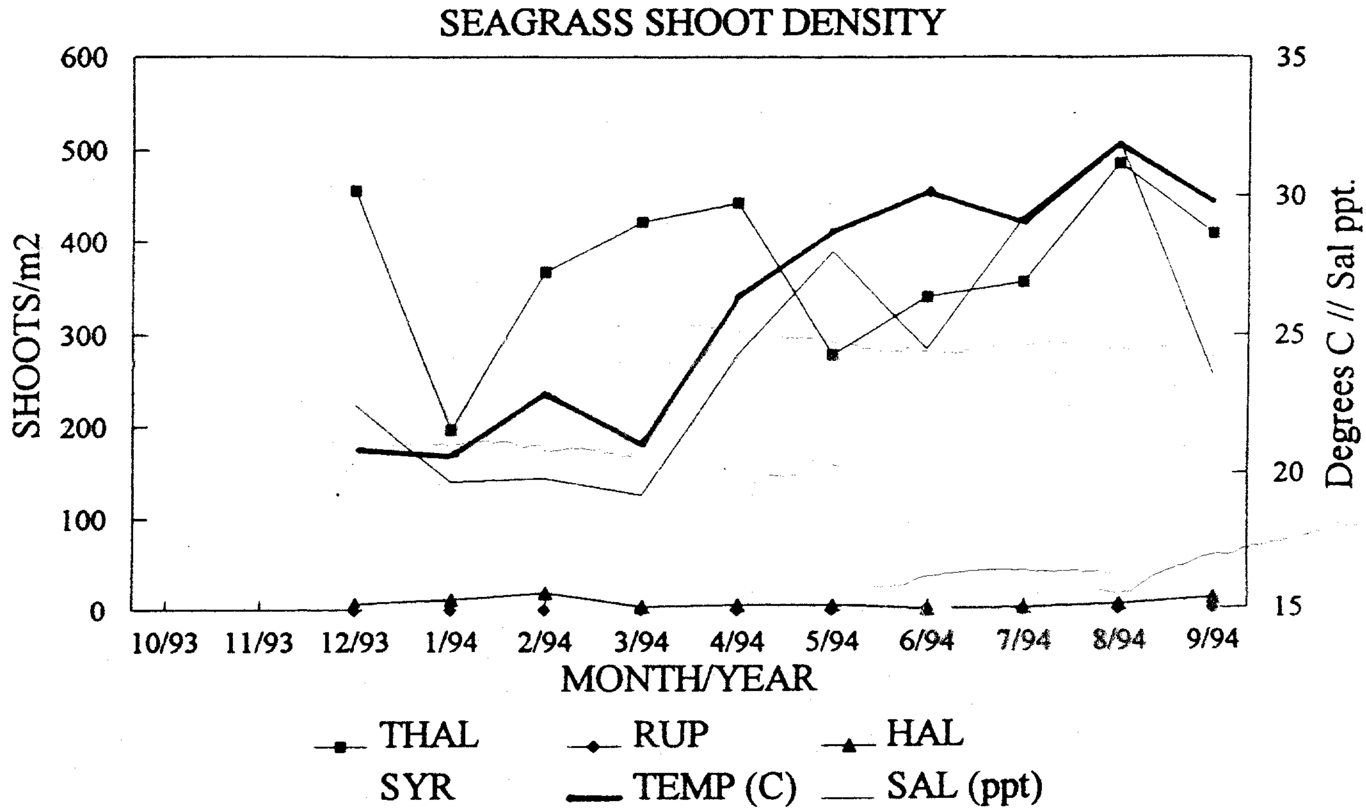


FIGURE 23

LITTLE MADEIRA BAY STATION

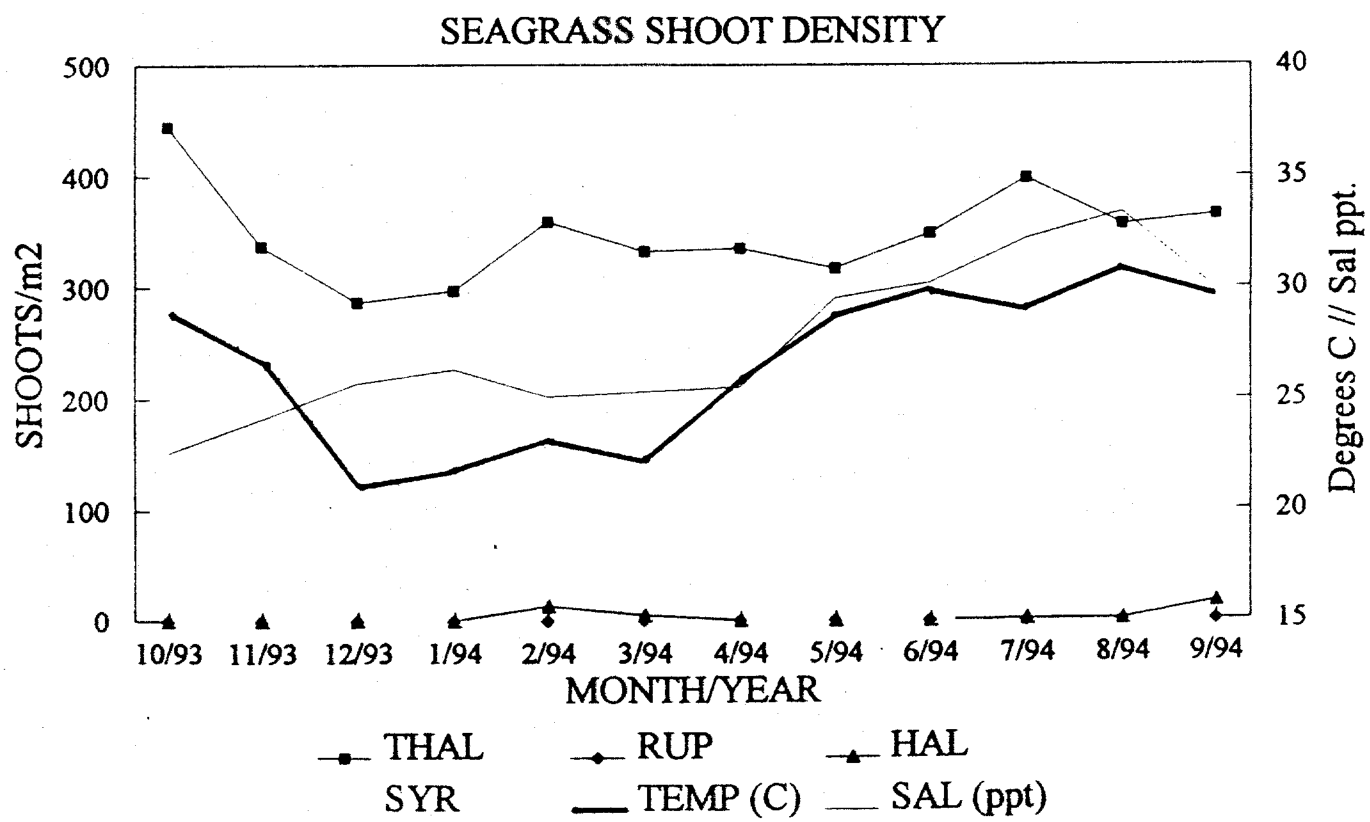


FIGURE 24