SEVENTH ANNUAL REPORT OF THE CONTINUING SURFACE WATER QUALITY MONITORING PROGRAM FOR THE PALMER RANCH JANUARY - DECEMBER, 1991 SARASOTA COUNTY, FLORIDA

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SEVENTH ANNUAL REPORT OF THE CONTINUING SURFACE WATER QUALITY MONITORING PROGRAM THE PALMER RANCH SARASOTA COUNTY, FLORIDA

1.0 INTRODUCTION

A master development plan for the Palmer Ranch Development of Regional Impact (DRI) is being implemented pursuant to the terms and conditions of the Master Development Order (MDO) which was adopted on December 24, 1984, by the Board of County Commissioners of Sarasota County. The MDO calls for planning and developing the 5,119-acre Palmer Ranch DRI in incremental developments. Construction of the first incremental development (Prestancia) was initiated in 1986. The Palmer Ranch is located in west-central Sarasota County as shown in Figure 1.1.

Pursuant to the conditions of the MDO, a "Continuing Surface Water Quality Monitoring Program" is required to be performed prior to and during construction, except during the period in which a "Pollutant Loading Monitoring Program" was to be performed as specified in the Agreement of Understanding between Sarasota County and Palmer Venture established during August 1987. The Stormwater Pollutant Loading Monitoring Program was performed between June 1988 and December 1989.

Annual reports of the surface water quality monitoring program are required to be provided to the Sarasota County Planning Department, the Southwest Florida Regional Planning Council, the Florida Bureau of Land and Water Management (now Depatrtment

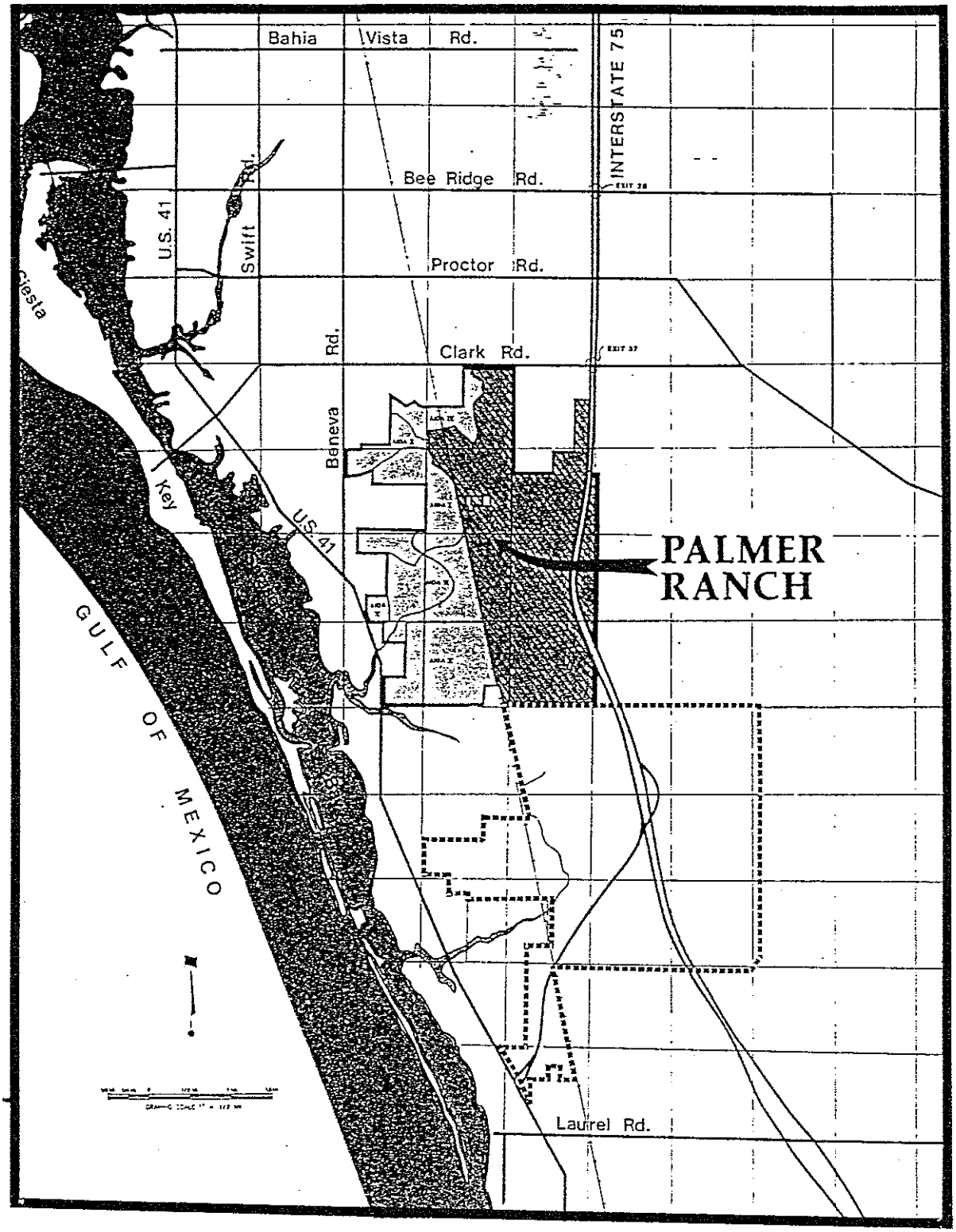


FIGURE 1.1 GENERAL SITE LOCATION.

of Community Affairs), and all affected permitting agencies pursuant to the requirements of Chapter 380.06(14) and (16), Florida Statutes, Chapter 9B-16.25, Florida Administrative Code, and procedures established by the Southwest Florida Regional Planning Council.

The primary purpose of the required "Continuing Surface Water Quality Monitoring Program" is to provide a continual assessment of the surface water quality conditions prior to and during the construction activities on the North Tract of the Palmer Ranch.

The monitoring program which was initiated in May 1984 by GeoScience, Inc. employed a bimonthly sampling frequency as required for the first year of monitoring. Subsequently, the scope of the monitoring program for the following two-year period was revised during an agency review meeting in June 1985. The meeting involved the developer's representative, Mr. T. W. Goodell, and Mr. Russ Klier of Sarasota County Pollution Control Division (personal communication with Mr. T. W. Goodell). The revised workscope entailed a 13 station network with a quarterly sampling frequency for the parameters monitored during the first year, except trace elements and organochlorine pesticides which would receive annual audits (refer to July 24, 1986 correspondence of Mr. T. W. Goodell to Mr. Russ Klier).

Palmer Venture contracted Conservation Consultants, Inc. (CCI) to implement the "Continuing Surface Water Quality Monitoring Program" during the second year of the monitoring program. CCI began monitoring on September 16, 1985, pursuant to the instructions provided by Palmer Venture. Except for an annual sampling event conducted in September 1988, the "Continuing Surface Water Quality Monitoring Program" was suspended in June 1988, due to the initiation of the "Pollutant Loading Monitoring

Program". Subsequent to an agreement between the Sarasota County Pollution Control Division and Palmer Venture, the "Continuing Surface Water Quality Monitoring Program" was resumed in December 1989 with a single annual sampling event conducted during the fifth monitoring year. Since the resumption of monitoring in December 1989, the surface water quality monitoring has been performed on a quarterly basis as required.

The water quality conditions observed during the period from January through December 1991 are reported herein. This report includes a discussion of the results with respect to applicable water quality criteria, observed spatial and temporal trends, and comparisons with results obtained during previous monitoring events. Beginning with the first sampling event during the 1992 monitoring year (*i.e.* March 1992) the monitoring program shall be revised pursuant to the "Amended and Restated Master Development Order for the Palmer Ranch Development of Regional Impact" approved by Sarasota County (*i.e.* Resolution No. 91-170).

2.0 GENERAL ENVIRONMENTAL SETTING

2.1 Climate

Prevailing climatic conditions in west-central Florida are sub-tropical, characterized by abundant rainfall and moderate temperatures. Average monthly temperatures derived from two separate 30-year periods of record are provided in Table 2.1 below :

TABLE 2.1 AVERAGE MONTHLY AIR TEMPERATURES (NATIONAL WEATHER SERVICE, TAMPA, FL.).

MONTH	AIR TEMPERATURE 1941-1970[a] °C	°F	1931-1960[b] °C	°F
January	16.4	61.6	16.9	62.4
February	17.2	62.9	17.7	63.8
March	19.4	66.9	19.4	67.0
April	22.3	72.1	22.1	71.8
May	24.8	76.7	24.9	76.8
June	26.8	80.3	26.9	80.4
July	27.6	81.6	27.6	81.6
August	27.7	81.9	27.8	82.0
September	26.9	80.5	27.0	80.6
October	23.9	75.0	23.9	75.1
November	19.8	67.7	19.9	67.9
December	17.1	62.8	17.4	63.4
Annual Average	22.5	72.5	22.6	72.7

[a]Thompson, 1976
[b]Bradley, 1974

Based on a 30-year period of record, rainfall in Bradenton, Florida (NOAA, 1977) averages 56 inches per year. The minimum annual rainfall recorded during the 30-year period was 29 inches while the maximum was 93 inches. Historical rainfall trends for this area show that a wet season occurs during the period of June through September

followed by a dry season during the period of October through January. On the average 62 percent (35 inches) of the annual rainfall occurs during the summer with only 13 percent (7 inches) during the fall. The dry season is followed by a short wet period during February and March and subsequently a short dry period during April and May.

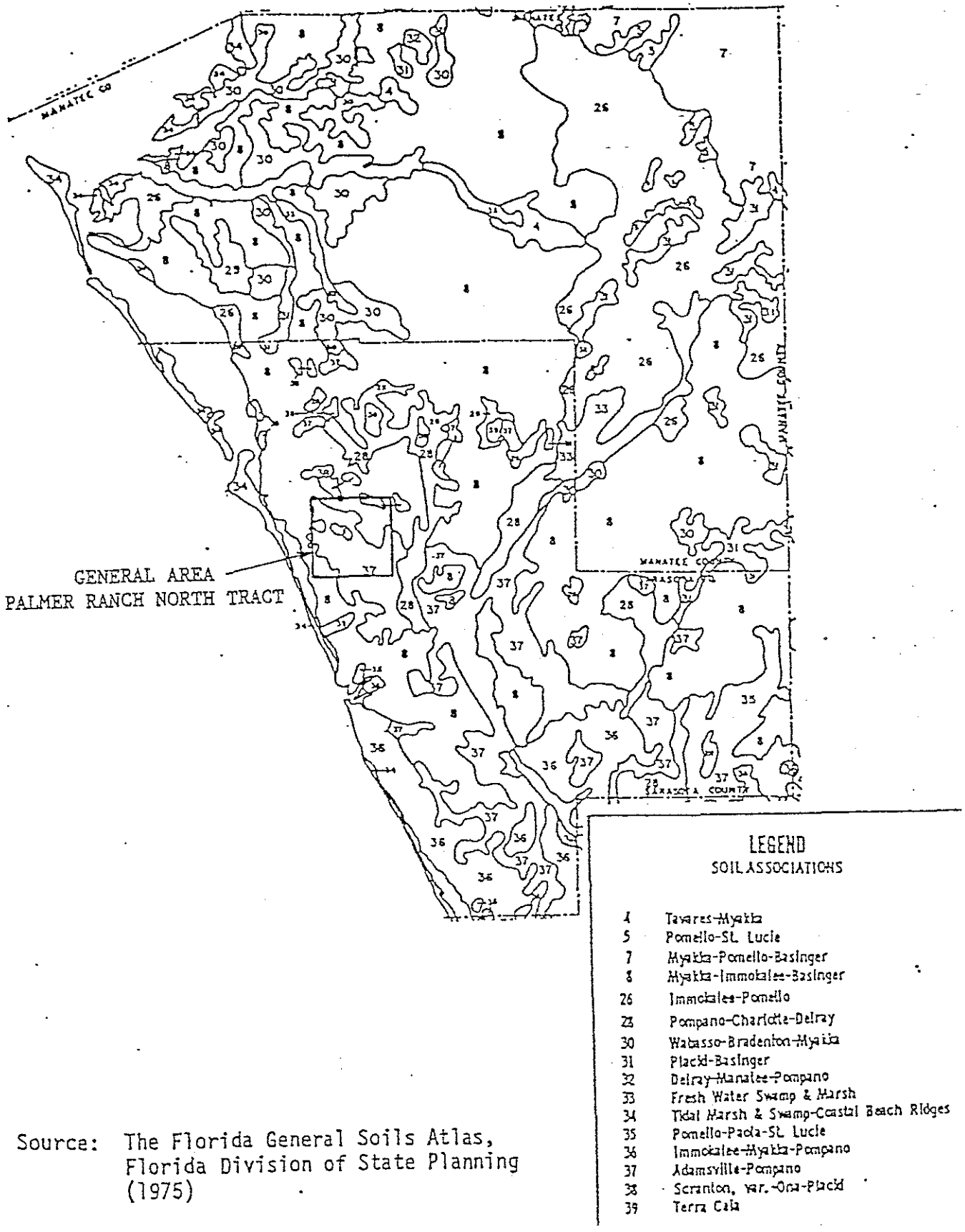
2.2 Soils

Soils in the area of the Palmer Ranch are generally sandy except in areas of low relief and poor drainage where peaty mucks are common (Florida Division of State Planning, 1975). Upland soils found throughout the Palmer Ranch are predominately of the Myakka-Immokalee-Basinger Association. This soil association is defined as being nearly level with poorly drained sandy soils (Florida Division of State Planning, 1975).

Along the well-incised banks of several drainage ditches traversing the Palmer Ranch (e.g. lower reach of Catfish Creek), it is evident that a natural marine deposit exists a few feet below the ground surface. This marine deposit contains a thin layer of shells and shell fragments. Figure 2.1 and Table 2.2 provide the locations and descriptions of the soil associations that occur in the area of the Palmer Ranch.

2.3 Land Use and Vegetation

Historically, the primary land use within the Palmer Ranch has been cattle ranching. However, recent changes in land uses on the Palmer Ranch have included the following: construction of a surface water management system; construction of roads, golf courses, homes, and wastewater treatment facilities and associated domestic wastewater spray effluent fields; and, land disposal of sludge. During the second monitoring year (April 1985 - March 1986), the land application of sludge wastes on the Palmer Ranch was



Source: The Florida General Soils Atlas, Florida Division of State Planning (1975)

FIGURE 2.1

SOIL ASSOCIATIONS IN REGION

TABLE 2.2 DESCRIPTIONS OF SOIL ASSOCIATIONS.

Area Definition	Map Unit No.	Soil Association Description
Areas dominated by moderately well to poorly drained soils not subject to flooding	4	Tavares-Myakka association: Nearly level to gently sloping, moderately well-drained soils sandy throughout and poorly drained sandy soils with weakly cemented sub-soils.
	5	Pomello-St. Lucie association: Nearly level to sloping, moderately well drained, sandy soils with weakly cemented sandy subsoil and excessively drained soils sandy throughout.
	7	Myakka-Pomello-Basinger association: Nearly level, poorly and moderately well drained, sandy soils with weakly cemented sandy subsoil and poorly drained sandy soils throughout.
	8	Myakka-Immokalee-Basinger association: Nearly level, poorly drained, sandy soils with weakly cemented sandy subsoil and poorly drained sandy soils throughout.
	26	Imokalee-Pomello association: Nearly level to gently sloping, poorly and moderately well drained, sandy soils with weakly cemented sandy subsoil.
	30	Wabasso-Bradenton-Myakka association: Nearly level, poorly drained, sandy soils with a weakly cemented sandy subsoil layer underlain by loamy subsoil; poorly drained soils with thin, sandy layers over loamy subsoil and poorly drained soils with weakly cemented sand subsoil.

TABLE 2.2 DESCRIPTIONS OF SOIL ASSOCIATIONS (Continued).

Area Definition	Map Unit No.	Soil Association Description
Areas dominated by moderately well to poorly drained soils not subject to flooding (continued)	35	Pomello-Paola-St. Lucie association: Nearly level to sloping, moderately well drained sandy soils with weakly cemented sandy subsoil and excessively drained soils, sandy throughout.
	36	Imokalee-Myakka-Pompano association: Nearly level, poorly drained, sandy soils with weakly cemented sandy subsoil and poorly drained soils, sandy throughout.
	37	Adamsville-Pompano association: Nearly level, somewhat poorly and poorly drained, soils, sandy throughout.
	38	Scranton, var.-Ona-Placid association: Nearly level, somewhat poorly drained, dark surface soils, sandy throughout; poorly drained soils with thin, sandy layers over weakly cemented sandy subsoil and very poorly drained soils, sandy throughout.
Areas dominated by poorly and very poorly drained soils subject to flooding.	28	Pompano-Charlotte-Delray association: Nearly level, poorly drained soils, sandy throughout, and very poorly drained soils with thick sandy layers over loamy sub-soil.
	31	Placid-Bassinger association: Nearly level, very poorly and poorly drained soils, sandy throughout.

TABLE 2.2 DESCRIPTIONS OF SOIL ASSOCIATIONS (Continued).

Area Definition	Map Unit No.	Soil Association Description
Areas dominated by poorly and very poorly drained soils subject to flooding (continued)	32	Delray-Manatee-Pompano association: Nearly level, very poorly drained soils with thick, sandy layers over loamy subsoil; very poorly drained sandy soils, with loamy subsoil and poorly drained soils, sandy throughout.
	33	Fresh Water Swamp and Marsh association: Nearly level, very poorly drained soils subject to prolonged flooding.
	34	Tidal Marsh and Swamp-Coastal Beach Ridges/Dune association: Nearly level, very poorly drained soils subject to frequent tidal flooding, high-lying coastal dune-like ridges and deep, draughty sands.
	39	Terra Ceia association: Nearly level, very poorly drained, well-decomposed, organic soils 40-91 cm (16-36 inches) thick over loamy material.

discontinued and construction of the Central County Utilities Regional Treatment Plant and an adjacent golf course was completed. Subsequently, construction of a residential development was initiated during the third monitoring year.

Land uses adjacent to the ranch which are located upstream in several drainage basins covering portions of the ranch include golf courses, roads and highways, residential developments, a mobile home park, commercial businesses, a dairy farm which was changed to a sod farm (effective August 1, 1987), light industry, and a metal salvage operation.

The primary vegetation associations found on the undeveloped areas of the ranch include pine flatwoods, improved and semi-improved pastures, wet prairies, marshes and sloughs, swamps, and wetland fringing hammocks.

2.4 Drainage

The Palmer Ranch DRI is divided into six primary drainage basins which ultimately discharge into Drymond Bay. Two basins, the Catfish Creek\Trunk Ditch Basin and the South Creek Basin, drain the majority of the North Tract. As shown in Figure 2.2, approximately 2,590 acres of the Catfish Creek-Trunk Ditch Basin which has a total drainage area of 3,700 acres and approximately 1,770 acres of the South Creek Basin which has a total drainage area of approximately 12,000 acres are located on the North Tract. Four minor basins also drain portions of the property. These include Metheny Creek Basin (40 acres), Elligraw Bayou Basin (180 acres), North Creek Basin (460 acres), and Clower Creek Basin (80 acres). A general description of the major streams in these basins is provided in the following sections.

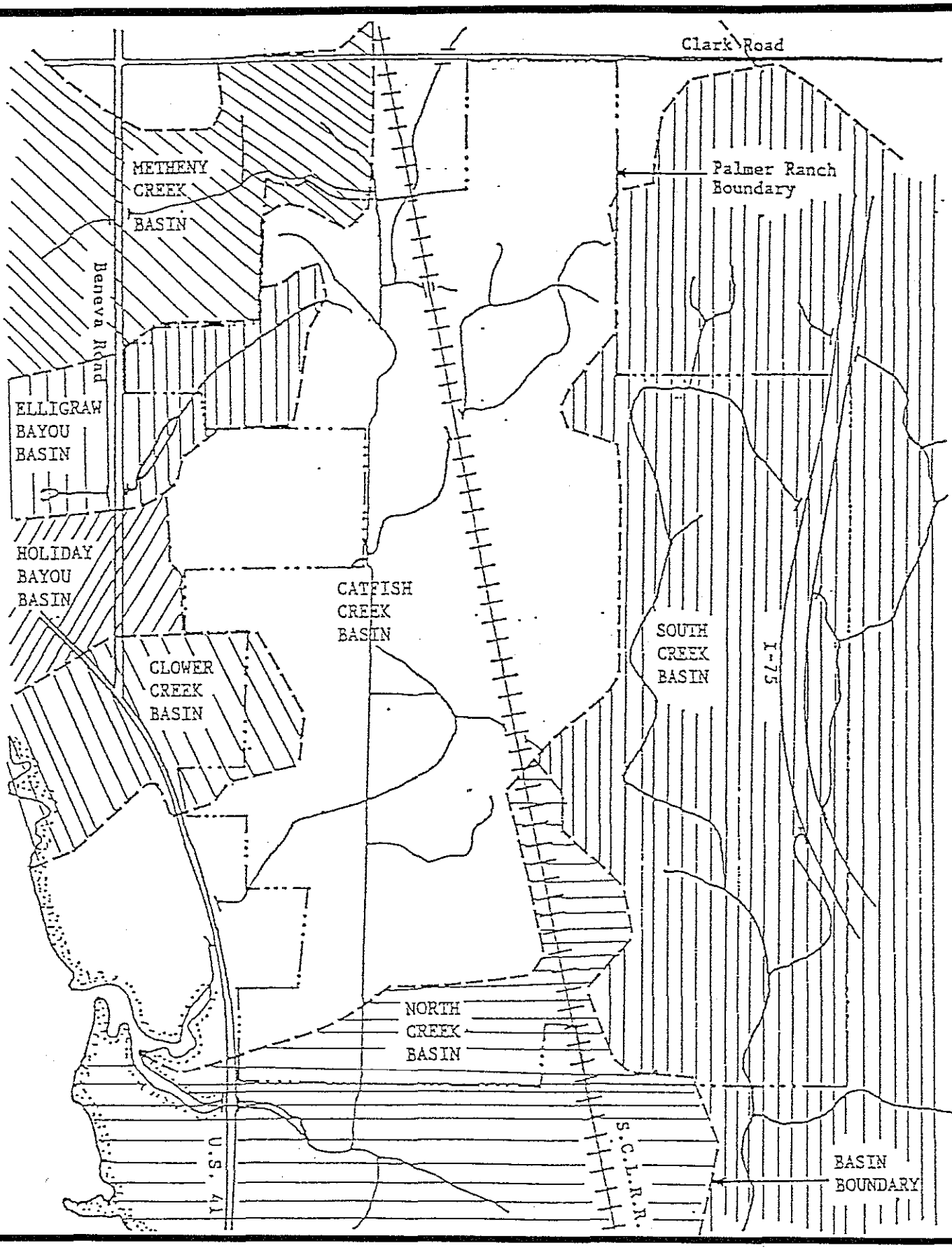


FIGURE 2.2

PALMER RANCH DRAINAGE BASINS

2.4.1 *Catfish Creek*

Catfish Creek within the limits of the Palmer Ranch DRI was a man-made ditch/channel system which flowed southwest to the southern boundary of the property, intersecting Trunk Ditch, a straight man-made canal, at five locations. The upper reach of Catfish Creek receives off-site drainage from commercial and industrial areas near Clark Road. Many of these commercial and industrial areas lack stormwater management systems.

At the initiation of development on the Palmer Ranch, the Catfish Creek drainage system received drainage from a domestic wastewater effluent disposal spray field of Palmer Utilities. Subsequently, a golf course irrigation system using treated effluent was initiated by the Central County Regional Utilities (CCU) Wastewater Treatment Plant. As Increments have been developed, drainage from various stormwater management systems enter the Catfish Creek Basin. The remainder of drainage into Catfish Creek originates in wetlands, pine flatwoods and improved pasture. At the end of the third monitoring year, *i.e.*, February 1987, an upper segment of Catfish Creek underwent realignment. Mid-way through the fourth monitoring year, in September 1987, Sarasota County cleared the segment of Catfish Creek downstream of its last confluence with Trunk Ditch of vegetation and snags to facilitate drainage.

Downstream of the Palmer Ranch, the Catfish Creek drainage system receives drainage from residential areas and runoff from U.S. Highway 41. Further downstream, Catfish Creek is subject to the tidal influences of Drymond Bay.

2.4.2 *Trunk Ditch*

Trunk Ditch is a straight canal that was originally constructed to improve drainage. Trunk Ditch originates near the northern end of the property and flows south where it becomes contiguous with a dredged tributary to North Creek. As previously mentioned, Trunk Ditch intersects Catfish Creek at five locations. During early 1986, a segment of Trunk Ditch was realigned in association with the Development of Prestancia. In the realigned segment, Trunk Ditch exhibits an improved channel and two weirs which result in lentic conditions during the dry season. Upstream and downstream, however, Trunk Ditch exhibits steep banks showing evidence of erosion. Vegetation in Trunk Ditch is dominated by Hydrilla, Elodea, cattail, and other aquatic weeds. During September 1987, Sarasota County cleared its channel of vegetation and snags downstream of the southern boundary of Prestancia.

Runoff entering the upper reaches of Trunk Ditch originates along Clark Road, including the adjacent commercial and industrial areas. Downstream, runoff enters Trunk Ditch from Prestancia's golf course and residential development, the Country Club of Sarasota and associated residential area, as well as pine flatwoods, improved pastures, and wetlands of the Palmer Ranch.

In addition to two weirs in the realigned segment of Trunk Ditch, a drainage basin divide between Catfish Creek and North Creek was created with the construction of Central Sarasota Parkway.

2.4.3 North Creek

North Creek is connected to Trunk Ditch by a dredged tributary located near the southern boundary of the North Tract. The banks of this tributary are vegetated with grasses and trees resulting in a partially overhanging canopy. Most of the drainage into this dredged tributary originates from improved pasture, idle agricultural land, a marsh/slough system, and an off-site metal salvage operation. Downstream of the North Tract, Trunk Ditch enters the main channel of North Creek, which subsequently flows into Drymond Bay. Residential areas, U. S. Highway 41, and pine flatwoods drain into the downstream reach of North Creek.

2.4.4 South Creek

South Creek within the Palmer Ranch is largely a shallow ditch system which interconnects many low-lying areas. The banks of South Creek are vegetated with grasses and occasional pines, while its channel is generally void of aquatic vegetation. Upstream of the Palmer Ranch, South Creek receives drainage in its western tributary from a golf course and a mobile home park. Also, it receives drainage in its eastern tributary from I-75 and a dairy which was gradually converted into a sod farm during the third and fourth monitoring years. This land use change was completed August 1, 1987.

Within the Palmer Ranch, the South Creek basin is undeveloped and primarily receives drainage from improved pastures, pine flatwoods, and to a lesser extent from a portion of the CCU spray field. Downstream of the ranch, South Creek flows through the Oscar Scherer State Recreational Area and subsequently into the tidal waters of Drymond Bay.

2.4.5 *Elligraw Bayou*

Elligraw Bayou is a channelized stream that flows southwesterly to Drymond Bay. The banks of Elligraw Bayou are sloped and vegetated with grasses and trees. On the ranch, Elligraw Bayou receives drainage from Increment II development areas and Prestancia (Increment I). Downstream of the Palmer Ranch, Elligraw Bayou flows through Ballantrae and several other residential areas before entering Drymond Bay.

2.4.6 *Metheny Creek*

Metheny Creek is a channelized stream that originates in the marshes and sloughs northwest of the Palmer Ranch. It flows southwest and eventually discharges into Drymond Bay. The banks of Metheny Creek are steep and vegetated with grasses and some trees. Drainage enters Metheny Creek from residential developments, commercial and industrial areas, and golf courses.

2.4.7 *Clower Creek*

Clower Creek forms the south border of the 70-acre Sarasota Square Mall. A 1.6 acre wet prairie located east of the mall on the Palmer Ranch most likely represents the headwaters of Clower Creek during the wet season. Drainage conveyed by Clower Creek flows westerly for 1,350 feet, and subsequently, through an underground pipeline along the north and west borders of a trailer park adjacent to the Sarasota Square Mall. After flowing underground for about 650 feet, drainage enters the mall's stormwater management system. Subsequently, discharge from the mall's stormwater management system drains through swales into culverts and underneath U.S. 41 to Drymond Bay.

2.5 Water Quality Classification

The segments of the streams traversing the North Tract of the Palmer Ranch are non-tidal freshwater systems which have been designated by the State as Class III waters pursuant to Sub-section 17-302.400(1) of the Florida Administrative Code (FAC). Downstream, these streams flow into an estuarine system (Drymond) which is classified as an Outstanding Florida Water (OFW). In addition, the segment of South Creek which flows through the Oscar Scherer State Recreational Area is classified as an OFW. State and Sarasota County water quality standards applicable to the "Continuing Water Quality Monitoring Program" (*i.e.*, those applicable to Class III, predominantly fresh surface waters) are listed in Table 2.3.

TABLE 2.3 APPLICABLE STATE AND COUNTY WATER QUALITY CRITERIA FOR CLASS III, PREDOMINATELY FRESH WATERS.

Parameter	State of Florida FAC 17-302	Sarasota County Ord. No. 72-37
Arsenic	Not > 0.05 mg/l	Not > 0.01 mg/l
BOD-5	Not to be increased in a manner that would depress Dissolved Oxygen levels below criteria.	Same as FAC 17-3
Cadmium	Not >0.0008 mg/l in predominantly fresh waters with a hardness of less than 150 mg/l of $CaCO_3$. Not to exceed 0.0012 mg/l in harder waters.	Not >0.01 mg/l
Chromium	Not > 0.05 mg/l in predominantly fresh waters	Not > 0.02 mg/l
Coliform, Fecal	Not > 800/100 ml	----
Coliform, Total	Not > 2,400/100 ml	Not > 2,400/100 ml
Conductivity	Shall not be increased more than 50% above background or to 1275 umhos/cm, whichever is greater, in predominantly fresh waters.	+100% above background, or to max. of 500 umhos/cm in fresh water streams.
Copper	Not > 0.03 mg/l	Not > 0.01 mg/l
Dissolved Oxygen	Not < 5 mg/l	Not < 4 mg/l
Lead	Not > 0.03 mg/l	Not > 0.01 mg/l
Mercury	Not > 0.0002 mg/l	Not > 0.01 mg/l
Nickel	Not > 0.1 mg/l	Not > 0.1 mg/l

TABLE 2.3 APPLICABLE STATE AND COUNTY WATER QUALITY CRITERIA FOR CLASS III, PREDOMINATELY FRESH WATERS (Continued).

Parameter	State of Florida FAC 17-302	Sarasota County Ord. No. 72-37
Nutrients	Concentrations in a body of Water shall not be altered in such a manner as to cause an imbalance in natural populations of aquatic flora or fauna.	-----
Nitrogen, Ammonia (ionic plus non-ionic)	See Nutrients	Only applies to non-ionic Ammonia
Nitrogen, Nitrite	See Nutrients	-----
Nitrogen, Nitrate	See Nutrients	-----
Nitrogen, Total	See Nutrients	-----
Nitrogen, Organic	See Nutrients	-----
Oil and Greases	Not > 5 mg/l	Not > 15 mg/l
Phosphate, Ortho	See Nutrients	-----
Phosphate, Total	See Nutrients	-----
pH	6 - 8.5	6 - 8.5
Solids, Total Suspended	-----	-----
Turbidity	Not > 29 NTU above background	Not > 25 JTU above background
Zinc, as Zn	Not > 0.03 mg/l	Not > 0.01 mg/l

TABLE 2.3 APPLICABLE STATE AND COUNTY WATER QUALITY CRITERIA FOR CLASS III, PREDOMINATELY FRESH WATERS (Continued).

Parameter	State of Florida FAC 17-302	Sarasota County Ord. No. 72-37
Aldrin plus Dieldrin	Not > 0.003 ug/l	-----
alpha - BHC	-----	-----
beta - BHC	-----	-----
delta - BHC	-----	-----
gamma - BHC (Lindane)	Not > 0.01 ug/l	-----
Chlordane	Not > 0.01 ug/l	-----
4,4' DDD	-----	-----
4,4'-DDE	-----	-----
4,4'-DDT	Not > 0.001 ug/l	-----
Endosulfan	Not > 0.003 ug/l	-----
Endrin	Not > 0.004 ug/l	-----
Heptachlor	Not > 0.001 ug/l	-----
Toxaphene	Not > 0.005 ug/l	-----
Polychlorinated Biphenyls	Not > 0.001 ug/l	-----

3.0 FIELD AND LABORATORY PROCEDURES

3.1 Station Locations and General Descriptions

The "Continuing Surface Water Quality Monitoring Program" employs a network of 13 sampling stations located at various sites along South Creek, Catfish Creek, Elligraw Bayou, and Trunk Ditch (Figure 3.1). A general description of the characteristics of the 13 sampling stations is provided in Table 3.1.

South Creek was monitored at five locations. These included two points of inflow (SC-3 and SC-7) as well as one point of outflow (SC-2) from the Palmer Ranch Property. One point of inflow, Station SC-7, is located downstream of the aforementioned dairy/sod farm and I-75. The other point of inflow, Station SC-3, is located downstream of a mobile home park and golf course. South Creek was also monitored in the interior of the North Tract at Stations SC-4 and SC-1, and downstream of the North Tract at Station SC-8.

In Catfish Creek, inflow into the Palmer Ranch was monitored at Station CC-1 while outflow was monitored at Station CC-5. Station CC-1 receives drainage from Clark Road, McIntosh Road, and various commercial/industrial developments. Two tributaries of Catfish Creek were also monitored near their confluences with Trunk Ditch (Stations CC-2 and CC-3). These two stations represent stream segments which receive drainage from Prestancia and backwater effects of Trunk Ditch.

Trunk Ditch was monitored within its realigned segment within the Catfish Creek-Trunk Ditch Drainage Basin at Station CC-4. This site lies adjacent to and receives drainage from both the Country Club of Sarasota and Prestancia and sources farther upstream, as well as pine flatwoods, improved pastures, and wetlands of the Palmer Ranch. Farther

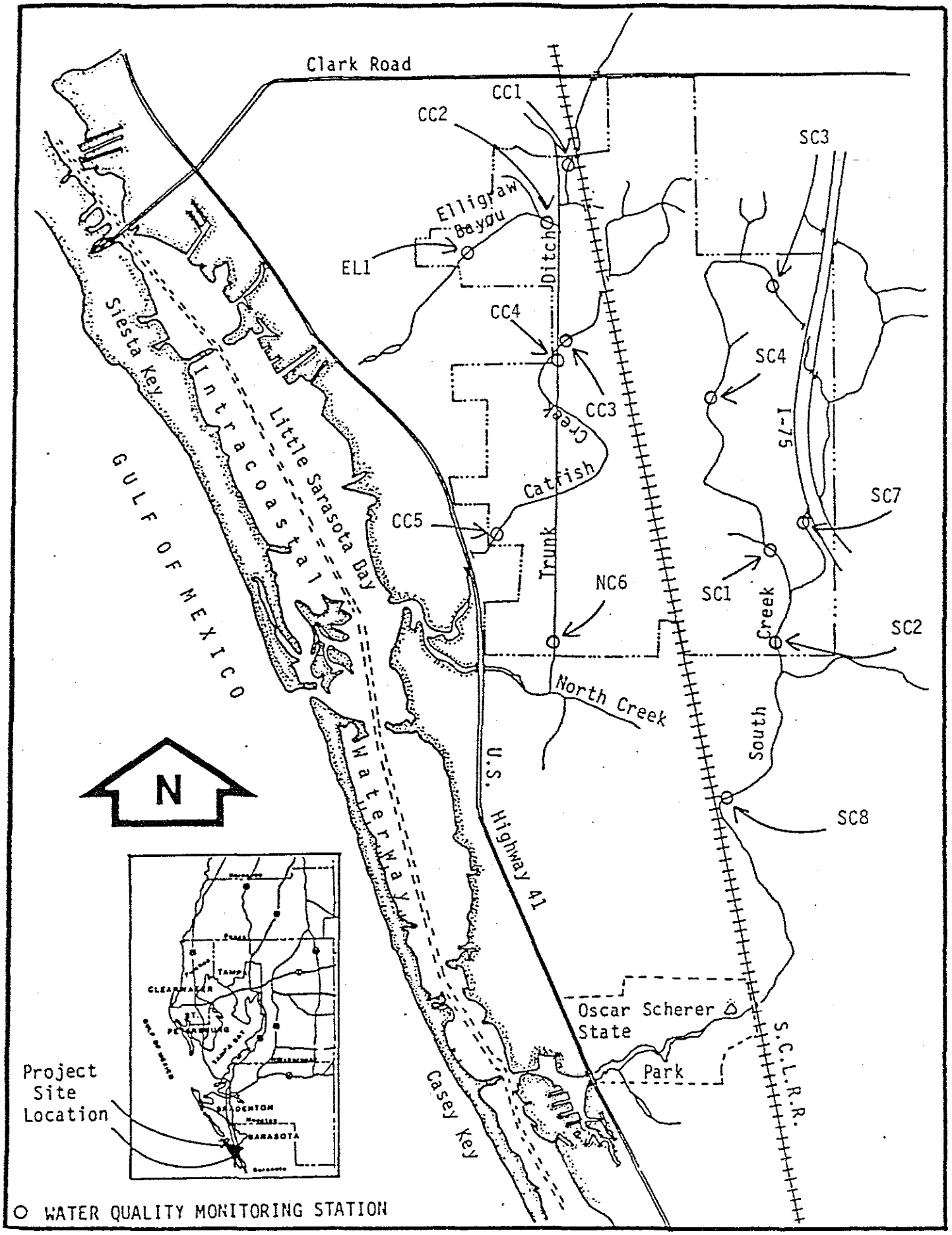


FIGURE 3.1 LOCATION OF SURFACE WATER MONITORING STATIONS.

TABLE 3.1 GENERAL DESCRIPTIVE CHARACTERISTICS OF SURFACE WATER QUALITY SAMPLING STATIONS.

Station	General Location	Water Depth (ft)[a]	Channel Width (ft)	Habitat
CC-1	Catfish Creek Site Entry	1.0-1.6	10	75-100% Canopy of Salix, Rooted Emergents, Incised Banks.
CC-2	Catfish Creek Upstream of Trunk Ditch	0.0-0.45	12	Aquatic Vegetation, Shallow Sloped Banks.
CC-3	Catfish Creek Upstream of Trunk Ditch	0.3-0.6	6	Aquatic Vegetation, Incised Banks.
CC-4[b]	Trunk Ditch Downstream of Catfish Creek Confluence	0.6-2.2	50	Sodded Banks, Rooted Emergents.
CC-5	Catfish Creek Outfall from Site	0.3-0.8	50	Shading in by Oaks, Willows, and Wax Myrtle, Sodded Banks.
NC-6	Trunk Ditch Downstream of Catfish Creek	1.7-2.7	12	Aquatic Vegetation.
El-1	Elligraw Bayou near Site Exit	0.4-0.6	6	Aquatic Vegetation.
SC-1	South Creek Mid-property	0.6-0.7	12	Sand covered with Organic Matter.
SC-2	South Creek at Site Exit	0.5-1.2	17	Rooted Emergents, Floating Aquatics, Palm Trees Shade Channel in A.M.
SC-3	South Creek Outfall from Large Wetland	0.0-0.7	10	Shallow banks, Aquatic Vegetation.
SC-4	South Creek near Honore Avenue	0.7-1.2	8	Rooted Emergents Cover 33% of Channel, Canopy of Pine.
SC-7	South Creek near I-75 Downstream of Old Dairy	0.4-0.6	9	50% Cover of Rooted Emergents, 75% Upstream Coverage by Floating Aquatics, Willow and Pepper Trees Line Banks.
SC-8	South Creek Upstream of Oscar-Scherer Recreational Area	0.8-1.7	10	Aquatic Vegetation, Incised Banks.

[a]Range in Depth recorded during monitoring period of April, 1987 - March, 1988.

[b]Depths reported are depths at sampling location - total depth at site averages 8.0 feet.

to the South, Trunk Ditch was monitored at a location within the North Creek Basin, *i.e.*, Station NC-6.

Elligraw Bayou was monitored near its point of outflow from the North Tract at Station EL-1A. Elligraw Bayou receives drainage primarily from marshes, sloughs, and open areas on the Palmer Ranch and from the Prestancia Development.

3.2 Parameters and Sampling Frequency

Quarterly sampling was performed during March, June, September, and December 1991. In addition, samples were collected for analysis of the annual parameters during the September 1991 monitoring event. During the monitoring event performed in December 1991, five (5) stations (*i.e.* CC-2, SC-1, SC-2, SC-3 and SC-7) exhibited dry conditions, therefore, no *in situ* measurements or water samples were collected at these stations for this event. In addition, Station SC-8 was not accessible during the December monitoring event and was not sampled. All other attempts to collect samples during the 1991 monitoring year were successful. The dates and times of all sample collections are provided in Table 3.2.

Surface water quality monitoring during the period from January through December 1991 was performed by: (1) the use of field instrumentation and *in situ* measurements; and (2) the collection of grab samples for subsequent laboratory analyses. A digital readout Hydrolab multi-parameter water quality meter was used for *in situ* measurements of dissolved oxygen, pH, specific conductance, and water temperature. Prior to deployment in the field, the Hydrolab was calibrated according to the manufacturer's recommended procedures. All *in situ* measurements were taken at approximate mid-depth at each

TABLE 3.2 DATE AND TIME OF SAMPLING FOR THE SEVENTH ANNUAL MONITORING PERIOD OF JANUARY THROUGH DECEMBER, 1991.

Quarter No.	Date of Sampling	EL-1A	CC-1	CC-2	CC-3	CC-4	CC-5	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8
1	03/11/91	1030	1325	1105	1125	1135	1200	1220						
	03/12/91								1110	1130	1010	1030	1050	1200
2	06/17/91	1130	1200	1150	1100	1110	1030	1015						
	06/18/91								1100	1035	1200	1135	1020	0935
3	09/09/91	1040	0935	1000	1215	1200	1110	1140						
	09/10/91								1210	1150	1300	1235	1130	1045
4	12/09/91	1215	1245	1225	1135	1155	1040	1115	1410	1420	1330	1350	1450	1435

station. Grab samples were collected at each station during the four quarterly events, preserved, and analyzed in the laboratory within the recommended hold times for the following parameters:

- Ammonia Nitrogen
- Nitrate Nitrogen
- Nitrite Nitrogen
- Organic Nitrogen
- Total Nitrogen
- Total Reactive Phosphate
- Total Phosphorus
- Oil and Grease
- Total Suspended Solids
- Turbidity
- Biochemical Oxygen Demand
- Fecal Coliform Bacteria
- Total Coliform Bacteria

Additional surface water grab samples were collected at each of the 13 monitoring stations during the September 1991 monitoring event for the laboratory analysis of the following parameters:

- Arsenic
- Chromium
- Mercury
- Lead
- EPA 608 Pesticides and PCBs
- Cadmium
- Copper
- Nickel
- Zinc

All sampling was performed in accordance with CCI's Comprehensive Quality Assurance Plan on file with the Florida Department of Environmental Regulation. All laboratory analyses were performed in accordance with the procedures described in the sixteenth edition of *Standard Methods for the Examination of Water and Wastewater* (APHA, 1985), *Methods for Chemical Analysis of Water and Wastes* (USEPA, 1983) or other FDER/USEPA approved methodology. The method used in the collection, preservation, handling, storage, and analysis of all surface water samples are provided by parameter in Table 3.3.

TABLE 3.3 COLLECTION AND ANALYTICAL METHODS USED DURING THE CONTINUING SURFACE WATER QUALITY MONITORING PROGRAM.

Parameter	Sample Type	Field Handling	Hold Time	Laboratory Handling	Analytical Method	Method Reference
Total Arsenic	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion, Atomic Absorption - Furnace Technique	EPA 206.2
Fecal Coliform Bacteria	Grab	Stored on Ice	30 Hours	Immediate Analysis	Multiple Tube Fermentation	APHA 908 C
Total Coliform Bacteria	Grab	Stored on Ice	30 Hours	Immediate Analysis	Multiple Tube Fermentation	APHA 908 A
Biochemical Oxygen Demand (BOD-5 Day)	Grab	Stored on Ice	48 Hours	Immediate Analysis	Membrane Electrode	APHA 507
Total Cadmium	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion/PDCA Extraction, Atomic Absorption	EPA 213.1
Total Chromium	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion/PDCA Extraction Atomic Absorption	EPA 218.1
Conductivity	In situ	---	---	---	Hydrolab - Wheatstone Bridge	APHA 205
Total Copper	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion, Atomic Absorption	EPA 220.1
Total Lead	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion/PDCA Extraction, Atomic Absorption	EPA 239.1
Total Mercury	Grab	HNO_3 to pH <2, Stored on Ice	28 Days	Stored at 4 °C Temperature	Digestion, Atomic Absorption Cold Vapor Method	EPA 245.1
Total Nickel	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion, Atomic Absorption	EPA 249.1
Ammonia Nitrogen	Grab	H_2SO_4 to pH <2, Stored on Ice	28 Days	Stored at 4 °C	Automated Phenate	EPA 350.1
Nitrate + Nitrite Nitrogen	Grab	H_2SO_4 to pH <2, Stored on Ice	28 Days	Stored at 4 °C	Automated Cadmium Reduction	EPA 353.2
Nitrite Nitrogen	Grab	Stored on Ice	48 Hours	Stored at 4 °C	Automated Autoanalyzer	EPA 353.2
Nitrate Nitrogen	Grab	---	---	---	Calculation	EPA 353.2

TABLE 3.3 COLLECTION AND ANALYTICAL METHODS USED DURING THE CONTINUING SURFACE WATER QUALITY MONITORING PROGRAM (Continued).

Parameter	Sample Type	Field Handling	Hold Time	Laboratory Handling	Analytical Method	Method Reference
Total Kjeldahl Nitrogen	Grab	H_2SO_4 to pH <2, Stored on Ice	28 Days	Stored at 4 °C	Automated Block Digestion, Autoanalyzer	EPA 351.2
Total Nitrogen	Grab	----	----	----	Calculation	EPA 351.2
Oil and Grease	Grab	H_2SO_4 to pH <2, Stored on Ice	28 Days	Stored at 4 °C	Gravimetric	EPA 413.1
Dissolved Oxygen	In situ	----	----	----	Hydrolab - Membrane Electrode	APHA 421 B
pH	In situ	----	----	----	Hydrolab - Electrometric	APHA 423
Total Reactive Phosphate	Grab	Stored on Ice	48 Hours	Immediate Analysis	Automated, Ascorbic Acid	EPA 365.1
Total Phosphorus	Grab	H_2SO_4 to pH <2, Stored on Ice	28 Days	Stored at 4 °C	Automated Block Digestion, Autoanalyzer	EPA 365.4
Total Suspended Solids (TSS)	Grab	Stored on Ice	7 Days	Stored at 4 °C	Glass Fiber Filtration, Dried at 105 °C	APHA 209B
Temperature	In situ	----	----	----	Hydrolab - Thermistor	APHA 212
Turbidity (NTU)	Grab	Stored on Ice	48 Hours	Stored at 4 °C	Nephelometric	APHA 214A
Total Zinc	Grab	HNO_3 to pH <2, Stored on Ice	6 Months	Stored at Room Temperature	Digestion, Atomic Absorption	EPA 289.1
Organochlorine Pesticides	Grab	Stored on Ice	7 Days	Stored at 4 °C	Gas Chromatograph	EPA 608
Flow/Direction	In situ	----	----	----	Marsh-McBirney Flow Meter - Electromagnetic Sensor	Manufacturer's Specifications

APHA - American Public Health Association, American Water Works Association and Water Pollution Control Federation, 1985. Standard Methods for the Examination of Water and Wastewater, 16th Edition. American Public Health Association.

EPA - U.S. Environmental Protection Agency, 1983. Methods for Chemical Analysis of Water and Wastes, EPA - 600/4-79-020, National Environmental Research Center, Cincinnati, Ohio.

Laboratory analyses, except for organochlorine pesticides, were performed by the CCI's laboratory which is certified by Florida Department of Health and Rehabilitative Services for the analyses of environmental and drinking water analyses. The analyses for organochlorine pesticides were performed by a state-certified subcontract laboratory. Copies of the laboratory reports are provided in Appendix B.

Two additional parameters, stream flow and stream depth, were monitored at each sampling point concurrently with water quality monitoring as an aid in evaluating the water quality data although not part of the "Continuing Surface Water Quality Monitoring Program." Water velocity was determined using a Marsh McBirney model 201D flow meter. Stream flows were subsequently determined in accordance with the USGS two-point (*i.e.* area\velocity) method (USGS, 1982). Stream depth was measured with a weighted fiberglass tape at each point of water quality sampling.

4.0 RESULTS AND DISCUSSION

During the seventh year of the "Continuing Surface Water Quality Monitoring Program" (*i.e.*, January through December 1991) quarterly surface water quality monitoring was conducted by CCI in compliance with the conditions of the Master Development Order for the North Tract of the Palmer Ranch. Monitoring events were performed on March 11-12, June 17-18, September 9-10, and December 9, 1991. Individual results for the four events performed during the 1991 monitoring year of the "Continuing Surface Water Quality Monitoring Program" are tabulated by parameter in Appendix A. In addition, the data acquired during the January through December 1991 monitoring year are summarized in Appendix A by parameter according to sampling location and sampling event. For each parameter statistics (*i.e.*, mean, range, standard deviation, and number of observations) are calculated across sampling events and sampling locations. Also, applicable water quality criteria are footnoted below each table.

Copies of the laboratory reports of analytical results for the samples collected during the 1991 monitoring year are provided in Appendix B. Comparison of the data with previous results and general conclusions are included with the discussion for each parameter or group of related parameters.

4.1 Rainfall and Hydrology

4.1.1 Rainfall

Less than the normal amount of rainfall occurred on the Palmer Ranch during the seventh year of monitoring for the "Continuing Surface Water Quality Monitoring Program". The rainfall amount recorded during 1991 is approximately 12 inches less than the average

annual rainfall of approximately 56 inches based on a 30-year period of record (NOAA, 1982). During the 1991 monitoring year, approximately 44 inches of precipitation were recorded in comparison to 38 to 52 inches recorded during previous monitoring years (CCI, 1988, 1988b, and 1991).

Figure 4.1 provides a comparison of the monthly distribution of rainfall measured on the Palmer Ranch during the 1991 monitoring year with the monthly distribution of historical rainfall for the 30-year period of record (NOAA, 1982). As observed during previous monitoring years, the distribution of rainfall in 1991 generally followed expected seasonal trends for this region of Florida. During the 1991 monitoring year, below-normal rainfall occurred during eight months, whereas above-normal rainfall occurred only during January, April, and May. The highest monthly rainfall during 1991 was recorded for May when 7.65 inches were recorded compared to the historical average for May of approximately 2.6 inches.

As provided in Table 4.1, the seasonal amounts of rainfall recorded on-site during the spring and summer quarters were 17.3 and 15.4 inches, respectively. During the winter and fall quarters, 8.7 and 2.6 inches were recorded, respectively. During the four-month period in which the wet season normally occurs (*i.e.* June through September) 21.2 inches (*i.e.* 48 % of the annual rainfall) was recorded on the Palmer Ranch, while only 6.3 inches (*i.e.* 14 % of the annual rainfall) was recorded during the four-month period in which the dry season normally occurs (*i.e.*, October through January). The percentage of the total annual rainfall recorded for the 1991 dry season was above that reported during previous years due to the relatively high amount of rainfall which occurred in

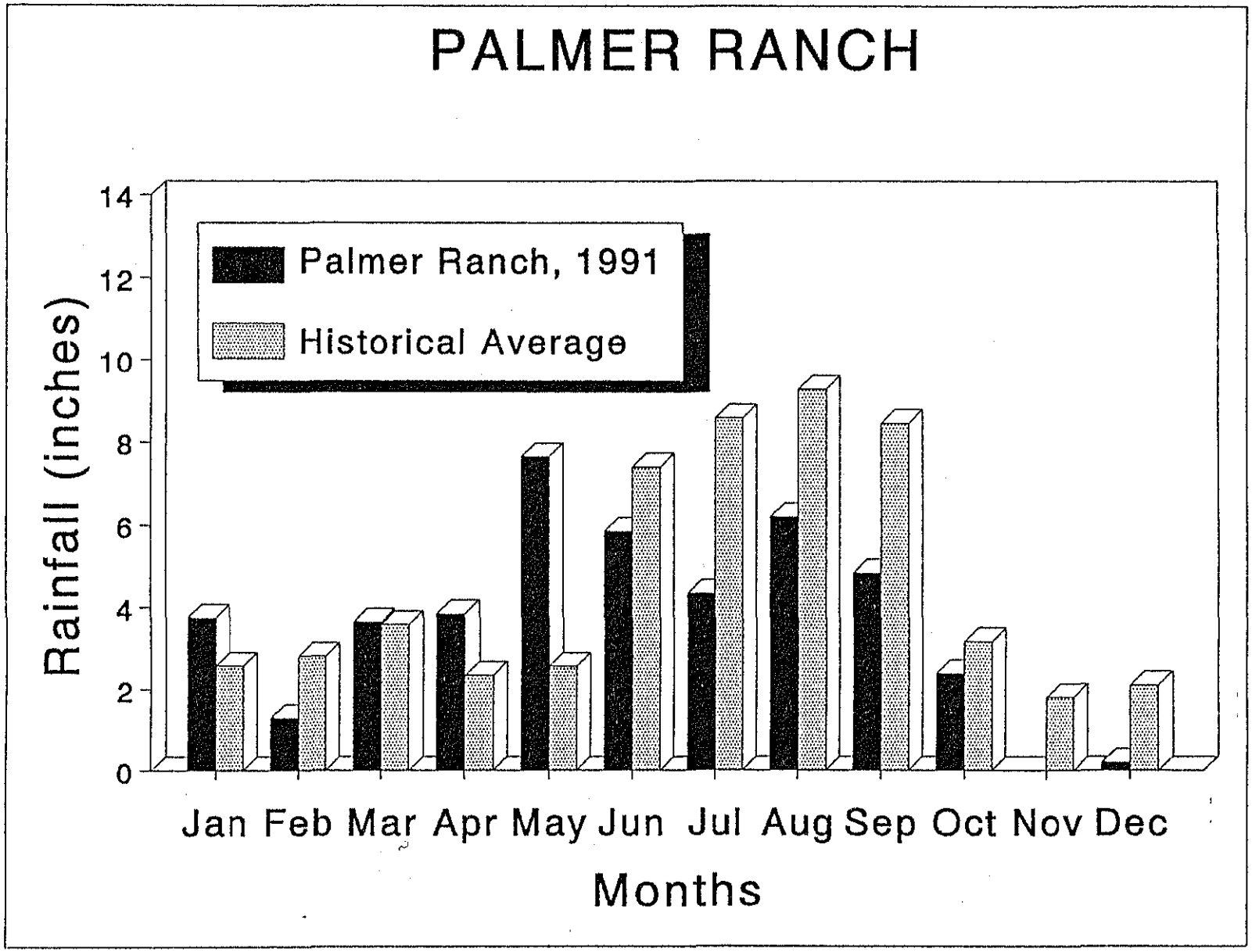


FIGURE 4.1 HISTORICAL VS ACTUAL RAINFALL RECORDED ON THE PALMER RANCH DURING JANUARY - DECEMBER, 1991.

TABLE 4.1 RAINFALL RECORDED ON THE PALMER RANCH DURING THE PERIOD OF JANUARY THROUGH DECEMBER, 1991.

Date	Monthly Rainfall (inches)	Seasonal Rainfall[a] (inches)	Pre-event Rainfall (inches) 2 Month	2 Week	2 Day
January, 1991	3.75				
February, 1991	1.30				
March, 1991	3.65		6.00	2.25	0.50
Winter		8.70			
April, 1991	3.85				
May, 1991	7.65				
June, 1991	5.85		11.60	3.40	0.65
Spring		17.35			
July, 1991	4.35				
August, 1991	6.20				
September, 1991	4.85		10.75	1.25	0.75
Summer (wet season)		15.40			
October, 1991	2.40				
November, 1991	0.00				
December, 1991	0.20		1.40	0.20	0.00
Fall (dry season)		2.60			
Yearly Total		44.05			

[a]Primary Wet Season (June - September) - 21.25
Primary Dry Season (October - January) - 6.35
Secondary Wet Season (February - March) - 4.95
Secondary Dry Season (April - May) - 11.50

January and the below average rainfall amounts observed during much of the wet season.

Antecedent rainfall accumulations during a 2-week period prior to each quarterly monitoring event, as well as 2-month and 2-day antecedent accumulations, are given in Table 4.1. As evident in the table, rainfall was recorded during the 2-day antecedent period for the March, June, and September 1991 monitoring events. Additionally, rainfall occurred during the 2-week antecedent periods for all events performed during the 1991 monitoring year. Prior to the December quarterly event, a minimal rainfall accumulation of 0.2 inches was recorded during the 2-week antecedent period. In contrast, 3.4 and 2.2 inches of rainfall were recorded during the 2-week period prior to the June and March quarterly events, respectively.

4.1.2 Stream Stage

Water depths measured at each station during the four quarterly sampling events performed during 1991 are tabulated in Appendix Table A-1. As expected, the stream stages determined during 1991 are generally higher than those measured during the 1990 monitoring year due to the greater amount of precipitation that was received during 1991. Overall, stream stage averaged 0.8 feet with a range of 0.0 to 2.4 feet compared to an average of 0.6 feet recorded during the previous monitoring year (CCI, 1991).

In general, the Trunk Ditch exhibits the deepest waters of the streams traversing the North Tract of the Palmer Ranch with a depth of approximately 8 feet near the center of its reconstructed segment. This segment of Trunk Ditch runs adjacent to the Country Club of Sarasota and Prestancia. Although Station CC-4 is located on the reconstructed

segment of Trunk Ditch, it exhibited an average depth of 0.65 feet because the depth measurements are taken in the littoral zone of the ditch. Even so, stream stage at Station CC-4 was slightly higher than observed at most other stations. The uppermost station in Catfish Creek (Station CC-1) exhibited the highest average during 1991 with a depth of 1.5 feet.

The shallowest stations were located in Catfish Creek and South Creek, at Station CC-2 which averaged 0.5 feet and Station SC-4 which averaged 0.5 feet. Shallow conditions were also observed in Catfish Creek at Station CC-4 and in North Creek at Station NC-6 with stream depths averaging 0.6 and 0.5 feet, respectively. During the quarterly event in December, five of the thirteen monitoring stations exhibited dry conditions (*i.e.* Stations CC-2, SC-1, SC-2, SC-3, and SC-7). All 13 stations were inundated during the quarterly monitoring events performed in March, June, and September, 1991.

4.1.3 Stream Flow

As evident in Appendix Table A-2, positive stream flows were recorded for 36 of 51 measurements (*i.e.* 70 %) taken during the seventh year of monitoring. As expected, the percentage of positive flows measured during 1991 is slightly higher than the 60 percent positive flow measurements observed during the 1990 monitoring year (CCI, 1991) due to the wetter conditions. However, the 70 percent positive flow measurements recorded in 1991 were more comparable to the 65 and 67 percent observed during the third and fourth years of monitoring when higher amounts of annual rainfall were received (CCI, 1988, and 1988b).

The highest steam flows during 1991 occurred during the September monitoring event with average flows for Catfish Creek and South Creek were found to be 731 and 702 gpm, respectively. The high stream flows measured in September coincide with the end of the wet season and the highest 2-day antecedent rainfall amount (Table 4.1) which resulted in an elevated groundwater table and a higher percentage of runoff, and therefore, increased stream flow.

As noted during the past three years of monitoring, it is apparent that low flow conditions have prevailed in various stream segments. During the seventh monitoring year, low flow conditions were most frequently observed in the Catfish Creek\Trunk Ditch Basin at Station CC-2, and in the South Creek Basin at Stations SC-1, SC-2, and SC-3, and at Station EL-1A. No flow conditions were observed at Station EL-1A during all four monitoring events performed in 1991. Similar results were obtained during the 1990 monitoring year (CCI, 1991).

During the seventh year of monitoring, stream flows in the Catfish Creek\Trunk Ditch Basin ranged from 0 to 835 gpm in its upper reaches (CC-1 and CC-2) and from 50 to 772 gpm in its mid-reach (CC-3 and CC-4). During this same period, South Creek exhibited a range of 0 to 996 gpm in its upper reaches and 0 to 2042 gpm in its mid-reach. In comparison, less flow was recorded in Elligraw Bayou and in the southern end of Trunk Ditch, as flow ranged from 31 to 108 gpm at Station NC-6 with no flow recorded at Station EL-1A.

4.2 Physical Water Quality Parameters

4.2.1 Water Temperature

Appendix Table A-3 presents the surface water temperature measurements acquired during the 1991 monitoring year. Results indicate that the water temperature of the streams of the North Tract of the Palmer Ranch ranged from 13.3 to 30.4°C during the four monitoring events. This range is similar to those recorded during previous years of monitoring (Palmer Venture, 1986 and CCI, 1986, 1988, 1988b, 1991).

As expected, the lowest water temperatures were recorded in the streams of the North Tract during the March, 1991 quarterly event, and the highest water temperatures were recorded during the June and September monitoring events. During the June monitoring event, an average temperature of 27.5°C was recorded, while an average temperature of 16.2°C was observed during the March event. Average temperatures for Catfish Creek and South Creek for each event are very similar with differences generally being less than 3°C.

An evaluation of diurnal variations in water temperature in the Catfish Creek and South Creek Basins was performed during the 1985 dry season and the 1986 wet season (CCI, 1987). Results of the diurnal evaluation showed increases in water temperature to maximum levels by mid-afternoon followed by declines during the evening to minimal levels by early morning. An evaluation of the results of the diurnal study is provided in the report prepared by CCI.

4.2.2 *Specific Conductance*

As evidenced in Appendix Table A-4, streams of the North Tract exhibited a range in specific conductance of 472 to 1,332 micromhos per centimeter (μmhos/cm) as compared with similar ranges of 422 to 1,406 and 620 to 1,430 μmhos/cm during the third and fourth monitoring years, respectively (CCI, 1988 and 1988b). A higher range of 587 to 1,625 μmhos/cm was observed during the sixth monitoring year (CCI, 1991). The slightly higher conductivities found during the sixth year probably resulted from the relatively low amount of rainfall which occurred during 1990. As discussed in the previous annual reports (CCI, 1988, 1988b, and 1991), during times of drought, such as occurred during the second and sixth monitoring years, the lack of precipitation resulted in minimal runoff of low conductivity stormwater thereby allowing the conductivity in the streams of the ranch to increase due to evaporation. In addition, a larger portion of the streams' surface waters probably originated from groundwater exfiltration. Since groundwater normally has a higher conductivity than rainwater and surface runoff, an increase in the conductivity of the streams would be expected.

The lowest average conductivities were reported for the June and September, 1991 monitoring events, 849 and 708 μmhos/cm, respectively. As described above, these lower conductivities most likely resulted from the cumulative effects of increased surface runoff of low conductivity stormwater during the periods of highest rainfall (refer to Table 4.1).

In a comparison of streams within the Palmer Ranch, the overall annual mean conductivities for South Creek and Catfish Creek basins were 1332 and 1263 μmhos/cm,

respectively. As with the annual mean conductivities, Catfish Creek exhibited higher conductivities than South Creek during the March, June, and September monitoring events, with the highest conductivities being found in South Creek during the December event when only one station was sampled in South Creek due to dry conditions. Relatively high conductivities were also consistently found at Station EL-1A. During past monitoring years, South Creek has generally exhibited slightly higher conductivities than the other streams of the North Tract (Palmer Venture, 1986; CCI, 1986, 1988, and 1988b).

As observed during the previous years of monitoring (CCI, 1988 and 1988b), there were no apparent spatial trends observed in conductivity within the two major basins of the Palmer Ranch (Appendix Table A-4). In the Catfish Creek\Trunk Ditch Basin, conductivities in the upper reaches averaged 802 µmhos/cm, compared to average of 1076 µmhos/cm observed for the mid-reach. In the South Creek Basin, upstream conductivities in the western branch averaged 971 µmhos/cm as compared to the lower mid-reach conductivities which averaged 803 µmhos/cm. Similarly, conductivities in the eastern branch of South Creek averaged 805 µmhos/cm.

The State specific conductance criteria applicable to the streams of the Palmer Ranch allows an increase of not more than 50 percent above background levels or to a level of 1,275 µmhos/cm which ever is greater. Only one of the 51 conductivity measurements made during the 1991 monitoring year exceeded the conductivity 1,275 µmhos/cm threshold. The conductivity measured at Station CC-3 during the March monitoring event slightly exceeded the 1275 State Standard. However, since the conductivity levels observed at Station CC-3 during the 1991 monitoring year are similar to those reported

during previous years, the levels measured in 1991 are not considered to be more than 50 percent above background levels. Therefore, no violations of the State criteria for specific conductivity occurred during 1991.

The Sarasota County criteria for specific conductance (Ordinance No. 72-37) is similar to, but more stringent than, the State criteria. The County standard allows up to a 100 percent increase above background but to a maximum level of 500 μmhos/cm in freshwater streams. Therefore, 45 of the 46 conductivity measurements made in the streams of the Palmer Ranch during 1991 were out of compliance with the County criteria. Ubiquitous non-compliance conductivities were also observed during the past years of monitoring (CCI, 1986, 1988, 1988b, 1991).

4.2.3 Total Suspended Solids

During the seventh year of monitoring, the streams of the Palmer Ranch exhibited a range of total suspended solids (TSS) from <1 to 280 mg/l with a yearly average of approximately 13 mg/l (Appendix Table A-5). In general, the TSS levels observed during the 1991 monitoring year are comparable to those recorded during the second, third and fourth years of monitoring. Lower TSS levels were observed during the 1990 monitoring year and are probably associated with droughty conditions experienced during much of the year and the subsequent low mass transport rates (CCI, 1991).

The highest TSS levels during 1991 were recorded at the upper-reach of Catfish Creek (CC-2) and in Elligraw Bayou (EL-1A). The lowest TSS levels were recorded in the mid reaches of Catfish Creek (CC-3) and in the South Creek Basin at Stations SC-2, SC-3, SC-7, and SC-8. As expected, the highest TSS levels were recorded for the September

monitoring event, probably due to the higher amounts of rainfall and the resultant increase in the amount of suspended material. The lowest TSS levels were observed during the March event when less rainfall occurred.

During the 1990 monitoring year TSS ranged from <1 to 24 mg/l with an annual average of 6 mg/l (CCI, 1991). Higher TSS levels were reported for the third and fourth monitoring years with ranges from 1 to 57 and from <1 to 86 mg/l, respectively, and a yearly average of approximately 15 mg/l during each of the two monitoring years (CCI, 1988 and 1988b). During the second year of monitoring, the streams of the Palmer Ranch exhibited a much wider range in TSS (*i.e.* 1 to 207 mg/l) and a higher yearly average (*i.e.* 24 mg/l) (CCI, 1986). Moreover, high TSS levels were recorded in the vicinity of the Prestancia construction site in Catfish Creek (CC-3), Trunk Ditch (CC-4), and Elligraw Bayou (EL-1A). These elevated TSS levels observed near Prestancia were attributed to construction activities including the excavation of Trunk Ditch.

During the first year of monitoring, TSS was reported to be much lower than observed during the past four years of the monitoring program, perhaps as a result of low mass transport rates associated with drought conditions or differences in sampling and analytical procedures (Palmer Venture, 1986). Overall, the surface waters of the ranch showed a range of approximately 1 to 12 mg/l during the first year of monitoring.

4.2.4 Turbidity

Stream turbidities were found to be strongly correlated with TSS during the 1991 monitoring year, as expected (*i.e.*, correlation coefficient (r) = 0.96). Also, turbidity exhibited the same seasonal trends observed for TSS with the highest mean turbidity level

(*i.e.*, 15.3 NTU) occurring in September 1991 while the lowest mean level (*i.e.*, 4.4 NTU) was determined for the March event (Appendix Table A-6). Intermediate averages of 5.4 and 6.3 NTU were observed for the June and December events, respectively.

During the seventh year of the monitoring program, the streams traversing the North Tract exhibited a range in turbidity of 0.8 to 106 NTU with an overall average of 8.1 NTU (Appendix Table A-6). In comparison, similar turbidity ranges of 1.2 to 36 NTU, 0.6 to 30 NTU, and 0.6 to 24 NTU were exhibited during the third, fourth, and sixth monitoring years, respectively, with strong positive correlations with TSS during all years (CCI, 1988, 1988b, and 1991).

During the second year of monitoring, CCI (1986) reported higher turbidities of 1 to 61 NTU, while during the first year of monitoring, much lower turbidities (*i.e.*, less than 6 NTU) were reported (Palmer Venture, 1986). Differences between the first and second year have been attributed to a combination of the droughty conditions in the first year resulting in lower pollutant loadings, and the initiation of construction including the reconstructed of Trunk Ditch during the second year of monitoring.

The General Water Quality Criteria for all surface waters (FAC Chapter 17-302) specifies that turbidity shall not exceed 29 NTU above natural background. Based on turbidity measurements taken during previous years of monitoring, natural background turbidity levels are expected to be less than 25 NTU (mean plus one standard deviation), although higher background turbidities might occur as a result of natural processes, *e.g.*, organic decay and import of particulate matter via stormwater runoff. Therefore, all turbidity measurements, except one, performed during the 1991 monitoring year were in

compliance with the applicable state water quality criteria. The only non-compliance turbidity was recorded for Station EL-1A during the September monitoring event.

Sarasota County Ordinance (No. 72-37) allows a maximum increase of 25 Jackson units above background. Analysis of turbidity samples, however, were performed in accordance with FAC Chapter 17-302 criteria which is based on the Nephelometric procedure. Therefore, a comparison of the turbidity results to the County criteria can not be made.

4.3 Oxygen Demand and Related Parameters

4.3.1 Biochemical Oxygen Demand

As shown in Appendix Table A-7, the 5-day biochemical oxygen demand (BOD_5) recorded in the streams of the North Tract averaged 1.6 mg/l and ranged from <0.1 to 7.4 mg/l during the 1991 monitoring year. Additionally, a positive correlation between BOD_5 and TSS was noted (*i.e.*, correlation coefficient (r) = 0.72), and is attributed to decaying vegetation and other organic matter in the water column. Generally, the highest BOD_5 levels were recorded for the for the June and December events.

The levels of BOD_5 in the two largest streams, South Creek and Catfish Creek, varied somewhat. South Creek exhibited an average level of approximately 1.4 mg/l with a range of 0.3 to 4.3 mg/l, whereas Catfish Creek exhibited a similar average concentration of approximately 1.4 mg/l with a narrower range of 0.8 to 2.5 mg/l. The highest mean BOD_5 levels were determined for Stations EL-1A, CC-4, and SC-4.

In general, similar results were obtained for the 1990 monitoring year with an overall average BOD_5 concentration of 1.9 mg/l (CCI, 1991). Slightly higher results were obtained during the third and fourth years of monitoring (CCI, 1988 and 1988b) when BOD_5 in the streams of the Ranch averaged 3.1 and 3.2 mg/l, respectively. Moreover, South Creek and Catfish Creek exhibited low to moderate BOD_5 concentrations with Elligraw Bayou and the southern end of Trunk Ditch exhibiting higher BOD_5 levels during this period. Similar trends were observed during the second year of monitoring when a higher average BOD_5 concentration of 4 mg/l was found (CCI,1986).

During the first year of monitoring, Palmer Venture (1986) reported an overall range in BOD_5 of 1.2 to 8.9 mg/l. Catfish Creek\Trunk Ditch exhibited a range of 1.2 to 6.5 mg/l, and South Creek exhibited a range of 1.4 to 8.9 mg/l. In Elligraw Bayou and at the Trunk Ditch-North Creek juncture, BOD_5 was reported to range from 2 to 6 mg/l.

According to Hynes (1966), a BOD_5 of 3 mg/l is indicative of "fairly clean" water while a BOD_5 of 5 mg/l is indicative of "doubtful" quality water. In addition, a BOD_5 screening level of greater than 3.3 mg/l has been established for Florida waters to indicate potential water quality problems (FDER, 1990). Therefore, South Creek and Catfish Creek generally exhibited fairly clean water with only two of the 46 measurements being in excess of the 3.3 mg/l screening level. Elligraw Bayou at Station EL-1A generally exhibited poorer water quality with two of the four measurements made at that station during 1991 exceeding the 3.3 mg/l limit.

The General Criteria for BOD_5 in all surface waters as designated by FAC Chapter 17-302, "Rules and Regulations of the Department of Environmental Regulation," as well as

Sarasota County Ordinance No. 72-37, specifies that BOD_5 shall not be increased to levels that would result in violations of dissolved oxygen. The BOD_5 concentrations recorded in the streams traversing the North Tract of the Palmer Ranch only occasionally exceeded 3.3 mg/l, a screening level which the FDER (1990) considers to be indicative of potential water quality problems. During the seventh year of monitoring, only one of the 46 BOD_5 measurements exceeded the 5 mg/l level which Hynes (1966) considered to be "doubtful" or between "fairly clean" and "bad" water quality. This measurement was made in Elligraw Bayou (*i.e.*, Station EL-1A) during the September 1991 monitoring event.

4.3.2 Dissolved Oxygen

Appendix Table A-8 provides the results of dissolved oxygen measurements acquired during the seventh year of monitoring. Overall, dissolved oxygen was found to average 4.0 mg/l, with a range of 0.4 to 12.3 mg/l. The highest dissolved oxygen concentrations were recorded in the Catfish Creek\Trunk Ditch Basin where dissolved oxygen averaged 5.2 mg/l. The lowest dissolved oxygen levels were recorded in the southern end of Trunk Ditch (North Creek-Trunk Ditch Basin Station NC-6) where dissolved oxygen averaged 1.0 mg/l. Seasonally, the highest average dissolved oxygen levels were observed for the March 1991 monitoring event with the lowest levels occurring for the June and September monitoring event in conjunction with the highest average water temperatures and relatively high BOD_5 levels. Similar seasonal trends have been observed during previous monitoring years (CCI, 1988, 1988b, and 1991) and reflect the changes in the solubility of dissolved oxygen in the water column with changes in water temperature.

The results obtained during the 1991 monitoring year are generally lower than those measured during the third, fourth, and sixth monitoring years (CCI 1988, 1988b, and 1991) but slightly higher than the concentrations determined during the first two years of the monitoring program (Palmer Venture, 1986 and CCI, 1986). During the third, fourth, and sixth monitoring years (CCI, 1988, 1988b, and 1991), dissolved oxygen was found to average 6.1, 7.2, and 5.6 mg/l, respectively. Highest seasonal levels were recorded during early spring (March 1987), as dissolved oxygen averaged 8.4 mg/l. Lowest seasonal levels were recorded during late summer (September 1986) as dissolved oxygen averaged 4.7 mg/l. Dissolved oxygen measurements acquired during the second year of monitoring were similar to those observed during 1991 with a ranch-wide average of 4.0 mg/l and the overall range of 0.4 to 12.4 mg/l. The lowest dissolved oxygen levels were observed during the first year of monitoring (Palmer Venture, 1986), as 22 of the 38 measurements were less than 4 mg/l.

An evaluation of diurnal variations in dissolved oxygen in Catfish Creek and South Creek was performed during the dry season of 1985 and the wet season of 1986. The results of the diurnal evaluation showed typical increases in dissolved oxygen during the day to maximum levels by mid-afternoon and declines during the night to minimal levels by mid-morning, as well as diurnal trends characteristic of the stream community. A summary of the results of the diurnal study is provided in the report prepared by CCI (1987).

During the seventh monitoring year, dissolved oxygen concentrations in the streams of the North Tract frequently occurred at levels below the 5.0 mg/l criteria specified by FAC Chapter 17-302 and the 4.0 mg/l standard specified by Sarasota County Ordinance 72-37

for predominantly freshwaters at several stations. Of the 46 dissolved oxygen measurements made during the 1991 monitoring year, 31 were below the 5.0 mg/l state criteria with 26 of the measurements being below the 4.0 mg/l County Criteria.

4.3.3 pH

Results of pH monitoring are given in Appendix Table A-9. During the 1991 monitoring year, the streams of the Palmer Ranch exhibited pH levels in a range of 5.8 to 8.3. In comparison to other years of monitoring, the range of pH observed during the 1991 monitoring year was similar to that observed during the first, second, fourth, and sixth monitoring years, but considerably lower than that observer during the third year of monitoring (Palmer Venture, 1986 and CCI, 1986, 1988, 1988b, and 1991).

During the third year of monitoring, the streams of the Palmer Ranch exhibited pH levels in the range of 6.7 to 9.8 (CCI, 1988). During the first and second years of monitoring, however, Palmer Venture (1986) and CCI (1986) reported ranges in pH of 6.3 to 8.4 and 6.0 to 8.1, respectively.

During the seventh year, the lowest pH levels were observed at Stations EL-1A and NC-6 located in Elligraw Bayou and the lower end of Trunk Ditch, respectively, whereas the highest pH levels were recorded at Station CC-5. These differences are attributed primarily to spatial variations in community metabolism. Differences or changes in pH are indicative of the effects of net community metabolism on the level of carbon dioxide and pH. During periods of net community respiration, carbon dioxide is produced faster than it is assimilated, thereby depressing pH as a result of its reaction with water to form carbonic acid. In contrast, carbon dioxide is consumed faster than it is produced during

periods of net community photosynthesis (primary production), thereby increasing pH. Therefore, pH typically exhibits a diel trend of increases during the day and decreases during the night. The amplitude of the cycle normally depends on the rate of production and consumption and to a lesser extent on the buffering capacity of the water (alkalinity) and atmospheric exchange of carbon dioxide.

In a diurnal evaluation of Catfish Creek and South Creek, which was conducted during the dry season of 1985 and the wet season of 1986, CCI (1987) reported changes in pH characteristic of the different biological communities. During the day, Catfish Creek and South Creek exhibited changes in pH ranging up to a 1 to 2 unit increase with maximum diurnal changes observed in the lower reach of Catfish Creek and the upper reach of South Creek where the greatest metabolic rates were encountered.

As specified in the General Criteria for all surface waters (FAC Chapter 17-302) and in the Sarasota County Ordinance No. 72-37, the allowable variation in pH is 1.0 unit above or below the normal pH provided that the pH is not lowered or elevated outside the range of 6.0 to 8.5. Additionally, if natural background is less than 6.0, the pH shall not vary below the natural background or vary more than one unit above natural background. Similarly, if natural background is above 8.5, pH shall not vary above natural background or vary more than one unit below background. During the seventh year of monitoring, only one measurement was outside the allowable range of 6.0 to 8.5. The pH at Station EL-1A during the September monitoring event was slightly below the 6.0 minimum allowable pH level. This low pH was associated with the highest BOD_5 level measured

during 1991 and is probably a result of the decomposition of organic matter and high respiratory activity at this station during the September monitoring event.

4.4 Macronutrients

4.4.1 Total Nitrogen

Appendix Table A-10 provides the results of total nitrogen measurements acquired during the 1991 monitoring year. Although generally lower than during previous monitoring years, the spatial and compositional trends in total nitrogen were similar to the trends observed previously. During the seventh monitoring year, Elligraw Bayou and the upper reaches of South Creek and Catfish Creek exhibited higher total nitrogen levels than observed in the stream segments of the Palmer Ranch. The highest total nitrogen concentrations for 1991 were observed in Elligraw Bayou at Station EL-1A which exhibited an average total nitrogen concentration of 2.50 mg/l for the four monitoring events. In the upper segments of South Creek, total nitrogen levels averaged 1.36 and 1.65 mg/l for the east and west branches, respectively. In the Catfish Creek\Trunk Ditch Basin the highest total nitrogen levels occurred at Station CC-2 and generally decreased in a downstream direction. Total nitrogen averaged 1.77 mg/l at Station CC-2 with average concentrations of 0.97 and 1.21 mg/l being observed at the downstream property boundaries in Catfish Creek and Trunk Ditch, respectively. As expected, the highest total nitrogen concentrations were observed for the June and September monitoring events which correspond to the wettest conditions and period of the greatest runoff and stream flows.

Overall, total nitrogen levels averaged 1.40 mg/l during the 1991 monitoring year as compared to higher averages of 2.59, 1.90, 1.56, and 1.42 mg/l observed for the second,

third, fourth, and sixth years of monitoring, respectively (CCI, 1986, 1988, 1988b, and 1991). Figure 4-2 provides the mean total nitrogen concentrations observed for the streams traversing the Palmer Ranch during the second, third, fourth, sixth, and seventh monitoring years. The mean concentrations for each component of total nitrogen (*i.e.* ammonia, nitrate + nitrite, and organic nitrogen) are also depicted in Figure 4-2 in order compare the relative importance of each nitrogen fraction. The average total nitrogen concentration for the thirteen monitoring stations has exhibited a continual decrease over the past several years and may be indicative of a general improvement in water quality in the streams of the North Tract of the Palmer Ranch. Not only has total nitrogen decreased, the forms of nitrogen which are readily assimilated by algae and plants (*i.e.* ammonia and nitrate + nitrite) have also decreased substantially.

The largest fraction of total nitrogen observed during the seventh year of monitoring occurred in the form of organic nitrogen. Organic nitrogen represented approximately 92 percent of total nitrogen and averaged 1.29 mg/l. The second most abundant form of nitrogen was ammoniacal nitrogen (ionized plus un-ionized ammonia) which represented approximately 4 percent of the total nitrogen with an average concentration of 0.06 mg/l. Nitrate represented approximately 3 percent of the total nitrogen with an average level of 0.05 mg/l. As expected, the smallest fraction of total nitrogen was found to be nitrite which represented less than one (1) percent of the total.

Similarly, CCI (1986, 1988, 1988b, and 1991) reported comparable breakdowns of total nitrogen during previous years of monitoring. The largest fraction of total nitrogen observed during the previous years of monitoring also occurred in the form of organic

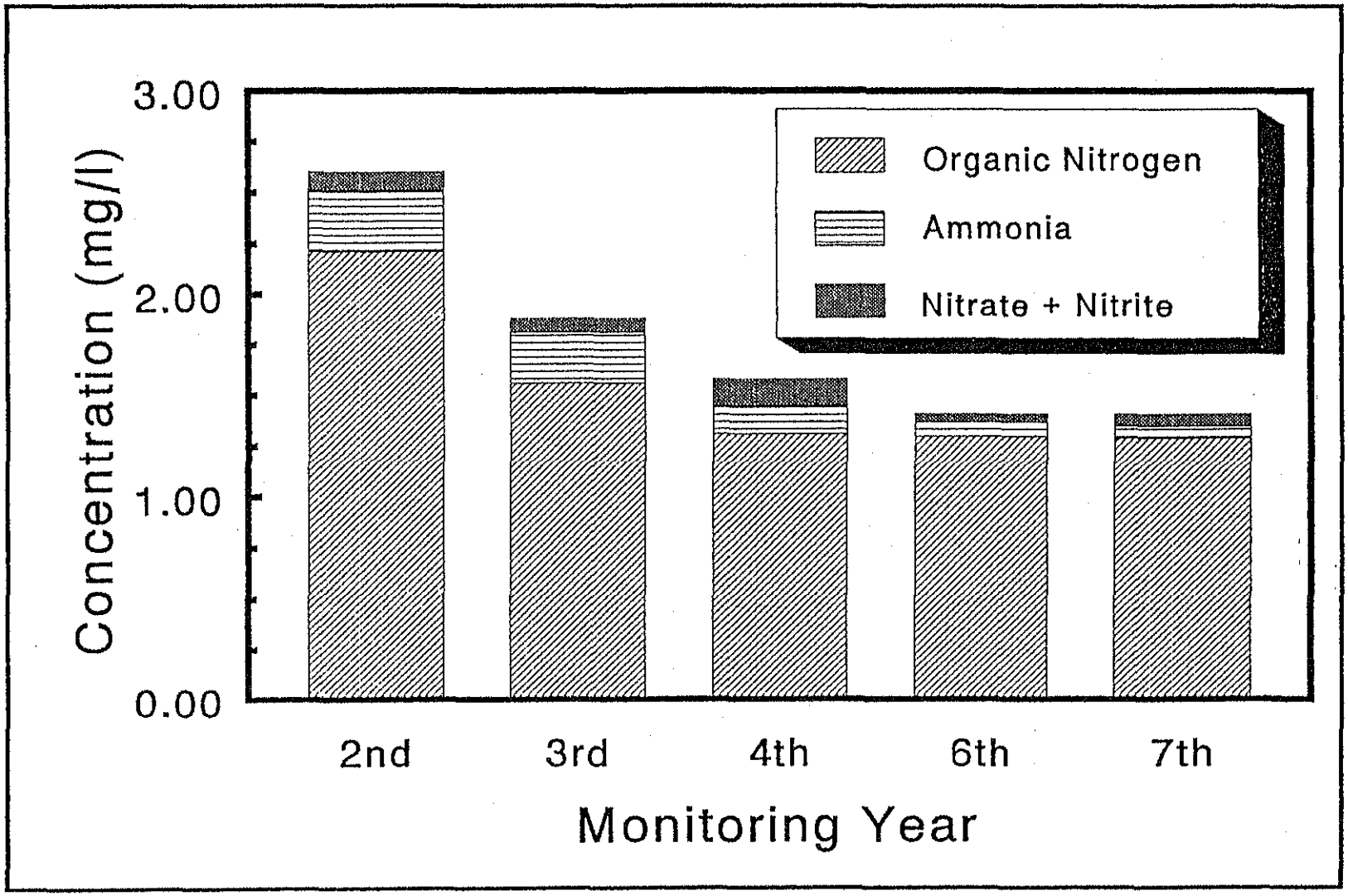


FIGURE 4.2 AVERAGE NITROGEN CONCENTRATIONS DURING THE SECOND, THIRD, FOURTH, SIXTH, AND SEVENTH YEARS OF MONITORING.

nitrogen. Organic nitrogen represented from 82 to 92 percent of the total and averaged from 1.3 to 2.2 mg/l during this period. Likewise, the second most abundant form of nitrogen was ammoniacal nitrogen which represented from 5 to 13 percent of the total with average levels of 0.07 to 0.30 mg/l over the same period. Nitrate represented approximately from 3 to 8 percent of the total with average levels ranging from 0.04 to 0.12 mg/l during the previous years of monitoring. As during the 1991 monitoring year, the smallest fraction of total nitrogen during previous years of monitoring was nitrite, which represented less than one percent of the total nitrogen present during all years.

During the first year monitoring, however, Palmer Venture (1986) reported a significantly different breakdown and a substantially lower total nitrogen (0.8 mg/l) than during the following monitoring years. During the first year, total nitrogen averaged 69 percent organic nitrogen, 8 percent ammonia-nitrogen, 23 percent nitrate-nitrogen, and less than one percent nitrite-nitrogen. The lower total nitrogen during the first year versus the latter years can not be explained based on the available information, but may be associated with the extremely droughty conditions experienced during the first monitoring year. Also, it is not completely understood why nitrate levels exceeded ammonia levels during the first year since nitrate is normally assimilated by denitrifying bacteria under conditions of depressed oxygen levels, a condition which prevailed throughout the first year.

As specified in FAC Chapter 17-302, nutrients, including total nitrogen, shall not be elevated to levels causing an imbalance in the natural flora and fauna, a condition characteristic of eutrophic or nutrient-rich streams. In this respect, there were some implications in the data acquired during the second, third, and fourth monitoring years

which linked the observed total nitrogen levels to eutrophic conditions even though there appeared to be a general trend of decreasing nitrogen levels as previously discussed (CCI, 1986, 1988, 1988b, 1991). Results obtained during the 1991 monitoring year indicate that total nitrogen rarely exceeded the screening level of 2.0 mg/l considered by the FDER (1990) to be characteristic of eutrophic conditions. Only three of the 46 total nitrogen measurements made during 1991 exceeded the 2.0 mg/l screening level. The total nitrogen levels exceeding the screening level were recorded during the September event in Elligraw Bayou and at Stations CC-2 and SC-4 during the June monitoring event.

4.4.2 Nitrite

Nitrite levels observed in the streams of the Palmer Ranch during the seventh year of monitoring are provided in Appendix Table A-11. As expected, nitrite concentrations throughout the streams traversing the North Tract were much lower than the other forms of nitrogen, and too low to be a significant nutrient source. Of the 46 samples collected during the 1991 monitoring year, 30 contained nitrite concentrations below the 0.01 mg/l analytical detection limit. Overall, nitrite observations averaged 0.01 mg/l with a range of <0.01 to 0.06 mg/l as compared with the fourth and sixth monitoring years in which nitrite averaged 0.01 and <0.01 mg/l and ranged from 0.01 to 0.04 and <0.01 to 0.02 mg/l, respectively.

During the second and third years of monitoring, elevated nitrite levels were observed downstream of the dairy (deactivated by August 1987) in the eastern branch of South Creek. During the fourth year of monitoring, however, only traces of nitrite (0.01 mg/l) were recorded in South Creek.

As a nutrient, nitrite is considered to be covered by the general water quality standard (FAC Chapter 17-302). Due to the observed low concentrations, however, nitrite was generally found to be of little importance as a nutrient in the streams of the Palmer Ranch. For all practical purposes, therefore, nitrite is considered to meet desired standards.

4.4.3 Nitrate

As shown in the results provided in Appendix Table A-12, nitrate levels observed in the streams traversing the North Tract during 1991 exhibited a yearly average of 0.05 mg/l with a range of <0.01 to 0.27 mg/l. These results are much lower than those determined during the fourth monitoring year in which nitrate averaged 0.12 mg/l with a range of <0.01 to 1.30 mg/l. More comparable nitrate concentrations were reported for the second, third, and sixth monitoring years when nitrate exhibited yearly averages of 0.07, 0.06, and 0.04 mg/l and ranges of < 0.01 to 0.54, < 0.01 to 0.42, and <0.01 to 0.33 mg/l, respectively.

Similar to the previous years, the highest nitrate levels, averaging 0.06 mg/l, were recorded during the March and December, 1991 monitoring events. This temporal trend is attributed to lower rates of nitrate assimilation and/or higher rates of nitrification during the fall and winter seasons as primary production declines to minimal rates. Additionally, nitrate loading rates might have increased during the fall and winter seasons in association with increased fertilization of the adjacent golf courses along Trunk Ditch along with decreased gross production.

Ranch-wide, the Catfish Creek\Trunk Ditch Basin exhibited the highest nitrate levels recorded during the seventh monitoring year, averaging 0.09 mg/l in its upper reach

(Stations CC-1 and CC-2), 0.10 mg/l in its mid-reach (Stations CC-3 and CC-4), and 0.02 mg/l in its lower reach (Station CC-5). Similar to the sixth monitoring year, nitrate levels in the South Creek Basin were found to be comparatively low during 1991. In contrast, during the first three years of monitoring (Palmer Venture, 1986, and CCI, 1986 and 1988), the South Creek Basin was found to have a major source of nitrate (*i.e.* the dairy) located in its eastern branch upstream of the Palmer Ranch. During the 1991 monitoring year, however, the eastern branch (Stations SC-7 and SC-3) averaged only 0.05 mg/l. Even lower nitrate values were recorded in the western branch (Stations SC-1 and SC-4) as nitrate averaged 0.02 mg/l. Downstream in the mid-reach of South Creek the nitrate concentration also averaged 0.02 mg/l. The highest nitrate level observed in South Creek during 1991 occurred at the most upstream monitoring station in the eastern branch (*i.e.* Station SC-3).

Very low nitrate levels were also recorded at the juncture of Trunk Ditch and the North Creek Basin and in Elligraw Bayou, as evidenced by the annual mean concentrations of 0.01 and <0.01 mg/l determined for Stations EL-1A and NC-6, respectively. Since both Trunk Ditch and Elligraw Bayou sites exhibited low-flow conditions, nitrate import was probably minimal. Furthermore, the Trunk Ditch site exhibited anaerobic conditions which are conducive to denitrification and minimal nitrate concentrations. Elligraw Bayou, on the other hand, exhibited relatively high dissolved oxygen levels during the seventh year suggesting that the low nitrate levels in the water might have resulted from nitrate assimilation during plant production.

As a nutrient, nitrate is designated as a parameter covered by the general water quality criteria (FAC Chapter 17-302), and is an important limiting nutrient in the streams of the Palmer Ranch. Therefore, increases in nitrate availability from anthropogenic sources would accelerate production rates of aquatic plants resulting in an imbalance in the flora and fauna which would be considered a violation of the nutrient standard. However, the nitrate concentrations determined during the 1991 monitoring year were among the lowest recorded during the seven year monitoring program and are not thought to represent an important source of nitrogen in the streams of the Palmer Ranch. Therefore, nitrate is considered to meet desired criteria.

4.4.4 Ammoniacal Nitrogen

Appendix Table A-13 provides the results of ammoniacal nitrogen measurements (ionized plus un-ionized ammonia) recorded during the seventh year of monitoring. As described previously, ammoniacal nitrogen represented 4 percent of the total nitrogen found during the 1991 monitoring year. Overall, ammoniacal nitrogen exhibited an average of 0.06 mg/l with a range from <0.02 to 0.65 mg/l.

Although ammoniacal nitrogen is a potentially important nutrient to the primary producers in the streams of the Palmer Ranch, the results suggest that nitrate might be the preferred nitrogen source. This indication is based on two annual trends observed during the 1991 monitoring year as well as previous monitoring years as related to normal plant production and decay. First, nitrate declined to minimal levels during the late spring (June 1991), most likely in association with the peak of the growing season while the concentration of ammoniacal nitrogen reached a maximum, *i.e.* 0.13 mg/l, during the June

monitoring event. Second, ammoniacal nitrogen declined to minimal levels during March and December (*i.e.*, 0.04 mg/l) at a time when nitrate levels peaked (*i.e.*, 0.04 mg/l). Since December is considered to be the beginning of the winter season when net (primary) production is minimal, assimilation of nutrients should also be minimal. Since nutrients should be more available when they are assimilated at minimal rates, and vice versa, their concentrations should be elevated during December and depressed during June. Furthermore, nitrification (biological oxidation of organic nitrogen to nitrate) is expected to increase in association with the die-off and decay of plant material under aerobic conditions. Moreover, die-off and decay of plant material is expected to increase immediately following the period in which its standing crop peaks. This should occur in the streams of the Palmer Ranch from October to December. Since it was evident that the streams of the Palmer Ranch followed these trends of primary production, decay, nitrification, and minimal levels of nitrate during the growing season, it is concluded that nitrate is the preferred nitrogen source. Other freshwater studies (Wetzel, 1975) have also concluded that aquatic vegetation, including algae, prefer nitrate to ammonia.

During the previous years of monitoring (Palmer Venture, 1986 and CCI, 1986, 1988, 1988b, and 1991), ammonia was higher than observed during the 1991 monitoring year. During the sixth year, ammonia ranged from <0.02 to 0.86 mg/l with an annual average of 0.07 mg/l (CCI, 1991). Substantially higher average ammonia concentrations were reported for the first, second, third and fourth monitoring years. Additionally, the eastern tributary of South Creek exhibited the highest ammoniacal nitrogen levels on the ranch during the first three years of monitoring.

Until recently, the eastern tributary of South Creek received drainage from an active dairy farm. During a period of approximately one year, the dairy farm was gradually phased out and officially converted to a sod farm on August 1, 1987. While actively operated during most of the third year of monitoring, drainage from the dairy farm represented a significant source of nitrogen. The effect of this nitrogen source was observed in the eastern tributary of South Creek to the downstream boundary of the North Tract. Additionally, its effects included elevated ammoniacal nitrogen levels (Palmer Venture, 1986 and CCI, 1986 and 1988). However, following the third year of monitoring the results show a decrease in the concentration of ammoniacal nitrogen in South Creek.

Although ammoniacal nitrogen is a nutrient and therefore has the potential to influence the growth of the primary producers (plants) and their balance with the consumers (bacteria and animals), FAC Chapter 17-302 does not provide a quantitative nutrient standard for ammoniacal nitrogen. Although it might be less preferred than nitrate, increases in ammonia have the potential to accelerate plant production, and, in turn, influence the balance between the flora and fauna of the streams traversing the Palmer Ranch. However, the concentrations of ammoniacal nitrogen determined during the 1991 monitoring year were the lowest recorded during the seven year monitoring program and are not thought to represent an important source of nitrogen in the streams of the Palmer Ranch. Therefore, ammonia is considered to meet desired criteria. Since the non-ionized fraction of ammoniacal nitrogen was not evaluated independently, comparisons to County and State criteria for non-ionized ammonia were not made.

4.4.5 Organic Nitrogen

Organic nitrogen (total Kjeldahl nitrogen less ammoniacal nitrogen) concentrations determined in the streams traversing the Palmer Ranch during the 1991 monitoring year are provided in Appendix Table A-14. Overall, the streams of the Palmer Ranch exhibited an average organic nitrogen concentration of 1.29 mg/l during the seventh year of monitoring with a range from 0.55 to 4.82 mg/l. Similar average organic nitrogen concentrations of 1.31 and 1.30 mg/l were reported for the fourth and sixth monitoring years, respectively (CCI, 1988b, 1991). However, during the second and third years of monitoring (CCI, 1986 and 1988), organic nitrogen exhibited higher averages of 2.21 and 1.56 mg/l, respectively. This can be interpreted as another indication of a gradual improvement in water quality over the past seven years. An important contributing factor to the trend of improving water quality is the deactivation of the dairy farm in the South Creek Basin. Also, channel maintenance in Trunk Ditch during the fourth monitoring year, as well as the aquatic community changes resulting from the "reconstruction" of a segment of the Catfish Creek\Trunk Ditch Basin during the second year, could have contributed to the declining trend in organic nitrogen.

The concentration of organic nitrogen followed a seasonal trend similar to that observed during previous monitoring years with the level of organic nitrogen increasing through the spring and summer to a maximum during the late summer (*i.e.*, September 1991) then declined during the fall to a minimum in December. During the September 1991 monitoring event, ranch-wide organic nitrogen levels averaged 1.51 mg/l compared to the 1.08 mg/l observed during the March 1991 event.

The peak in organic nitrogen during September is apparently associated with peaks in the standing crop of aquatic vegetation and stormwater loadings, since September represents the end of the summer wet season. During the fall and winter, the standing crop of vegetation declined in association with low production rates and the decay of plant material. During this period, organic nitrogen exhibited a concomitant decline as the plant material was depleted by the microbial heterotrophs. Additionally, stormwater loading rates most likely declined in association with minimal runoff during the dry months of October through January.

4.4.6 Total Phosphorus

During the 1991 monitoring year, total phosphorus in the streams of the Palmer Ranch exhibited a yearly average of 0.30 mg/l and a range of 0.01 to 2.59 mg/l (Appendix Table A-15). The highest total phosphorus levels were recorded in the Elligraw Bayou basin at Station EL-1A which averaged 0.80 mg/l for the four 1991 monitoring events. The lowest mean total phosphorus concentrations were observed in the mid and lower segments of Catfish Creek (*i.e.*, CC-3, CC-4, and CC-5).

Slightly lower total phosphorus concentrations were recorded for the 1990 monitoring year with an overall yearly average of 0.20 mg/l for the 13 monitoring stations (CCI, 1991). During the third and fourth monitoring years considerably higher levels of total phosphorus were recorded with overall mean concentrations of 0.47 and 0.45 mg/l, respectively. Also, the highest total phosphorus levels during the third and fourth monitoring years were recorded in the eastern tributary of the South Creek Basin, apparently originating from the dairy farm as previously noted. Since inactivation of the

dairy farm, which was initiated during the third monitoring year, a gradual decrease in phosphorus levels as well as a general improvement in water quality have been observed beginning in the fourth year following the inactivation of the dairy farm.

In addition, high total phosphorus levels were also observed in Elligraw Bayou during the second and third years of monitoring (CCI, 1986 and 1988). The source of this phosphorus is attributed to cleared lands and construction activities associated with the development of Prestancia which is adjacent to Elligraw Bayou.

During the second year of the monitoring program (Palmer Venture, 1986), total phosphorus levels were higher than recorded during the latter years of monitoring. This was evidenced by the ranch-wide yearly average of 1.0 mg/l and by the wider range of 0.08 to 6.4 mg/l. As observed during the other years of monitoring, the highest total phosphorus levels were recorded in the eastern branch of South Creek, apparently originating from the dairy farm. Likewise, Palmer Venture (1986) reported high total phosphorus concentrations in the eastern tributary of South Creek during the first monitoring year and attributed them to the upstream dairy farm.

The decrease in total phosphorus concentration in the streams of the Palmer Ranch during recent years is illustrated in Figure 4.3 which provides the annual mean total phosphorus concentrations during the second, third, fourth, sixth, and seventh monitoring years. For comparison, a division between orthophosphate and organic phosphorus is also provided.

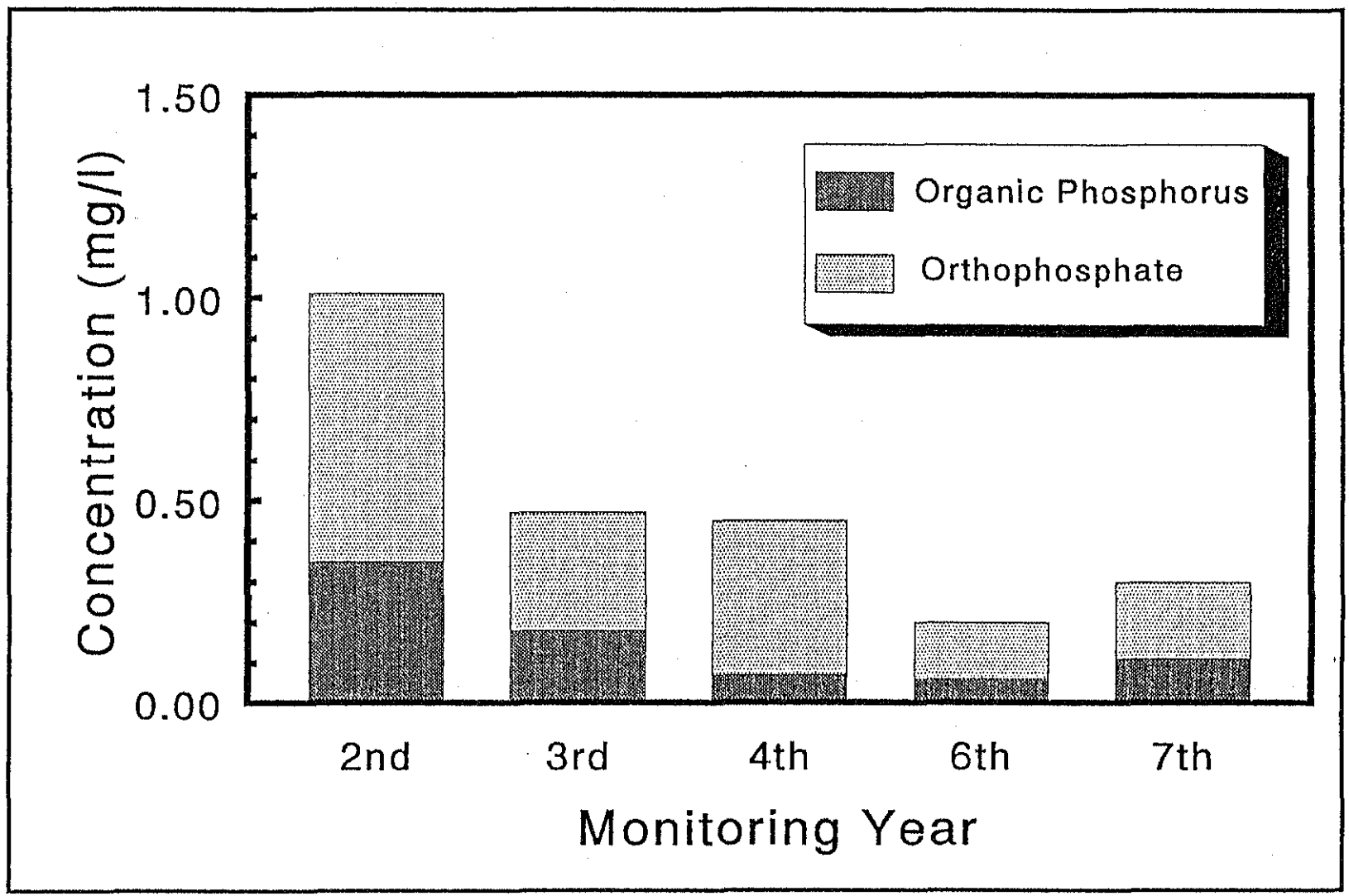


FIGURE 4.3 AVERAGE PHOSPHORUS CONCENTRATIONS DURING THE SECOND, THIRD, FOURTH, SIXTH, AND SEVENTH YEARS OF MONITORING.

As a nutrient, phosphorus is required by algae and other plants for the primary production of organic matter and, therefore, as specified in FAC Chapter 17-302, shall not be elevated to levels which will cause an imbalance in the natural flora and fauna. The results of the seventh year of monitoring indicate that the total phosphorus concentrations in the streams of the Palmer Ranch only occasionally exceeded the FDER screening level of 0.46 mg/l (FDER, 1990) which is considered to be indicative of water quality problems. The total phosphorus concentrations were more often above the 0.09 mg/l level determined to be the median concentration for Florida streams (FDER, 1990).

Similar concentrations are normally found in west-central Florida because of the widespread deposits of naturally occurring phosphate (Sheldon, 1982). Interestingly, well drillers' logs show that phosphates exist in shallow deposits on the Palmer Ranch (Patton and Associates, 1984). The strong correlation (*i.e.* $r = 0.88$) between the total phosphorus concentrations and TSS concentrations measured during 1991 also indicates the controlling role of naturally occurring phosphate deposits on the phosphorus concentrations in the streams of the Palmer Ranch. In addition, Palmer Venture (1986) noted that the phosphate levels in the streams of the Palmer Ranch were significantly influenced by groundwater during periods when stream flow was augmented by groundwater exfiltration (*i.e.*, low flow conditions). Consequently, phosphates originating from these naturally occurring deposits within, or upstream of, the Palmer Ranch should not be considered violations even though they exhibit the potential for contributing to high rates of primary production and a concomitant imbalance in the flora and fauna.

4.4.7 Orthophosphate

Orthophosphate (total reactive phosphate) concentrations determined in the streams traversing the Palmer Ranch during the 1991 monitoring year are provided in Appendix Table A-16. Overall, the streams of the Palmer Ranch exhibited an average orthophosphate concentration of 0.19 mg/l during the seventh year of monitoring with a range from <0.01 to 0.67 mg/l. As with total phosphorus, the orthophosphate concentrations observed during the 1991 monitoring year are similar to those observed during the 1990 monitoring year but, significantly below the levels recorded for previous monitoring years. The annual mean orthophosphate concentration determined during 1990 was 0.14 mg/l with a range from <0.01 to 0.57 mg/l (CCI, 1991). During the fourth year orthophosphate was found to average 0.38 mg/l with a range of from 0.02 to 2.30 mg/l with an average of 0.29 mg/l and range of <0.01 to 2.86 mg/l during the third year. Even higher ranges of 0.10 to 4.3 and <0.02 to 5.5 mg/l were determined for the first and second monitoring years, respectively (Palmer Venture, 1986 and CCI, 1986).

Even though the phosphorus concentrations have decreased considerably over the last four years, the percentage of total phosphorus consisting of orthophosphate has remained relatively constant. In general, orthophosphate represented approximately 63 percent of the total phosphorus during 1991 compared to 62 to 84 percent recorded for previous years of monitoring.

During the seventh year of monitoring, an apparent spatial and temporal trend in orthophosphate showed that there continued to be a significant source of phosphate in the headwaters of the South Creek Basin the dairy farm which was inactivated in August,

1987 and converted into a sod farm. Due to this upstream nutrient source, the highest mean orthophosphate level (*i.e.*, 0.38 mg/l) was found for the eastern tributary of South Creek. A similar trend was observed during the previous years of monitoring for the South Creek Basin. These spatial and temporal declines are attributed to the following: (1) the inactivation of the dairy farm and subsequent residual effects; (2) downstream dilution of the dairy farm drainage; and, (3) phosphate uptake by biological and physico-chemical processes.

As a nutrient, orthophosphate is designated by FAC Chapter 17-302 as a general water quality parameter. This criteria specifies that the discharge of nutrients, such as orthophosphate, shall be limited to prevent an imbalance in the natural populations of aquatic flora and fauna. Although the observed levels are occasionally above the threshold considered to indicate eutrophic conditions as defined by FDER (1983), orthophosphate has been found to occur naturally on the North Tract. Consequently, other factors, such as nitrogen availability, are probably more growth limiting than orthophosphate. Therefore, the phosphate levels found during the 1991 monitoring year is not likely to have caused an imbalance in the aquatic flora and fauna.

4.4.8 Nutrient Ratios

Nitrate and phosphate are required by aquatic plants in proportions of approximately 16:1 (N:P on a molar basis or 6.8 on a weight basis) (Odum, 1959 and GESAMP, 1987). Nitrogen and phosphorus are assimilated in this proportion by the primary producers (rooted aquatic plants and algae) and converted into protoplasm during the process of photosynthesis. Conversely, the (unresistant or digestible) organic forms of nitrogen and

phosphate are oxidized back into their biogenic salts during the process of aerobic respiration, *e.g.*, organic decomposition, heterotrophic activity.

The primary forms of these biogenic salts are nitrate and orthophosphate. However, nitrate may be substituted by some plants for other forms of nitrogen, such as ammonia. Also of importance, orthophosphate may be accumulated and stored as polyphosphates by some algae, thereby alleviating a potential future phosphate limiting condition.

Importantly, other limiting factors such as low light and low dissolved oxygen could play as important, if not more important, roles in limiting the rate of primary production and decomposition in the streams of the Palmer Ranch, respectively. For example, if the availability of inorganic nitrogen is high and the N_i:P_i ratio is low, *e.g.*, 2:1, it would indicate that some factor other than inorganic nitrogen is the real limiting factor. Even so, determinations and the use of nutrient ratios in light of other important and potentially limiting factors is helpful in evaluating the results of long-term monitoring programs when nutrient loading and its consequences are major concerns, such as for the "Continuing Surface Water Quality Monitoring Program."

Results of the seventh year of monitoring were used to determine the molar ratios of nitrogen to phosphorus in the streams of the Palmer Ranch. Total nitrogen to total phosphorus ratios (N_t:P_t) are provided in Appendix Table A-17 with ratios of inorganic nitrogen (ammonia, nitrite, and nitrate) to orthophosphate (N_i:P_i) being given in Appendix Table A-18.

The N_i:P_i ratios are consistently low and found to average approximately 5:1, indicative of conditions in which fixed inorganic nitrogen would limit plant growth before orthophosphate. In contrast, N_t:P_t ratios were found to average 23:1 which indicates conditions in which phosphate would limit plant growth in an excess of nitrogen. The lower N_i:P_i ratios are attributed to the naturally high levels of orthophosphate, as well as the high percentage of total phosphorus represented by orthophosphate (63 percent of total phosphorus) while approximately 92 percent of the total nitrogen is comprised of organic nitrogen.

The most meaningful ratio in assessing nutrient limiting conditions is based on the inorganic forms (biogenic salts as previously discussed) since these constituents are immediately available to the primary producers whereas even the unresistant organic forms must be chemically transformed into the inorganic forms prior to photosynthesis. During the seventh year of monitoring, the N_i:P_i ratios found were generally indicative of excess phosphorus with respect to nitrogen during the four quarterly events. In June, N_i:P_i ratios averaged approximately 2:1 and increased to 12:1 during September. The N_i:P_i ratio for both the March and December monitoring events was approximately 9:1. In a comparison of the different drainage basins, the Catfish Creek\Trunk Ditch Basin exhibited a yearly average of 11:1 whereas the South Creek Basin was much lower, averaging 0.8:1. Within the Catfish Creek\Trunk Ditch Basin, the reconstructed segment (*i.e.*, Stations CC-3 and CC-4) exhibited a higher ratio of 21:1. Perhaps these somewhat elevated ratios observed in the Catfish Creek\Trunk Ditch Basin resulted from the runoff of fertilizers originating from one or both of the adjacent golf courses.

4.5 Oils and Greases

As provided in Appendix Table A-19, the concentration of oil and grease in the streams of the Palmer Ranch was found to range from < 1.0 mg/l to 11.2 mg/l during the seventh year of monitoring. Only one of the 46 measurements during the past year of monitoring (*i.e.*, Station SC-7 for the March 1991 event) exceeded the State standard of 5 mg/l specified in FAC Chapter 17-302. None of the 46 measurements exceeded the Sarasota County standard of 15 mg/l.

Most of the oil and grease measurements above the 1.0 mg/l detection limit were observed during the March and June 1991 monitoring events with none of the measurements for the September 1991 monitoring event being above 1.0 mg/l. The elevated oil and grease levels coincide with the period of lowest stream flows which occurred for the March and December events.

The elevated oils and greases concentrations are attributed to sources of oils and greases on and/or upstream of the Palmer Ranch and are probably associated with the natural decay of vegetation during extended dry periods followed by their removal by the storm water runoff which occurred in the two weeks preceding the monitoring events.

The concentrations of oils and greases reported in the streams of the Palmer Ranch during the previous years of the monitoring program (Palmer Venture, 1986, and CCI, 1986, 1988, 1988b, and 1991), ranged from less than 1 mg/l to 17 mg/l. Most of the observations (198 of 205) were found to be less than the maximum allowable State criteria of 5 mg/l and only one was found to be greater than the maximum allowable County criteria of 15 mg/l.

4.6 Bacteriological Parameters

4.6.1 Total Coliform

As indicated in Appendix Table A-20, the streams traversing the Palmer Ranch were found to exhibit frequent violations of the State and County standards for total coliform bacteria during the 1991 monitoring year. Both the State and County standards, which allow up to 2,400 colonies/100 ml, were exceeded in 31 of the 46 samples (*i.e.* 67 percent) collected during the 1991 monitoring year. Highest concentrations were observed in the upper reach of the Catfish Creek\Trunk Ditch Basin at Stations CC-1 and CC-2 as was also observed during 1990 monitoring year.

During the third, fourth, and sixth monitoring years (CCI, 1988, 1988b, and 1991), the total coliform concentrations were also found to commonly exceed the State and County standards with 43, 57, and 40 percent of the results being higher than the 2,400 colonies/100 ml criteria, respectively. Even higher coliform densities and a higher frequency of violations were observed during the first two years of monitoring. During the first year of monitoring, Palmer Venture (1986) reported non-compliance bacteria levels for 71 percent of the measurements made. During the second year (CCI, 1986) 68 percent of the samples taken were determined to exceed the 2,400 colonies/100 ml standard.

As during previous years, the highest number of total coliform colonies were observed during the 1991 wet season with a mean level of 10,400 colonies/100 ml being observed for the June 1991 monitoring event. This trend is expected since the primary mode of

transport of the coliform bacteria to the streams traversing the ranch is surface runoff, consequently resulting in seasonal trends associated with the amount of rainfall.

As noted in previous years (CCI, 1988, 1988b, 1991), these data show that several sources of coliform bacteria exist on and upstream of the Palmer Ranch. A primary source is expected to be the naturally occurring coliform bacteria of the soils and vegetation on and upstream of the ranch. During periods of land clearing coupled with significant runoff, this source is expected to be exacerbated. Such a condition probably occurred during the second and third monitoring years in the Catfish Creek\Trunk Ditch Basin as the construction of Prestancia was initiated. Another source of coliform bacteria is represented by the warm-blooded animals inhabiting the watershed, including cattle, birds, feral hogs, deer, and rodents.

4.6.2 Fecal Coliform

During the seventh year of monitoring, the streams of the Palmer Ranch exhibited fecal coliform densities which ranged from 9 to >16,000 colonies/100 ml (Appendix Table A-21) as compared to a range of 4 to 16,000 colonies/100 ml during the sixth year (CCI, 1991). Of the 46 samples which were collected during the seventh year of monitoring, 15 (*i.e.* 33 percent) exceeded the Class III State and County Standard of 800 colonies/100 ml. Similar numbers of exceedances were recorded during the third, fourth, and sixth monitoring years, however, fewer samples were collected during the fourth year than during the third and sixth years of monitoring.

The highest number of fecal coliform colonies and the greatest number of exceedances during the 1991 monitoring year generally occurred in the upper reach of the Catfish

Creek\Trunk Ditch Basin probably due to a greater number of warm blooded animals in the stream communities associated with the developed portion of the Palmer Ranch. The high fecal coliform bacteria levels were observed both upstream and internal to the Palmer Ranch, indicate significant sources of fecal coliform bacteria originating both upstream and within the ranch, with birds, cattle, and other warm-blooded wild animals considered the primary sources.

4.7 Trace Elements

During the September 1991 monitoring event, samples were collected for the analyses of trace elements (*i.e.*, arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc). The results of these analyses are provided in Appendix Table A-22 along with the applicable State and County Standards for each element. The concentrations of lead, mercury, and nickel were below the analytical detection limits at all monitoring locations. Therefore, the concentrations of these metals found in the streams of the Palmer Ranch during the 1991 monitoring year are in compliance with all applicable State and County water quality criteria.

Arsenic concentrations ranging from <0.005 to 0.012 mg/l were found during 1991 with an average of 0.005 mg/l. Of the thirteen measurements made during the September 1991 monitoring event, none exceeded the State Standard of 0.05 mg/l, while one was in excess of the more stringent 0.01 mg/l criteria of Sarasota County (*i.e*, Station EL-1A). Possible sources of arsenic include the use of arsenic containing pesticides on and upstream of the North Tract of the Palmer Ranch.

The concentration of zinc determined for the thirteen monitoring stations during 1991 ranged from <0.005 to 0.014 mg/l with an average of less than 0.005 mg/l. None of the thirteen zinc concentrations determined during the September 1991 monitoring event exceeded the State standard of 0.03 mg/l, with only one being in excess of the more stringent 0.01 mg/l criteria of Sarasota County (*i.e*, Station SC-3). Possible sources of zinc include the use of zinc containing fertilizers and runoff from roads and parking areas on and upstream of the Palmer Ranch.

During the September 1991 monitoring event, the concentrations of cadmium, chromium and copper at only one monitoring station (*i.e.* EL-1A) were above analytical detection limits for these metals. Of the trace metals found at Station EL-1A during the September event, only cadmium exceeded the State Standard. The cadmium concentration of 3.2 µg/l concentration measured at EL-1A is above the 1.2 µg/l State standard but, was well below the 0.01 mg/l County criteria. The elevated concentrations of trace metals measured at Station EL-1A are probably associated with the high TSS and turbidity levels observed for this site during the September event. Since the elevated metal concentrations at EL-1A appear to have resulted from a disturbance of the bottom sediments in the vicinity of this site prior to sampling, this is not believed to represent a new source of pollutants for the streams traversing the Palmer Ranch.

4.8 Organochlorine Pesticides and PCBs

Analyses for organochlorine pesticides and polychlorinated biphenyls (PCBs) were performed on samples collected during the September 1991 monitoring event. The results of these analyses are provided in Appendix Table A-23 along with the applicable

State and County Standards. The results indicate that the concentrations of all pesticides and PCBs were below their respective analytical detection limits. Therefore, no violations of the applicable water quality criteria were observed during the 1991 monitoring year.

5.0 SUMMARY

During the seventh year of the "Continuing Surface Water Quality Monitoring Program", sampling was performed at 13 stations located in the streams of the Palmer Ranch over the period from January through December 1991. Quarterly monitoring events were performed during the March, June, September, and December 1991. Monitoring during the previous six years was performed at approximately the same 13 locations. Minor changes in the location of Stations CC-2, CC-4, and El-1A (EL-1) were made during the second and third years. However, monitoring was performed bimonthly during the first year and subsequently changed to a quarterly frequency at the beginning of the second year of monitoring. The results of the first six years of monitoring may be reviewed in the annual reports prepared by Palmer Venture (1986) and CCI (1986, 1988, 1988b, 1990, and 1991).

Monitoring of the Palmer Ranch streams entailed measurements of conductivity, water temperature, suspended solids, turbidity, dissolved oxygen, pH, biochemical oxygen demand, macronutrients, oils and greases, and bacteriological quality during each sampling event. The results of the seventh year of monitoring are summarized in Table 5.1. A complete tabulation of the results is provided in Appendix A.

The seventh year of monitoring exhibited a less than normal amount of rainfall with approximately 44 inches of precipitation occurring on the Palmer Ranch. During the sixth monitoring year only 38 inches of precipitation were recorded while during the third and fourth years of monitoring 51 and 52 inches of rainfall were reported, respectively. However, a drought was experienced during much of the second year during which only

TABLE 5.1 SUMMARY OF RESULTS FOR THE PALMER RANCH WATER QUALITY MONITORING PROGRAM FOR THE PERIOD FROM JANUARY THROUGH DECEMBER, 1991.

Parameter	CC-1 Mean	CC-2 Mean	CC-3 Mean	CC-4 Mean	CC-5 Mean	Catfish Creek Basin Mean	N	Min.	Max.	Applicable Criteria
PHYSICAL										
Depth (ft.)	1.48	0.46	0.69	0.65	1.29	0.91	20	0.00	2.43	-----
Flow (GPM)	237.0	67.1	166.1	332.9	793.1	319.2	20	0.0	1530.5	-----
Temperature (°C)	21.6	23.6	22.5	25.0	25.9	23.7	19	15.6	30.4	-----
Conductivity (µmho/cm)	728	901	1228	924	923	943	19	628	1332	+ 50%, +100%[a]
Total Suspended Solids (mg/l)	2.6	45.7	1.5	6.0	2.5	9.9	19	<1	87.0	-----
Turbidity (NTU)	3.5	11.9	10.7	9.6	2.9	7.5	19	0.8	29.0	+29, +25[b]
OXYGEN DEMAND AND RELATED PARAMETERS										
BOD, 5-Day (mg/l)	1.5	1.8	0.5	2.3	0.9	1.4	19	<0.1	2.5	-----
Dissolved Oxygen (mg/l)	3.6	4.4	3.0	7.5	7.2	5.2	19	0.6	12.3	≥5, ≥4[c]
pH	7.2	7.2	7.1	7.2	7.7	7.3	19	6.7	8.00	6.0 - 8.5
MACRONUTRIENTS										
Nitrite Nitrogen (mg/l)	0.01	<0.01	0.01	<0.01	0.01	0.01	19	<0.01	0.04	-----
Nitrate Nitrogen (mg/l)	0.15	<0.01	0.19	0.01	0.02	0.08	19	<0.01	0.27	-----
Ammonia Nitrogen (mg/l)[d]	0.20	<0.02	0.08	0.05	<0.02	0.07	19	<0.02	0.65	-----[e]
Organic Nitrogen (mg/l)	0.65	1.76	0.77	1.15	0.94	1.02	19	0.55	2.19	-----
Total Nitrogen (mg/l)	1.01	1.77	1.05	1.21	0.97	1.17	19	0.73	2.20	-----
Total Reactive Phosphate (mg/l)	0.17	0.15	0.03	0.04	0.03	0.08	19	<0.01	0.26	-----
Total Phosphorus (mg/l)	0.21	0.37	0.06	0.10	0.06	0.15	19	0.01	0.62	-----
ORGANIC CONSTITUENTS										
Oils and Greases (mg/l)	<1.0	1.0	<1.0	1.0	1.2	<1.0	19	<1.0	2.0	≤5, ≤15[c]
BIOLOGICAL										
Total Coliform (#/100 ml)	14250	11667	5000	2198	6900	7810	19	280	>16000	≤2400
Fecal Coliform (#/100 ml)	10650	3267	955	384	237	3090	19	9	>16000	≤800

TABLE 5.1 SUMMARY OF RESULTS FOR THE PALMER RANCH WATER QUALITY MONITORING PROGRAM FOR THE PERIOD FROM JANUARY THROUGH DECEMBER, 1991 (CONTINUED).

Parameter	SC-1 Mean	SC-2 Mean	SC-3 Mean	SC-4 Mean	SC-7 Mean	SC-8 Mean	South Creek Basin Mean	N	Min.	Max.	Applicable Criteria
PHYSICAL											
Depth (ft.)	0.94	0.77	0.69	0.54	1.32	0.56	0.80	24	0.00	2.05	-----
Flow (GPM)	83.9	270.4	46.0	55.0	402.2	794.8	275.4	24	0.0	2042.2	-----
Temperature (°C)	23.4	23.0	23.7	22.7	21.8	23.3	23.0	19	13.3	28.7	-----
Conductivity (µmho/cm)	867	872	847	1050	764	734	866	19	472	1263	+ 50%, +100%[a]
Total Suspended Solids (mg/l)	9.3	4.0	3.7	9.2	1.5	4.0	5.5	19	<1	19.0	-----
Turbidity (NTU)	5.2	2.6	2.6	9.2	1.6	2.2	4.2	19	0.9	15.2	+29, +25[b]
OXYGEN DEMAND AND RELATED PARAMETERS											
BOD, 5-Day (mg/l)	2.0	1.3	1.6	2.1	0.7	0.8	1.4	19	0.3	4.3	-----
Dissolved Oxygen (mg/l)	3.7	2.9	2.8	4.6	3.4	4.5	3.7	19	1.0	8.4	≥5, ≥4[c]
pH	7.3	7.1	7.4	7.1	7.5	7.1	7.2	19	6.1	8.3	6.0 - 8.5
MACRONUTRIENTS											
Nitrite Nitrogen (mg/l)	<0.01	<0.01	0.02	0.02	<0.01	0.01	0.01	19	<0.01	0.06	-----
Nitrate Nitrogen (mg/l)	<0.01	0.01	0.07	0.02	0.03	0.03	0.03	19	<0.01	0.13	-----
Ammonia Nitrogen (mg/l)[d]	0.04	0.02	0.11	0.14	0.02	<0.02	0.06	19	<0.02	0.41	-----[e]
Organic Nitrogen (mg/l)	1.53	1.37	1.16	1.50	1.30	1.16	1.35	19	0.98	1.93	-----
Total Nitrogen (mg/l)	1.58	1.40	1.36	1.70	1.36	1.19	1.44	19	1.04	2.41	-----
Total Reactive Phosphate (mg/l)	0.24	0.44	0.41	0.24	0.35	0.26	0.32	19	0.08	0.67	-----
Total Phosphorus (mg/l)	0.34	0.49	0.49	0.32	0.40	0.28	0.38	19	0.13	0.81	-----
ORGANIC CONSTITUENTS											
Oils and Greases (mg/l)	<1.0	1.5	1.9	1.0	4.1	<1.0	1.6	19	<1.0	11.2	≤5, ≤15[c]
BIOLOGICAL											
Total Coliform (#/100 ml)	1800	3567	8700	6875	6167	2167	4984	19	500	>16000	≤2400
Fecal Coliform (#/100 ml)	180	224	2100	3850	220	270	1286	19	22	9000	≤800

TABLE 5.1 SUMMARY OF RESULTS FOR THE PALMER RANCH WATER QUALITY MONITORING PROGRAM FOR THE PERIOD FROM JANUARY THROUGH DECEMBER, 1991 (CONTINUED).

Parameter	EL-1 Mean	NC-6 Mean	All Stations Mean	N	Min.	Max.	Applicable Criteria
PHYSICAL							
Depth (ft.)	0.58	0.52	0.81	52	0.00	2.43	-----
Flow (GPM)	0.0	65.3	254.9	52	0.0	2042.2	-----
Temperature (°C)	23.6	20.4	23.1	46	13.3	30.4	-----
Conductivity (µmho/cm)	1048	740	903	46	472	1332	+ 50%, +100%[a]
Total Suspended Solids (mg/l)	75.0	4.5	13.3	46	<1	280.0	-----
Turbidity (NTU)	31.1	6.3	8.1	46	0.8	106.0	+29, +25[b]
OXYGEN DEMAND AND RELATED PARAMETERS							
BOD, 5-Day (mg/l)	3.97	1.1	1.6	46	<0.1	7.4	-----
Dissolved Oxygen (mg/l)	3.3	1.0	4.0	46	0.4	12.3	≥5, ≥4[c]
pH	6.8	6.8	7.2	46	5.8	8.3	6.0 - 8.5
MACRONUTRIENTS							
Nitrite Nitrogen (mg/l)	<0.01	<0.01	0.01	46	<0.01	0.06	-----
Nitrate Nitrogen (mg/l)	0.01	<0.01	0.05	46	<0.01	0.27	-----
Ammonia Nitrogen (mg/l)[d]	0.03	0.04	0.06	46	<0.02	0.65	-----[e]
Organic Nitrogen (mg/l)	2.45	1.17	1.29	46	0.55	4.82	-----
Total Nitrogen (mg/l)	2.50	1.21	1.40	46	0.73	4.89	-----
Total Reactive Phosphate (mg/l)	0.12	0.12	0.19	46	<0.01	0.67	-----
Total Phosphorus (mg/l)	0.80	0.16	0.30	46	0.01	2.59	-----
ORGANIC CONSTITUENTS							
Oils and Greases (mg/l)	1.2	1.1	1.2	46	<1.0	11.2	≤5, ≤15[c]
BIOLOGICAL							
Total Coliform (#/100 ml)	>16000	2575	6900	46	280	>16000	≤2400
Fecal Coliform (#/100 ml)	500	860	1926	46	9	16000	≤800

[a]State Criteria allows 50% increase above background to 1275 µmhos/cm and County Ordinance 72-37 allows 100% increase above background to 500 µmhos/cm.
[b]State Criteria allows a maximum increase of 29 NTU above background and County Ordinance 72-37 allows a maximum increase of 25 JTU above background.
[c]State and County Criteria, respectively.
[d]Ionized plus non-ionized ammonia.
[e]State Criteria allows a maximum of 0.02 mg/l unionized ammonia, County Criteria allows a maximum unionized ammonia concentration of 0.2 to 2.0 mg/l depending on pH.

33 inches of rainfall was recorded. The historical amount of rainfall for the region based on a 30-year record is 56 inches per year (NOAA, 1982). Consequently, the streams of the Palmer Ranch exhibited below normal flows during much of the seventh monitoring year.

The streams of the North Tract exhibited a range in specific conductance from 472 to 1,332 micromhos per centimeter (μmhos/cm), as compared with similar ranges of 422 to 1,406 and 620 to 1,430 μmhos/cm observed during the third and fourth monitoring years, respectively. A higher range of 587 to 1,625 μmhos/cm was determined during the sixth monitoring year. The higher conductivities found during the sixth year might have been associated to the droughty conditions and the subsequent lack of low conductivity rainfall and stormwater runoff entering the streams.

Seasonally lower conductivities were recorded during the quarterly surveys in June and September 1991. These lower conductivities most likely resulted from the cumulative effects of increased surface runoff of low conductivity stormwater during the early spring wet period.

During the previous years of monitoring, the streams of the Palmer Ranch have exhibited an annual cycle of suspended solids. Each annual cycle has consistently exhibited a peak during the wet season with lower TSS levels during drier period of the year. During the seventh year of monitoring, the peak in suspended solids occurred during the September monitoring event with an average of 32 mg/l.

Apparently this annual cycle of suspended solids is related to a combination of the annual distribution of rainfall and seasonal changes in primary production. Additionally, an apparent ongoing trend in suspended solids during the previous years is also related to these factors. During the 1991 monitoring year, the streams of the ranch exhibited a slightly lower average TSS level than determined for the third and fourth monitoring years but, higher than that observed during the 1990 monitoring year. The lower TSS levels observed during 1990 are probably associated to the lack of stormwater runoff and the associated reduction in mass transport. Turbidity also followed these same trends as evidenced by its strong positive correlation with total suspended solids (*i.e.*, $r = 0.96$).

Five-day biochemical oxygen demand (BOD_5) was found to average 1.6 mg/l in the streams of the ranch, considerably lower than the levels observed during the previous monitoring years. During the previous monitoring years there has been a continuing reduction in the BOD levels observed on the ranch. This trend is indicative of the general improvement in water quality which has been observed. As observed during prior monitoring years, higher BOD_5s indicative of decaying vegetation were recorded at Stations EL-1A, SC-1, SC-4, and CC-4.

Dissolved oxygen averaged 4.0 and ranged from 0.4 to 12.3 mg/l. Higher yearly averages of 6.1, 7.2, and 5.6 mg/l were reported for the third, fourth, and sixth monitoring years, respectively. The lower dissolved oxygen levels observed for 1991 may be associated with the dry conditions experienced during much of the year and the subsequent lack of flow. During 1991, 31 of the 46 dissolved measurements made were below the 5.0 mg/l State Standard.

Although there has been a steady decline in nutrients during the previous years, nutrient concentrations during the 1991 monitoring year occasionally exceed the threshold levels characteristic of eutrophic conditions. During the seventh year, the streams of the Palmer Ranch exhibited annual average total nitrogen and total phosphorus concentrations of 1.4 and 0.30 mg/l, respectively, as compared to similar average total nitrogen and phosphorus concentrations of 1.4 and 0.20 mg/l, respectively, which were observed during the sixth year of monitoring. Higher average total nitrogen and total phosphorus concentrations of 2.6 mg/l and 1.0 mg/l, 1.9 mg/l and 0.47 mg/l, and 1.6 mg/l and 0.45 mg/l, were observed during the second, third, and fourth monitoring years, respectively.

The inorganic nitrogen and phosphorus fractions which are required by plants during the process of photosynthesis were also found to be readily available since orthophosphate represented 63 percent of total phosphorus and inorganic nitrogen represented 8 percent of total nitrogen. Although the availability of inorganic nitrogen was found to be substantial, its low molecular ratio to orthophosphate implies that nitrogen should become limiting to primary producers in the streams of the ranch before phosphate. Ratios of inorganic nitrogen to inorganic phosphorus were found to average 5:1, as compared to algal protoplasm which is approximately 16:1. These results were comparable to previous monitoring results as orthophosphate represented from 62 to 84 percent of total phosphorus, inorganic nitrogen represented from 8 to 17 percent of the total nitrogen, and the ratio of inorganic nitrogen to inorganic phosphorus averaged from 10:1 to 2:1, during the previous years of monitoring

Potential sources of nutrients upstream of the Palmer Ranch include a former dairy farm which was changed to a sod farm in August 1987, a golf course, and mobile home park located in the South Creek Basin. In the Catfish Creek-Trunk Ditch Basin, nutrients are subject to being transported onto the ranch by surface runoff originating in the commercial-industrial strip development along Clark Road and originating in the country club development located in the western part of the Catfish Creek\Trunk Ditch Basin. Within the ranch, potential nutrient sources include Prestancia (golf course and residential development), spray irrigation fields (Central County Regional Utilities), and active pastures. Additionally, rainfall and surficial phosphate deposits represent two ubiquitous sources of phosphate and fixed nitrogen throughout the basins of the ranch.

During the seventh year of monitoring, oils and greases exceeded the State Standards of 5 mg/l only on one occasion (*i.e.*, at Station SC-7 during the March monitoring event). During 1991, oil and grease exhibited a range of < 1 to 11.2 mg/l. In fact most observations showed less than detectable levels. Sources of oils and greases in the South Creek Basin include runoff from the trailer park, golf course, roads, and natural vegetation associations into the western branch of South Creek. During the previous years of monitoring, oils and greases exhibited a range of < 1 - 17 mg/l while only seven of the 205 earlier samples (3 percent) were found to exceed the State standard, and only one measurement exceeded the 15 mg/l County standard.

The bacteriological quality of the streams of the Palmer Ranch was found to be poor, as total coliform and fecal coliform counts were frequently out of compliance with applicable standards. Of the 46 total coliform analyses performed during the seventh year, 31

exceeded the maximum allowable limit of 2,400 colonies/100 ml. Similarly, 15 of the 46 fecal coliform counts were found to exceed the maximum allowable limit of 800 colonies/100 ml. The primary sources of coliform bacteria within the Palmer Ranch are expected to include cattle and birds as well as the naturally occurring soil bacteria.

During storm events which frequently occur during the early spring and late summer, it is likely that more fecal and non-fecal coliform bacteria are transported by surface runoff to the streams of the Palmer Ranch than at other times of the year. However, during the drier periods of the year, it is likely that birds, cattle, and other warm blooded animals, which are the sources of fecal coliform bacteria, are attracted to the streams to water and feed, thereby resulting in an increase in fecal coliform counts.

During the September 1991 monitoring event, samples were collected for the analyses of trace elements (*i.e.*, arsenic, cadmium, chromium, copper, lead, mercury, nickel,and zinc) and organochlorine pesticides and PCBs. The concentrations of lead mercury and nickel were determined to be below the analytical detection limits at all monitoring stations. Therefore, the concentrations of these metals found during the 1991 monitoring year are in compliance with all State and County water quality criteria.

Arsenic concentrations ranging from <0.005 to 0.012 mg/l were found during 1991 with an average of 0.005 mg/l. Of the thirteen measurements made during 1991, none exceeded the State Standard of 0.05 mg/l, while one was in excess of the more stringent 0.01 mg/l criteria of Sarasota County (*i.e*, Station EL-1A).

The concentration of zinc determined for the thirteen monitoring stations during 1991 ranged from <0.005 to 0.014 mg/l with an average of less than 0.005 mg/l. None of the thirteen zinc concentrations determined exceeded the State standard of 0.03 mg/l, with only one being in excess of the more stringent 0.01 mg/l criteria of Sarasota County (*i.e*, Station SC-3). Possible sources of zinc include the use of zinc containing fertilizers and runoff from roads and parking areas on and upstream of the Palmer Ranch.

During the September 1991 monitoring event, the concentrations of cadmium, chromium and copper at only one monitoring station (*i.e.* EL-1A) were above analytical detection limits for these metals. Of the trace metals found at Station EL-1A during the September event, only cadmium exceeded the State Standard. The cadmium concentration of 3.2 µg/l concentration measured at EL-1A is above the 1.2 µg/l State standard but, was well below the 0.01 mg/l County criteria. The elevated concentrations of trace metals measured at Station EL-1A are probably associated with the high TSS and turbidity levels observed for this site during the September event and is not believed to represent a new source of pollutants for the streams traversing the Palmer Ranch.

Analyses for organochlorine pesticides and polychlorinated biphenyls (PCBs) were performed on samples collected during the September monitoring event. The results of the analyses indicate that the concentrations of all pesticides and PCBs were below their respective analytical detection limits. Therefore, no violations of the applicable water quality criteria were observed during the 1991 monitoring year.

6.0 REFERENCES

American Public Health Association 1985. Standard Methods for the Examination of Water and Wastewater, 16th Edition. American Public Health Association.

Bradley, J. T. 1974. The Climate of Florida. In: Climates of the States. Vol. I - Eastern States. Water Information Center, Port Washington, New York.

Conservation Consultants, Inc. 1991. Annual Report VI of the Continuing Surface Water Quality Monitoring Program for the Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Conservation Consultants, Inc. 1990. Annual Report V of the Continuing Surface Water Quality Monitoring Program for the Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Conservation Consultants, Inc. 1988b. Annual Report IV of the Continuing Surface Water Quality Monitoring Program for the Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Conservation Consultants, Inc. 1988. Annual Report of the Continuing Surface Water Quality Monitoring Program for the Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Conservation Consultants, Inc. 1987. Evaluation of Diurnal Variations in Dissolved Oxygen, The Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Conservation Consultants, Inc. 1986. Annual Report of the Continuing Surface Water Quality Monitoring Program for the Palmer Ranch, Sarasota County, Florida. Prepared for Palmer Venture.

Florida Department of Environmental Regulation. 1990. 1990 Florida Water Quality Assessment 305(b) Technical Appendix.

Florida Department of Environmental Regulation. 1990. Rule No.: Chapter 17-302, Water Quality Standards.

Florida Department of Environmental Regulation. 1989. Typical Water Quality Values for Florida's Lakes, Streams, and Estuaries.

Florida Department of Environmental Regulation. 1983. Discharge of Nutrients to Freshwater Lakes, Workshop, March 1983.

6.0 REFERENCES (Continued)

Florida Division of State Planning. 1975. The Florida General Soils Atlas.

GESAMP. 1987. Land\Sea Boundary Flux of Contaminants: Contribution From Rivers. Reports and Studies No. 32. Unesco. 172 pp.

Goodell, T.W. 1985. Quarterly Report. First Quarter of the Continuing Surface Water Quality Monitoring Program. April 1985 - March 1986.

Goodell, T.W. 1986. Correspondence to Mr. Russell Klier on July 24, 1986, regarding Stormwater Monitoring Event.

Goodell, T.W. 1985. Personal Communication with Conservation Consultants, Inc. regarding sampling sites, frequency, and parameters to be monitored for the Continuing Surface Water Quality Monitoring Program.

Hynes, H. B. N. 1966. The Biology of Polluted Waters. Liverpool University Press, Liverpool.

N.O.A.A. 1982. Monthly Normals of Temperature, Precipitation and Heating/Cooling Degree-Days for the period of 1951 - 1980 for the State of Florida. Extract of Climatology of the United States. No. 81. National Climatic Center, Ashville, NC.

N.O.A.A. 1977. Local Climatological Data. Annual Summary.

Odum, E. P. 1959. Fundamentals of Ecology. W. B. Saunders Company, Philadelphia and London.

Palmer Venture. 1986. Surface Water Quality Monitoring and Assessment of the Palmer Ranch, Sarasota County Florida.

Patton and Associates. 1984. Surface Water Management Plan. Appendix B. Groundwater Management Plan.

Sarasota County. 1972. Ordinance No. 72-37.

Sheldon, R.P. 1982. Phosphate Rock. Scientific American. Vol. 246:6, pp 45-51.

Thompson, R. B. 1976. Florida Statistical Abstract. University Presses, University of Florida, Gainesville, Florida.

6.0 REFERENCES (Continued)

Thompson, Stephen. 1987. Personal Communication with Conservation Consultants, Inc. regarding his directive to discontinue the "Continuing Surface Water Quality Monitoring Program" until further notice, effective August 1987.

United States Environmental Protection Agency. 1983. Methods for the Chemical Analysis of Water and Wastes, EPA - 600/4-79-0210, National Environmental Research Center, Cincinnati, Ohio.

United States Environmental Protection Agency. 1982. Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057. Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.

United States Geological Survey. 1982. Measurement and Computation of Stream Flow. Vol. I Measurement of Stage and Discharge. Water Supply Paper 2175.

Wetzel, R. G. 1975. The Nitrogen Cycle. In Limnology. W. B. Saunders Company, Philadelphia.

APPENDIX A:
WATER QUALITY DATA

Appendix Table A - 1
Continuing Surface Water Quality Monitoring Program
Stream Stage (ft.)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	1.80	0.75	0.60	0.70	0.70	0.91	0.50	0.58	1.22	1.12	1.03	0.78	2.05	0.65	1.10	0.96	0.48	0.50	2.05	13
June 17-18, 1991	2.14	0.48	0.80	0.80	1.13	1.07	0.52	0.49	1.01	1.10	0.78	0.32	1.44	0.96	0.94	0.92	0.48	0.32	2.14	13
Sept. 9-10, 1991	1.50	0.61	0.84	0.34	0.90	0.84	0.72	0.56	1.54	0.87	0.94	0.65	1.79	0.62	1.07	0.91	0.43	0.34	1.79	13
Dec. 9, 1991	0.48	0.00	0.52	0.76	2.43	0.84	0.58	0.44	0.00	0.00	0.00	0.40	0.00	0.00	0.40	0.43	0.66	0.00	2.43	13
Mean	1.48	0.46	0.69	0.65	1.29		0.58	0.52	0.94	0.77	0.69	0.54	1.32	0.56						
Minimum	0.48	0.00	0.52	0.34	0.70		0.50	0.44	0.00	0.00	0.00	0.32	0.00	0.00						
Maximum	2.14	0.75	0.84	0.80	2.43		0.72	0.58	1.54	1.12	1.03	0.78	2.05	0.96						
Std. Deviation	0.72	0.33	0.15	0.21	0.78		0.09	0.06	0.66	0.53	0.47	0.21	0.91	0.40						
N	4	4	4	4	4		4	4	4	4	4	4	4	4						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.97	0.75	0.00	2.14	8
CC-3, CC-4 (mid reach)	0.67	0.17	0.34	0.84	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.91	0.61	0.00	2.43	20
SC-4, SC-1 (upper reach - west)	0.74	0.51	0.00	1.54	8
SC-3, SC-7 (upper reach - east)	1.00	0.75	0.00	2.05	8
SC-2, SC-8 (mid reach)	0.66	0.45	0.00	1.12	8
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.80	0.58	0.00	2.05	24
All 13 Stations	0.81	0.55	0.00	2.43	52

[a] Stream Stage measured at sampling site for each station. 0.00 = Station dry.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 2
Continuing Surface Water Quality Monitoring Program
Stream Flow (GPM)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	72.2	17.1	97.8	125.2	683.6	199.0	0.0	90.2	335.7	0.0	0.0	81.7	209.2	680.9	218.9	184.0	240	0.0	683.6	13
June 17-18, 1991	10.8	0.0	237.0	384.2	658.4	258.2	0.0	31.1	0.0	193.0	0.0	31.4	403.1	456.2	180.6	185.1	224.7	0.0	658.4	13
Sept. 9-10, 1991	834.8	251.3	264.8	772.0	1530.5	731.4	0.0	107.7	0.0	888.7	184.0	103.2	996.4	2042.2	702.4	613.5	638.0	0.0	2042.2	13
Dec. 9, 1991	36.1	0.0	64.6	50.3	299.8	89.0	0.0	32.1	0.0	0.0	0.0	3.8	0.0	0.0	3.8	37.0	82.0	0.0	299.8	13
Mean	237.0	67.1	166.1	332.9	793.1		0.0	65.3	83.9	270.4	46.0	55.0	402.2	794.8						
Minimum	10.8	0.0	64.6	50.3	299.8		0.0	31.1	0.0	0.0	0.0	3.8	0.0	0.0						
Maximum	834.8	251.3	264.8	772.0	1530.5		0.0	107.7	355.7	888.7	184.0	103.2	996.4	2042.2						
Std. Deviation	339.4	123.1	100.0	325.8	521.9		0.0	39.5	167.9	442.1	92.0	45.5	429.0	878.5						
N	4	4	4	4	4		4	4	4	4	4	4	4	4						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	152.0	288.3	0.0	834.8	8
CC-3, CC-4 (mid reach)	249.5	240.2	50.3	772.0	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	319.2	394.9	0.0	1530.5	20
SC-4, SC-1 (upper reach - west)	69.5	114.9	0.0	335.7	8
SC-3, SC-7 (upper reach - east)	224.1	344.6	0.0	996.4	8
SC-2, SC-8 (mid reach)	532.6	696.9	0.0	2042.2	8
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	275.4	476.1	0.0	2042.2	24
All 13 Stations	254.9	412.5	0.0	2042.2	52

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 3
Continuing Surface Water Quality Monitoring Program
Water Temperature (°C)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	15.6	17.6	15.9	19.9	23.3	18.5	16.8	14.5	14.4	14.9	15.3	13.5	13.3	15.8	14.5	16.2	2.8	13.3	23.3	13
June 17-18, 1991	26.4	27.6	26.2	30.4	29.8	28.0	28.6	25.5	28.6	27.9	27.0	26.2	26.4	27.6	27.3	27.5	1.5	25.5	30.4	13
Sept. 9-10, 1991	25.3	25.7	26.8	29.2	29.4	27.2	26.6	24.9	27.2	26.3	28.7	28.0	25.8	26.6	27.1	27.0	1.5	24.9	29.4	13
Dec. 9, 1991	18.9	—	21.1	20.7	21.2	20.5	22.6	16.9	—	—	—	23.1	—	—	23.1	20.6	2.1	11.9	23.1	7
Mean	21.6	23.6	22.5	25.0	25.9		23.6	20.4	23.4	23.0	23.7	22.7	21.8	23.3						
Minimum	15.6	17.6	15.9	19.9	21.2		16.8	14.5	14.4	14.9	15.3	13.5	13.3	15.8						
Maximum	26.4	27.6	26.8	30.4	29.8		28.6	25.5	28.6	27.9	28.7	28.0	26.4	27.6						
Std. Deviation	5.2	5.3	5.1	5.5	4.3		5.2	5.6	7.8	7.1	7.3	6.5	7.4	6.5						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	22.4	4.9	15.6	22.6	7
CC-3, CC-4 (mid reach)	23.8	5.1	15.9	30.4	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	23.7	4.8	15.6	30.4	19
SC-4, SC-1 (upper reach - west)	23.0	6.4	13.5	28.6	7
SC-3, SC-7 (upper reach - east)	22.7	6.6	13.3	28.7	6
SC-2, SC-8 (mid reach)	23.2	6.1	14.9	27.9	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	23.0	6.0	13.3	28.7	19
All 13 Stations	23.1	5.3	13.3	30.4	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 4
Continuing Surface Water Quality Monitoring Program
Specific Conductance (µmhos/cm)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	810	949	1332	874	936	980	1049	859	892	1113	1011	1057	845	928	974	973	141	810	1332	13
June 17-18, 1991	703	819	1201	944	862	906	984	719	890	768	824	1070	739	801	849	871	146	703	1201	13
Sept. 9-10, 1991	628	935	1163	787	838	870	964	723	818	735	707	809	707	472	708	791	169	472	1163	13
Dec. 9, 1991	770	---	1215	1092	1055	1033	1197	661	---	---	---	1263	---	---	1263	1036	233	661	1263	7
Mean	728	901	1228	924	923		1048	740	867	872	847	1050	764	734						
Minimum	628	819	1163	787	838		964	661	818	735	707	809	707	472						
Maximum	810	949	1332	1092	1055		1197	859	892	1113	1011	1263	845	928						
Std. Deviation	80	71	73	129	98		105	84	42	209	153	186	72	235						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	802	116	628	949	7
CC-3, CC-4 (mid reach)	1076	189	787	1332	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	943	189	628	1332	19
SC-4, SC-1 (upper reach - west)	971	166	809	1263	7
SC-3, SC-7 (upper reach - east)	805	117	707	1011	6
SC-2, SC-8 (mid reach)	803	213	472	1113	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	866	180	472	1263	19
All 13 Stations	903	184	472	1332	46

[a] Applicable surface water quality criteria: State - Maximum allowable increase of 50 percent above background or to 1275 µmhos/cm which ever is greater;
Sarasota County - Maximum allowable increase of 100 percent above background to a maximum of 500 µmhos/cm.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation; N - number of observations

Appendix Table A - 5
Continuing Surface Water Quality Monitoring Program
Total Suspended Solids (mg/l)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	1	2	<1	1	1	1.1	5	9	1	2	2	4	1	<1	1.7	2.3	2.4	<1	9	13
June 17-18, 1991	4	48	2	11	3	13.6	6	4	19	2	8	13	<1	<1	7.2	9.3	12.8	<1	48	13
Sept. 9-10, 1991	5	87	3	8	3	21.2	280	1	8	8	1	4	3	11	58	32	78	1	280	13
Dec. 9, 1991	<1	—	<1	4	3	2.0	9	4	—	—	—	16	—	—	16	5.3	5.5	<1	16	7
Mean	2.6	45.7	1.5	6.0	2.5		75.0	4.5	9.3	4.0	3.7	9.2	1.5	4.0						
Minimum	<1	2	<1	1	1		5	1	1	2	1	4	<1	<1						
Maximum	5	87	3	11	3		280	9	19	8	8	16	3	11						
Std. Deviation	2.2	42.5	1.2	4.4	1.0		136.7	3.3	9.1	3.5	3.8	6.2	1.3	6.1						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	21.1	33.7	<1	87	7
CC-3, CC-4 (mid reach)	3.7	3.8	<1	11	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	9.9	21.5	<1	87	19
SC-4, SC-1 (upper reach - west)	9.3	6.8	1	19	7
SC-3, SC-7 (upper reach - east)	2.6	2.8	<1	8	6
SC-2, SC-8 (mid reach)	4.0	4.4	<1	11	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	5.5	5.7	<1	19	19
All 13 Stations	13.3	42.7	<1	280	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 6
Continuing Surface Water Quality Monitoring Program
Turbidity (NTU)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	3.3	0.8	11.8	11.1	3.1	6.0	6.2	8.9	1.1	1.8	1.6	4.5	1.3	2.0	2.0	4.4	3.9	0.8	11.8	13
June 17-18, 1991	2.3	6.0	6.3	9.6	1.3	5.1	4.9	5.3	11.3	2.0	4.7	15.2	1.1	0.9	5.9	5.4	4.3	0.9	15.2	13
Sept. 9-10, 1991	6.1	29.0	21.0	10.7	3.2	14.0	106.0	4.0	3.2	4.1	1.5	4.5	2.3	3.8	3.2	15.3	28.4	1.5	106.0	13
Dec. 9, 1991	2.3	—	3.8	6.9	4.0	4.2	7.2	7.0	—	—	—	12.6	—	—	12.6	6.3	3.4	2.3	12.6	7
Mean	3.5	11.9	10.7	9.6	2.9		31.1	6.3	5.2	2.6	2.6	9.2	1.6	2.2						
Minimum	2.3	0.8	3.8	6.9	1.3		4.9	4.0	1.1	1.8	1.5	4.5	1.1	0.9						
Maximum	6.1	29.0	21.0	11.1	4.0		106.0	8.9	11.3	4.1	4.7	15.2	2.3	3.8						
Std. Deviation	1.8	15.0	7.6	1.9	1.1		50.0	2.1	5.4	1.3	1.9	5.5	0.6	1.5						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	7.1	9.8	0.8	29.0	7
CC-3, CC-4 (mid reach)	10.1	5.2	3.8	21.0	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	7.5	7.1	0.8	29.0	19
SC-4, SC-1 (upper reach - west)	7.5	5.4	1.1	15.2	7
SC-3, SC-7 (upper reach - east)	2.1	1.3	1.1	4.7	6
SC-2, SC-8 (mid reach)	2.4	1.2	0.9	4.1	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	4.2	4.2	0.9	15.2	19
All 13 Stations	8.1	15.7	0.8	106.0	46

[a] Applicable surface water quality criteria: State - Allows a maximum increase of 29 NTU; Sarasota County - Allows a maximum increase of 25 JTU above background.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 7
Continuing Surface Water Quality Monitoring Program
5 - Day Biochemical Oxygen Demand (mg/l)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	1.8	1.1	0.8	2.5	1.1	1.5	2.7	0.6	0.8	0.9	1.1	1.2	0.7	0.9	0.9	1.2	0.7	0.6	2.7	13
June 17-18, 1991	1.1	1.9	0.3	2.4	<0.1	1.2	1.9	1.8	4.3	2.4	2.9	3.0	1.0	0.9	2.4	1.8	1.2	<0.1	4.3	13
Sept. 9-10, 1991	1.5	2.5	0.6	2.5	0.7	1.6	7.4	0.7	0.8	0.6	0.9	0.7	0.3	0.6	0.6	1.5	1.9	0.3	7.4	13
Dec. 9, 1991	1.5	—	0.4	1.7	1.8	1.4	3.7	1.3	—	—	—	3.4	—	—	3.4	2.0	1.2	0.4	3.7	7
Mean	1.5	1.8	0.5	2.3	0.9		3.9	1.1	2.0	1.3	1.6	2.1	0.7	0.8						
Minimum	1.1	1.1	0.3	1.7	<0.1		1.9	0.6	0.8	0.6	0.9	0.7	0.3	0.6						
Maximum	1.8	2.5	0.8	2.5	1.8		7.4	1.8	4.3	2.4	2.9	3.4	1.0	2.9						
Std. Deviation	0.3	0.7	0.2	0.4	0.7		2.4	0.6	2.0	1.0	1.1	1.3	0.4	0.2						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	1.6	0.5	1.1	2.5	7
CC-3, CC-4 (mid reach)	1.4	1.0	0.3	2.5	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	1.4	0.8	<0.1	2.5	19
SC-4, SC-1 (upper reach - west)	2.0	1.5	0.7	4.3	7
SC-3, SC-7 (upper reach - east)	1.2	0.9	0.3	2.9	6
SC-2, SC-8 (mid reach)	1.1	0.7	0.6	2.4	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	1.4	1.1	0.3	4.3	19
All 13 Stations	1.6	1.3	<0.1	7.4	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 8
Continuing Surface Water Quality Monitoring Program
Dissolved Oxygen (mg/l)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	4.5	8.0	4.3	8.4	12.3	7.5	7.2	1.4	6.1	3.4	4.8	6.6	5.4	8.4	5.8	6.2	2.8	1.4	12.3	13
June 17-18, 1991	1.7	1.8	0.6	6.2	5.9	3.2	1.6	0.8	2.8	1.9	1.8	3.6	1.0	2.9	2.3	2.5	1.8	0.6	6.2	13
Sept. 9-10, 1991	4.0	3.3	1.5	6.7	3.4	3.8	1.8	1.5	2.3	3.4	1.9	2.6	3.7	2.1	2.7	2.9	1.4	1.5	6.7	13
Dec. 9, 1991	4.4	---	5.5	8.8	7.0	6.4	2.7	0.4	---	---	---	5.7	---	---	5.7	4.9	2.8	0.4	8.8	7
Mean	3.6	4.4	3.0	7.5	7.2		3.3	1.0	3.7	2.9	2.8	4.6	3.4	4.5						
Minimum	1.7	1.8	0.6	6.2	3.4		1.6	0.4	2.3	1.9	1.8	2.6	1.0	2.1						
Maximum	4.5	8.0	5.5	8.8	12.3		7.2	1.5	6.1	3.4	4.8	6.6	5.4	8.4						
Std. Deviation	1.3	3.2	2.3	1.3	3.7		2.6	0.5	2.1	0.9	1.7	1.8	2.2	3.4						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	4.0	2.1	1.7	8.0	7
CC-3, CC-4 (mid reach)	5.2	3.0	0.6	8.8	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	5.2	3.0	0.6	12.3	19
SC-4, SC-1 (upper reach - west)	4.2	1.8	2.3	6.6	7
SC-3, SC-7 (upper reach - east)	3.1	1.8	1.0	5.4	6
SC-2, SC-8 (mid reach)	3.7	2.4	1.9	8.4	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	3.7	2.0	1.0	8.4	19
All 13 Stations	4.0	2.6	0.4	12.3	46

[a] Applicable surface water quality criteria: State - Minimum allowable concentration of 5.0 mg/l; Sarasota County - Minimum allowable concentration of 4.0 mg/l.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 9
Continuing Surface Water Quality Monitoring Program
pH (-log[H^+])[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	7.3	7.5	7.2	7.3	8.0	7.5	7.0	7.1	7.2	7.2	6.9	7.2	7.3	7.6	7.2	7.3	0.3	6.9	8.0	13
June 17-18, 1991	7.2	7.0	6.9	7.1	7.4	7.1	7.0	6.7	7.3	7.0	7.0	7.3	6.8	6.9	7.0	7.0	0.2	6.7	7.4	13
Sept. 9-10, 1991	6.9	7.2	6.7	6.9	7.3	7.0	5.8	6.1	7.3	7.2	8.3	6.1	8.3	6.7	7.3	7.0	0.8	5.8	8.3	13
Dec. 9, 1991	7.6	—	7.5	7.7	8.0	7.7	7.4	7.2	—	—	—	7.9	—	—	7.9	7.6	0.3	7.2	8.0	7
Mean	7.2	7.2	7.1	7.2	7.7		6.8	6.8	7.3	7.1	7.4	7.1	7.5	7.1						
Minimum	6.9	7.0	6.7	6.9	7.3		5.8	6.1	7.2	7.0	6.9	6.1	6.8	6.7						
Maximum	7.6	7.5	7.5	7.7	8.0		7.4	7.2	7.3	7.2	8.3	7.9	8.3	7.6						
Std. Deviation	0.3	0.3	0.3	0.3	0.4		0.7	0.5	0.1	0.1	0.8	0.7	0.8	0.5						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	7.2	0.3	6.9	7.6	7
CC-3, CC-4 (mid reach)	7.2	0.3	6.7	7.7	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	7.3	0.4	6.7	8.0	19
SC-4, SC-1 (upper reach - west)	7.2	0.5	6.1	7.9	7
SC-3, SC-7 (upper reach - east)	7.4	0.7	6.8	8.3	6
SC-2, SC-8 (mid reach)	7.1	0.3	6.7	7.6	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	7.2	0.5	6.1	8.3	19
All 13 Stations	7.2	0.5	5.8	8.3	46

[a] Applicable surface water quality criteria: State and Sarasota County - allowable range of 6.0 - 8.5.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 10
Continuing Surface Water Quality Monitoring Program
Total Nitrogen (mg/l)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.90	1.14	1.08	1.17	0.96	1.05	1.62	1.39	1.24	1.28	1.20	1.11	1.23	1.05	1.18	1.18	0.19	0.90	1.62	13
June 17-18, 1991	0.75	2.20	1.05	1.30	0.86	1.23	1.80	1.26	1.93	1.53	1.84	2.41	1.37	1.07	1.69	1.49	0.52	0.75	2.41	13
Sept. 9-10, 1991	1.67	1.96	1.09	1.17	1.16	1.41	4.89	1.22	1.56	1.40	1.04	1.48	1.47	1.45	1.40	1.66	1.00	1.04	4.89	13
Dec. 9, 1991	0.73	---	0.98	1.20	0.92	0.96	1.68	0.98	---	---	---	1.79	---	---	1.79	1.18	0.40	0.73	1.79	7
Mean	1.01	1.77	1.05	1.21	0.97		2.50	1.21	1.58	1.40	1.36	1.70	1.36	1.19						
Minimum	0.73	1.14	0.98	1.17	0.86		1.62	0.98	1.24	1.28	1.04	1.11	1.23	1.05						
Maximum	1.67	2.20	1.09	1.30	1.16		4.89	1.39	1.93	1.53	1.84	2.41	1.47	1.45						
Std. Deviation	0.44	0.56	0.05	0.06	0.13		1.60	0.17	0.34	0.12	0.42	0.55	0.12	0.22						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	1.34	0.60	0.73	2.20	7
CC-3, CC-4 (mid reach)	1.13	0.10	0.98	1.30	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	1.17	0.38	0.73	2.20	19
SC-4, SC-1 (upper reach - west)	1.65	0.44	1.11	2.41	7
SC-3, SC-7 (upper reach - east)	1.36	0.28	1.04	1.84	6
SC-2, SC-8 (mid reach)	1.30	0.20	1.05	1.53	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	1.44	0.35	1.04	2.41	19
All 13 Stations	1.40	0.64	0.73	4.89	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 11
Continuing Surface Water Quality Monitoring Program
Nitrite (mg/l as N)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.004	<0.01	0.02	13
June 17-18, 1991	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.06	0.01	<0.01	0.02	0.01	0.02	<0.01	0.06	13
Sept. 9-10, 1991	0.04	<0.01	0.02	<0.01	0.02	0.02	0.01	<0.01	0.01	0.01	0.02	0.04	0.01	0.02	0.02	0.02	0.01	<0.01	0.04	13
Dec. 9, 1991	<0.01	—	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	—	—	—	<0.01	—	—	<0.01	<0.01	0.002	<0.01	0.01	7
Mean	0.01	<0.01	0.01	<0.01	0.01		<0.01	<0.01	<0.01	<0.01	0.02	0.02	<0.01	0.01						
Minimum	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01						
Maximum	0.04	<0.01	0.02	0.01	0.02		0.01	<0.01	0.01	0.01	0.03	0.06	0.01	0.02						
Std. Deviation	0.02	0.00	0.007	0.003	0.008		0.003	0.00	0.003	0.003	0.01	0.03	0.003	0.009						
N	4	3	4	4	4		4	4	3	3	3	4	3	4						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.01	0.01	<0.01	0.04	7
CC-3, CC-4 (mid reach)	0.01	0.007	<0.01	0.02	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.01	0.009	<0.01	0.04	19
SC-4, SC-1 (upper reach - west)	0.02	0.02	<0.01	0.06	7
SC-3, SC-7 (upper reach - east)	0.01	0.01	<0.01	0.03	6
SC-2, SC-8 (mid reach)	<0.01	0.006	<0.01	0.02	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.01	0.01	<0.01	0.06	19
All 13 Stations	0.01	0.01	<0.01	0.06	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 12
Continuing Surface Water Quality Monitoring Program
Nitrate (mg/l as N)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.26	<0.01	0.27	<0.01	<0.01	0.11	<0.01	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	0.03	0.06	0.10	<0.01	0.27	13
June 17-18, 1991	0.07	<0.01	0.10	0.01	0.02	0.04	<0.01	<0.01	<0.01	0.01	0.06	0.01	0.04	<0.01	0.02	0.03	0.03	<0.01	0.10	13
Sept. 9-10, 1991	0.13	0.01	0.16	<0.01	0.07	0.07	0.02	<0.01	0.01	0.02	0.02	0.04	0.06	0.07	0.04	0.05	0.05	<0.01	0.16	13
Dec. 9, 1991	0.13	---	0.23	0.02	<0.01	0.10	<0.01	<0.01	---	---	---	0.04	---	---	0.04	0.06	0.09	<0.01	0.23	7
Mean	0.15	<0.01	0.19	0.01	0.02		0.01	<0.01	<0.01	0.01	0.07	0.02	0.03	0.03						
Minimum	0.07	<0.01	0.10	<0.01	<0.01		<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01						
Maximum	0.26	0.01	0.27	0.02	0.07		0.02	<0.01	0.01	0.02	0.13	0.04	0.06	0.07						
Std. Deviation	0.08	0.003	0.07	0.007	0.003		0.008	0.00	0.003	0.008	0.06	0.02	0.03	0.04						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.09	0.09	<0.01	0.26	7
CC-3, CC-4 (mid reach)	0.10	0.11	<0.01	0.27	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.08	0.09	<0.01	0.27	19
SC-4, SC-1 (upper reach - west)	0.02	0.02	<0.01	0.04	7
SC-3, SC-7 (upper reach - east)	0.05	0.04	<0.01	0.13	6
SC-2, SC-8 (mid reach)	0.02	0.03	<0.01	0.07	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.03	0.03	<0.01	0.13	19
All 13 Stations	0.05	0.07	<0.01	0.27	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 13
Continuing Surface Water Quality Monitoring Program
Ammoniacal Nitrogen (mg/l)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch						EL-1A	NC-6	South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean			SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.05	<0.02	0.08	0.09	<0.02	0.05	0.02	<0.02	0.02	<0.02	0.06	0.05	0.03	<0.02	0.03	0.04	0.03	<0.02	0.09	13
June 17-18, 1991	0.07	<0.02	0.12	0.06	<0.02	0.05	0.05	0.04	<0.02	0.04	0.26	0.41	0.03	<0.02	0.13	0.09	0.12	<0.02	0.41	13
Sept. 9-10, 1991	0.65	<0.02	0.09	<0.02	<0.02	0.15	0.04	0.09	0.10	0.02	0.02	0.06	<0.02	<0.02	0.04	0.09	0.17	<0.02	0.65	13
Dec. 9, 1991	0.05	---	0.03	0.04	0.02	0.03	0.03	0.03	---	---	---	0.06	---	---	0.06	0.04	0.01	0.02	0.06	7
Mean	0.20	<0.02	0.08	0.05	<0.02		0.03	0.04	0.04	0.02	0.11	0.14	0.02	<0.02						
Minimum	0.05	<0.02	0.03	<0.02	<0.02		0.02	<0.02	<0.02	<0.02	0.02	0.05	<0.02	<0.02						
Maximum	0.65	<0.02	0.12	0.09	0.02		0.05	0.09	0.10	0.04	0.26	0.41	0.03	<0.02						
Std. Deviation	0.30	0.00	0.04	0.03	0.005		0.01	0.03	0.05	0.02	0.13	0.17	0.01	0.00						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.12	0.23	<0.02	0.65	7
CC-3, CC-4 (mid reach)	0.07	0.04	<0.02	0.12	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.07	0.14	<0.02	0.65	19
SC-4, SC-1 (upper reach - west)	0.10	0.14	<0.02	0.41	7
SC-3, SC-7 (upper reach - east)	0.07	0.09	<0.02	0.26	6
SC-2, SC-8 (mid reach)	0.02	0.01	<0.02	0.04	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.06	0.10	<0.02	0.41	19
All 13 Stations	0.06	0.11	<0.02	0.65	46

[a] Ionized plus un-ionized ammonia (State and County Surface Water Criteria applies only to un-ionized ammonia).
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 14
Continuing Surface Water Quality Monitoring Program
Organic Nitrogen (mg/l)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.59	1.14	0.71	1.08	0.96	0.90	1.60	1.39	1.22	1.28	1.01	1.06	1.20	1.05	1.14	1.10	0.26	0.59	1.60	13
June 17-18, 1991	0.61	2.19	0.82	1.23	0.84	1.14	1.75	1.22	1.93	1.48	1.49	1.93	1.29	1.07	1.53	1.37	0.48	0.61	2.19	13
Sept. 9-10, 1991	0.85	1.95	0.82	1.17	1.07	1.17	4.82	1.13	1.44	1.35	0.98	1.34	1.40	1.36	1.31	1.51	1.04	0.82	4.82	13
Dec. 9, 1991	0.55	—	0.72	1.13	0.90	0.82	1.65	0.95	—	—	—	1.69	—	—	1.69	1.08	0.44	0.55	1.69	7
Mean	0.65	1.76	0.77	1.15	0.94		2.45	1.17	1.53	1.37	1.16	1.50	1.30	1.16						
Minimum	0.55	1.14	0.71	1.08	0.84		1.60	0.95	1.22	1.28	0.98	1.06	1.20	1.05						
Maximum	0.85	2.19	0.82	1.23	1.07		4.82	1.39	1.93	1.48	1.49	1.93	1.40	1.36						
Std. Deviation	0.14	0.55	0.16	0.06	0.10		1.58	0.18	0.36	0.10	0.29	0.38	0.10	0.17						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	1.13	0.68	0.55	2.18	7
CC-3, CC-4 (mid reach)	0.96	0.21	0.71	1.23	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	1.02	0.42	0.55	2.19	19
SC-4, SC-1 (upper reach - west)	1.52	0.34	1.06	1.93	7
SC-3, SC-7 (upper reach - east)	1.23	0.21	0.98	1.49	6
SC-2, SC-8 (mid reach)	1.27	0.17	1.05	1.48	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	1.35	0.28	0.98	1.93	19
All 13 Stations	1.29	0.65	0.55	4.82	46

[a] Organic Nitrogen = Total Kjeldahl Nitrogen - Ammoniacal Nitrogen.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 15
Continuing Surface Water Quality Monitoring Program
Total Phosphate (mg/l as P)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.15	0.08	0.03	0.12	0.04	0.08	0.12	0.15	0.35	0.53	0.16	0.13	0.27	0.19	0.27	0.18	0.14	0.03	0.53	13
June 17-18, 1991	0.26	0.40	0.08	0.11	0.07	0.18	0.31	0.22	0.42	0.59	0.81	0.65	0.64	0.28	0.56	0.37	0.24	0.07	0.81	13
Sept. 9-10, 1991	0.26	0.62	0.08	0.16	0.13	0.25	2.59	0.19	0.26	0.35	0.51	0.31	0.30	0.37	0.35	0.47	0.65	0.08	2.59	13
Dec. 9, 1991	0.16	---	0.04	0.03	0.01	0.06	0.19	0.09	---	---	---	0.19	---	---	0.19	0.10	0.08	0.01	0.19	7
Mean	0.21	0.37	0.06	0.10	0.06		0.80	0.16	0.34	0.49	0.49	0.32	0.40	0.28						
Minimum	0.15	0.08	0.03	0.03	0.01		0.12	0.09	0.26	0.35	0.16	0.13	0.27	0.19						
Maximum	0.26	0.62	0.08	0.16	0.13		2.59	0.22	0.42	0.59	0.81	0.65	0.64	0.37						
Std. Deviation	0.06	0.27	0.03	0.05	0.05		1.19	0.06	0.08	0.12	0.32	0.23	0.21	0.09						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.28	0.18	0.08	0.62	7
CC-3, CC-4 (mid reach)	0.08	0.05	0.03	0.16	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.15	0.15	0.01	0.62	19
SC-4, SC-1 (upper reach - west)	0.33	0.17	0.13	0.65	7
SC-3, SC-7 (upper reach - east)	0.45	0.25	0.16	0.81	6
SC-2, SC-8 (mid reach)	0.39	0.15	0.19	0.59	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.38	0.19	0.13	0.81	19
All 13 Stations	0.30	0.39	0.01	2.59	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 16
Continuing Surface Water Quality Monitoring Program
Orthophosphate (mg/l as P)
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	0.10	0.04	0.01	0.01	0.01	0.03	0.02	0.06	0.31	0.48	0.12	0.08	0.22	0.15	0.23	0.12	0.14	<0.01	0.48	13
June 17-18, 1991	0.22	0.15	0.05	0.05	0.06	0.11	0.19	0.18	0.25	0.52	0.67	0.53	0.59	0.26	0.47	0.29	0.22	0.05	0.67	13
Sept. 9-10, 1991	0.22	0.26	0.06	0.08	0.06	0.14	0.14	0.16	0.17	0.31	0.43	0.27	0.25	0.37	0.30	0.21	0.12	0.06	0.43	13
Dec. 9, 1991	0.14	---	0.02	0.01	<0.01	0.04	0.14	0.09	---	---	---	0.10	---	---	0.10	0.07	0.06	<0.01	0.14	7
Mean	0.17	0.15	0.03	0.04	0.03		0.12	0.12	0.24	0.44	0.41	0.24	0.35	0.26						
Minimum	0.10	0.04	0.01	0.01	<0.01		0.02	0.06	0.17	0.31	0.12	0.08	0.22	0.15						
Maximum	0.22	0.26	0.06	0.08	0.06		0.19	0.18	0.31	0.52	0.67	0.53	0.59	0.37						
Std. Deviation	0.06	0.11	0.02	0.03	0.03		0.07	0.06	0.07	0.11	0.28	0.21	0.21	0.11						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	0.16	0.08	0.04	0.26	7
CC-3, CC-4 (mid reach)	0.04	0.03	0.01	0.08	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	0.08	0.08	<0.01	0.26	19
SC-4, SC-1 (upper reach - west)	0.24	0.15	0.08	0.53	7
SC-3, SC-7 (upper reach - east)	0.38	0.22	0.12	0.67	6
SC-2, SC-8 (mid reach)	0.35	0.14	0.15	0.52	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.32	0.17	0.08	0.67	19
All 13 Stations	0.19	0.17	<0.01	0.67	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 17
Continuing Surface Water Quality Monitoring Program
Total N to Total P Ratios (N_t:P_t)[a]
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	13	31	80	22	53	40	30	20	8	5	17	19	10	12	12	25	21	5	80	13
June 17-18, 1991	6	12	29	26	27	20	13	13	10	6	5	8	5	8	7	13	9	5	29	13
Sept. 9-10, 1991	14	7	30	16	20	17	4	14	13	9	5	11	11	9	9	12	7	4	30	13
Dec. 9, 1991	10	---	54	88	203	89	20	24	---	---	---	21	---	---	21	60	69	10	203	7
Mean	11	17	48	38	76		17	18	10	7	9	15	9	10						
Minimum	6	7	29	16	20		4	13	8	5	5	8	5	8						
Maximum	14	31	80	88	203		30	24	13	9	17	21	11	12						
Std. Deviation	4	13	24	34	86		11	5	3	2	7	6	3	2						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	13	8	6	31	7
CC-3, CC-4 (mid reach)	43	28	16	88	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	39	46	64	203	19
SC-4, SC-1 (upper reach - west)	13	5	8	2.1	7
SC-3, SC-7 (upper reach - east)	9	5	5	17	6
SC-2, SC-8 (mid reach)	8	2	5	12	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	10	5	4	21	19
All 13 Stations	23	32	4	203	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 18
Continuing Surface Water Quality Monitoring Program
Inorganic N to Inorganic P Ratios (N_i:P_i)[a]
January - December, 1991

Sampling Date[a]	Catfish Creek/Trunk Ditch						EL-1A	NC-6	South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean			SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	6.8	0.3	81.8	19.9	1.1	22.0	2.2	0.2	0.1	0.02	3.5	1.4	0.3	0.07	0.9	9.1	22.5	0.02	81.8	13
June 17-18, 1991	1.4	0.2	10.2	3.1	0.7	3.1	0.6	0.5	0.04	0.2	1.1	2.0	0.3	0.04	0.6	1.6	2.7	0.04	10.2	13
Sept. 9-10, 1991	8.2	0.1	9.9	0.1	3.3	4.3	1.1	1.2	1.6	0.4	0.3	1.1	0.6	0.5	0.8	12.5	7.0	0.1	9.9	13
Dec. 9, 1991	2.8	—	28.7	15.5	8.8	14.0	0.5	0.7	—	—	—	2.2	—	—	2.2	8.5	10.4	0.5	28.7	7
Mean	4.8	0.2	32.6	9.6	3.5		1.1	0.7	0.6	0.2	1.7	1.7	0.4	0.2						
Minimum	1.4	0.1	9.9	0.1	0.7		0.5	0.2	0.04	0.02	0.3	1.1	0.3	0.04						
Maximum	8.2	0.3	81.8	19.9	8.8		2.2	1.2	1.6	0.4	3.5	2.2	0.6	0.5						
Std. Deviation	3.2	0.1	33.9	9.5	3.7		0.8	0.4	0.8	0.2	1.7	0.5	0.2	0.3						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	2.8	3.4	0.1	8.2	7
CC-3, CC-4 (mid reach)	21	26	0.1	81.8	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	10.7	18.9	0.1	81.8	19
SC-4, SC-1 (upper reach - west)	1.2	0.8	0.04	2.2	7
SC-3, SC-7 (upper reach - east)	1.0	1.3	0.3	3.5	6
SC-2, SC-8 (mid reach)	0.2	0.2	0.02	0.54	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	0.8	0.9	0.02	3.5	19
All 13 Stations	4.9	12.9	0.02	81.8	46

[a] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 19
Continuing Surface Water Quality Monitoring Program
Oils and Greases (mg/l)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.4	4.6	1.2	11.2	1.4	3.7	2.0	3.1	<1.0	11.2	13
June 17-18, 1991	1.6	2.0	1.6	1.8	1.8	1.8	2.2	1.6	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	0.7	<1.0	2.2	13
Sept. 9-10, 1991	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.0	<1.0	<1.0	13
Dec. 9, 1991	<1.0	—	<1.0	1.0	2.0	1.0	1.8	2.0	—	—	—	2.0	—	—	2.0	1.4	0.7	<1.0	2.0	7
Mean	<1.0	1.0	<1.0	1.0	1.2		1.2	1.1	<1.0	1.5	1.9	1.0	4.1	<1.0						
Minimum	<1.0	<1.0	<1.0	<1.0	<1.0		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0						
Maximum	1.6	2.0	1.6	1.8	2.0		2.2	2.0	<1.0	3.4	4.6	2.0	11.2	1.4						
Std. Deviation	0.5	0.9	0.5	0.6	0.8		0.9	0.8	0.0	1.7	2.4	0.7	6.2	0.5						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	<1.0	0.6	<1.0	2.0	7
CC-3, CC-4 (mid reach)	<1.0	0.5	<1.0	1.8	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	<1.0	0.6	<1.0	2.0	19
SC-4, SC-1 (upper reach - west)	<1.0	0.6	<1.0	2.0	7
SC-3, SC-7 (upper reach - east)	3.0	4.3	<1.0	11.2	6
SC-2, SC-8 (mid reach)	1.1	1.2	<1.0	3.4	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	1.6	2.6	<1.0	11.2	19
All 13 Stations	1.2	1.7	<1.0	11.2	46

[a] Applicable surface water quality criteria: State - Maximum allowable concentration of 5.0 mg/l; Sarasota County - Maximum allowable concentration of 15 mg/l.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 20
Continuing Surface Water Quality Monitoring Program
Total Coliform (count/100 ml)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	>16000	3000	3000	1110	5000	5622	16000	1300	800	700	1100	9000	1100	3000	2617	4700	5509	700	>16000	13
June 17-18, 1991	>16000	16000	5000	5000	16000	11600	16000	3000	2200	5000	>16000	>16000	>16000	3000	9700	10400	6349	2200	>16000	12
Sept. 9-10, 1991	>16000	>16000	3000	2400	5000	8480	>16000	3000	2400	5000	9000	1600	1400	500	3317	6254	5950	500	>16000	13
Dec. 9, 1991	9000	---	9000	280	1600	4970	>16000	3000	---	---	---	900	---	---	900	5683	5836	280	>16000	7
Mean	14250	11667	5000	2198	6900		>16000	2575	1800	3567	8700	6875	6167	2167						
Minimum	9000	3000	3000	280	1600		16000	1300	800	700	1100	900	1100	500						
Maximum	>16000	>16000	9000	5000	16000		>16000	3000	2400	5000	>16000	>16000	>16000	3000						
Std. Deviation	3500	7506	2828	2062	6275		0	850	872	2483	7454	7102	8517	1443						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	13143	5128	3000	>16000	7
CC-3, CC-4 (mid reach)	3599	2738	280	9000	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	7810	6217	280	>16000	19
SC-4, SC-1 (upper reach - west)	4700	5730	800	>16000	7
SC-3, SC-7 (upper reach - east)	7433	7292	1110	>16000	6
SC-2, SC-8 (mid reach)	2887	1971	500	5000	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	4984	5506	500	>16000	19
All 13 Stations	6900	6174	280	>16000	46

[a] Applicable surface water criteria (State and County): Maximum of 2,400/100 ml.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 21
Continuing Surface Water Quality Monitoring Program
Fecal Coliform (count/100 ml)[a]
January - December, 1991

Sampling Date[b]	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
March 11-12, 1991	>16000	500	2400	1110	300	4062	170	70	70	110	800	9000	80	700	1793	2408	4744	70	>16000	13
June 17-18, 1991	9000	300	220	170	140	1966	900	130	300	600	5000	5000	500	80	1913	1718	2803	80	9000	13
Sept. 9-10, 1991	16000	9000	300	240	500	5208	900	240	170	22	500	500	80	30	217	2190	4799	22	16000	13
Dec. 9, 1991	1600	---	900	17	9	632	30	3000	---	---	---	900	---	---	900	922	1097	9	3000	7
Mean	10650	3267	955	384	237		500	860	180	244	2100	3850	220	270						
Minimum	1600	300	220	17	9		30	70	70	22	500	500	80	30						
Maximum	>16000	9000	2400	1110	500		900	3000	300	600	5000	9000	500	700						
Std. Deviation	6876	4966	1010	493	212		465	1428	115	311	2516	3990	242	373						
N	4	3	4	4	4		4	4	3	3	3	4	3	3						

Stations	Mean	STD	Min	Max	N
CC-1, CC-2 (upper reach)	7486	6888	300	>16000	7
CC-3, CC-4 (mid reach)	670	796	17	2400	8
CC-1, CC-2, CC-3, CC-4, CC-5 (entire basin)	3090	5291	9	>16000	19
SC-4, SC-1 (upper reach - west)	2277	3437	70	9000	7
SC-3, SC-7 (upper reach - east)	1160	1902	80	5000	6
SC-2, SC-8 (mid reach)	257	308	22	700	6
SC-1, SC-2, SC-3, SC-4, SC-7, SC-8 (entire basin)	1286	2389	22	9000	19
All 13 Stations	1926	3829	9	>16000	46

[a] Applicable surface water criteria (State and County): Maximum of 800/100 ml.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
STD - standard deviation
N - number of observations

Appendix Table A - 22
Continuing Surface Water Quality Monitoring Program
Trace Elements[a]
September 9 - 10, 1991[b]

Parameter	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
Arsenic	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.012	<0.005	0.006	0.005	0.008	0.006	0.006	0.007	0.006	0.005	0.0003	<0.005	0.012	13
Cadmium, µg/l	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	3.2[d]	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.8	<0.5	3.2	13
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.021	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	<0.005	0.021	13
Copper	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.001	<0.005	0.006	13
Lead	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.00	<0.005	<0.005	13
Mercury, µg/l	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.00	<0.2	<0.2	13
Nickel	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.00	<0.02	<0.02	13
Zinc	<0.005	<0.005	<0.005	<0.005	0.010	<0.005	0.008	<0.005	<0.005	<0.005	0.014	<0.005	<0.005	<0.005	<0.005	<0.005	0.004	<0.005	0.014	13

[a] Units of measure are mg/l unless otherwise specified.
[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.
[c] Out of Compliance with State Standards
[d] Out of Compliance with Sarasota County Standards
Applicable surface water criteria (State/County): Arsenic (0.05/0.01 mg/l); Cadmium (0.8-1.2 µg/l/0.01 mg/l); Chromium (0.05/0.02 mg/l); Copper (0.03/0.01 mg/l); Lead (0.03/0.01 mg/l); Mercury (0.2 µg/l/0.01 mg/l); Nickel (0.1/0.1 mg/l); and Zinc (0.03/0.01 mg/l).
STD - standard deviation
N - number of observations

Appendix Table A - 23
Continuing Surface Water Quality Monitoring Program
Organochlorine Pesticides (µg/l)[a]
September 9 - 10, 1991[b]

Parameter	Catfish Creek/Trunk Ditch								South Creek							All Stations				
	CC-1	CC-2	CC-3	CC-4	CC-5	Mean	EL-1A	NC-6	SC-1	SC-2	SC-3	SC-4	SC-7	SC-8	Mean	Mean	STD	Min	Max	N
Aldrin	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
alpha - BHC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
beta - BHC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
delta - BHC	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
gamma - BHC (Lindane)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Chlordane	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Dieldrin	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Endosulfan I	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Endosulfan II	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Endosulfan Sulfate	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Endrin	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Endrin Aldehyde	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Heptachlor	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Heptachlor Epoxide	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Methoxchlor	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
Toxaphene	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.00	<0.002	<0.002	13
4, 4'- DDD	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
4, 4'- DDE	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
4, 4'- DDT	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1016	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1221	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1232	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1242	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1248	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1254	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13
PCB 1260	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.00	<0.001	<0.001	13

[a] Applicable State surface water criteria (µg/l): Aldrin plus Dieldrin (0.003); Lindane (0.01); Chlordane (0.01); DDT (0.001); Endosulfan (0.003); Endrin (0.004); Heptachlor (0.001); Toxaphene (0.005); and PCB (0.001).

[b] Catfish Creek/Trunk Ditch, Elligraw Bayou and North Creek stations sampled on first day of event, South Creek stations on second day.

STD - standard deviation; N - number of observations.

APPENDIX B:
LABORATORY REPORTS

LABORATORY REPORT

CONSERVATION CONSULTANTS, INC.

5010 U.S. HIGHWAY 19 NORTH
POST OFFICE BOX 35
PALMETTO, FLORIDA 34220

ENVIRONMENTAL BIOLOGISTS, CHEMISTS,
AND WATER RESOURCE SCIENTISTS

Palmetto (813) 722-6667 Bradenton (813) 747-0006
Tampa (813) 229-3516 FAX (813) 722-8384

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 586/APR2391
Project Number: 0380-556
Sampling Date: 03-11,12-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	02512	02513	02514	-----
Sample Time	1325	1105	1125	24 hours
ANALYSES PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	1.8	1.1	0.8	mg/l
Fecal Coliform Bacteria	>16000*	500	2400*	No./100ml
Total Coliform Bacteria	>16000*	3000*	3000*	No./100ml
Ammonia Nitrogen	0.05	<0.02	0.08	mg/l
Nitrate Nitrogen	0.26	<0.01	0.27	mg/l
Nitrite Nitrogen	<0.01	<0.01	0.02	mg/l
Total Kjeldahl Nitrogen	0.64	1.14	0.79	mg/l
Total Nitrogen	0.90	1.14	1.08	mg/l
Total Phosphorus	0.15	0.08	0.03	mg/l
Total Reactive Phosphate	0.10	0.04	0.01	mg/l
Total Suspended Solids	1	2	<1	mg/l
Turbidity	3.3	0.8	11.8	NTU
Dissolved Oxygen (field)	4.5*	8.0	4.3*	mg/l
pH (field)	7.3	7.5	7.2	pH units
Specific Conductivity (field)	810*	949*	1332*	µmhos/cm
Temperature (field)	15.6	17.6	15.9	°C

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CONSERVATION CONSULTANTS, INC.

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 586/APR2391
Project Number: 0380-556
Sampling Date: 03-11,12-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	EL1-A	Units
Laboratory Number	02515	02516	02517	-----
Sample Time	1135	1200	1030	24 hours
ANALYSES PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	2.5	1.1	2.7	mg/l
Fecal Coliform Bacteria	1110*	300	170	No./100ml
Total Coliform Bacteria	1110	5000*	16000*	No./100ml
Ammonia Nitrogen	0.09	<0.02	0.02	mg/l
Nitrate Nitrogen	<0.01	<0.01	<0.01	mg/l
Nitrite Nitrogen	<0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.17	0.96	1.62	mg/l
Total Nitrogen	1.17	0.96	1.62	mg/l
Total Phosphorus	0.12	0.04	0.12	mg/l
Total Reactive Phosphate	0.01	0.01	0.02	mg/l
Total Suspended Solids	1	1	5	mg/l
Turbidity	11.1	3.1	6.2	NTU
Dissolved Oxygen (field)	8.4	12.3	7.2	mg/l
pH (field)	7.3	8.0	7.0	pH units
Specific Conductivity (field)	874*	936*	1049*	µmhos/cm
Temperature (field)	19.9	23.3	16.8	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 586/APR2391
Project Number: 0380-556
Sampling Date: 03-11,12-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	NC-6	SC-1	SC-2	Units
Laboratory Number	02518	02521	02522	-----
Sample Time	1220	1110	1130	24 hours
ANALYSES PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	3.4	mg/l
Biochemical Oxygen Demand	0.6	0.8	0.9	mg/l
Fecal Coliform Bacteria	70	70	110	No./100ml
Total Coliform Bacteria	1300	800	700	No./100ml
Ammonia Nitrogen	<0.02	0.02	<0.02	mg/l
Nitrate Nitrogen	<0.01	<0.01	<0.01	mg/l
Nitrite Nitrogen	<0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.39	1.24	1.28	mg/l
Total Nitrogen	1.39	1.24	1.28	mg/l
Total Phosphorus	0.15	0.35	0.53	mg/l
Total Reactive Phosphate	0.06	0.31	0.48	mg/l
Total Suspended Solids	9	1	2	mg/l
Turbidity	8.9	1.1	1.8	NTU
Dissolved Oxygen (field)	1.4*	6.1	3.4*	mg/l
pH (field)	7.1	7.2	7.2	pH units
Specific Conductivity (field)	859*	892*	1113*	µmhos/cm
Temperature (field)	14.5	14.4	14.9	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 586/APR2391
Project Number: 0380-556
Sampling Date: 03-11,12-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	02523	02524	02525	-----
Sample Time	1010	1030	1050	24 hours
ANALYSES PERFORMED BY CCI				
Oil And Grease	4.6	1.2	11.2*	mg/l
Biochemical Oxygen Demand	1.1	1.2	0.7	mg/l
Fecal Coliform Bacteria	800	9000*	80	No./100ml
Total Coliform Bacteria	1100	9000*	1100	No./100ml
Ammonia Nitrogen	0.06	0.05	0.03	mg/l
Nitrate Nitrogen	0.13	<0.01	<0.01	mg/l
Nitrite Nitrogen	<0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.07	1.11	1.23	mg/l
Total Nitrogen	1.20	1.11	1.23	mg/l
Total Phosphorus	0.16	0.13	0.27	mg/l
Total Reactive Phosphate	0.12	0.08	0.22	mg/l
Total Suspended Solids	2	4	1	mg/l
Turbidity	1.6	4.5	1.3	NTU
Dissolved Oxygen (field)	4.8*	6.6	5.4	mg/l
pH (field)	6.9	7.2	7.3	pH units
Specific Conductivity (field)	1011	1057*	845*	µmhos/cm
Temperature (field)	15.3	13.5	13.3	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 586/APR2391
Project Number: 0380-556
Sampling Date: 03-11,12-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	02526	-----
Sample Time	1200	24 hours
ANALYSES PERFORMED BY CCI		
Oil and Grease	1.4	mg/l
Biochemical Oxygen Demand	0.9	mg/l
Fecal Coliform Bacteria	700	No./100ml
Total Coliform Bacteria	3000*	No./100ml
Ammonia Nitrogen	<0.02	mg/l
Nitrate Nitrogen	<0.01	mg/l
Nitrite Nitrogen	<0.01	mg/l
Total Kjeldahl Nitrogen	1.05	mg/l
Total Nitrogen	1.05	mg/l
Total Phosphorus	0.19	mg/l
Total Reactive Phosphate	0.15	mg/l
Total Suspended Solids	<1.0	mg/l
Turbidity	2.0	NTU
Dissolved Oxygen (field)	8.4	mg/l
pH (field)	7.6	pH units
Specific Conductivity (field)	928*	µmhos/cm
Temperature (field)	15.8	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 775/JUL1091
Project Number: 0380-556
Sampling Date: 06-17,18-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	03208	03209	03210	-----
Sample Time	12:00	11:50	11:00	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	1.6	2.0	1.6	mg/l
Biochemical Oxygen Demand	1.1	1.9	0.3	mg/l
Fecal Coliform Bacteria	9000*	300	220	No./100ml
Total Coliform Bacteria	>16000*	16000*	5000*	No./100ml
Ammonia Nitrogen	0.07	<0.02	0.12	mg/l
Nitrate Nitrogen	0.07	<0.01	0.10	mg/l
Nitrite Nitrogen	<0.01	<0.01	0.01	mg/l
Total Kjeldahl Nitrogen	0.68	2.20	0.94	mg/l
Total Nitrogen	0.75	2.20	1.05	mg/l
Total Phosphorus	0.26	0.40	0.08	mg/l
Total Reactive Phosphate	0.22	0.15	0.05	mg/l
Total Suspended Solids	4	48	2	mg/l
Turbidity	2.3	6.0	6.3	NTU
Dissolved Oxygen (field)	1.7*	1.8*	0.6*	mg/l
pH (field)	7.2	7.0	6.9	pH units
Specific Conductivity, (field)	703*	819*	1201*	µmhos/cm
Temperature (field)	26.4	27.6	26.2	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 775/JUL1091
Project Number: 0380-556
Sampling Date: 06-17,18-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	EL1-A	Units
Laboratory Number	03211	03212	03214	-----
Sample Time	11:10	10:30	11:30	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	1.8	1.8	2.2	mg/l
Biochemical Oxygen Demand	2.4	<0.1	1.9	mg/l
Fecal Coliform Bacteria	170	140	900*	No./100ml
Total Coliform Bacteria	5000*	16000*	16000*	No./100ml
Ammonia Nitrogen	0.06	<0.02	0.05	mg/l
Nitrate Nitrogen	0.01	0.02	<0.01	mg/l
Nitrite Nitrogen	<0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.29	0.84	1.80	mg/l
Total Nitrogen	1.30	0.86	1.80	mg/l
Total Phosphorus	0.11	0.07	0.31	mg/l
Total Reactive Phosphate	0.05	0.06	0.19	mg/l
Total Suspended Solids	11	3	6	mg/l
Turbidity	9.6	1.3	4.9	NTU
Dissolved Oxygen (field)	6.2	5.9	1.6*	mg/l
pH (field)	7.1	7.4	7.0	pH units
Specific Conductivity, (field)	944*	862*	984*	µmhos/cm
Temperature (field)	30.4	29.8	28.6	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 775/JUL1091
Project Number: 0380-556
Sampling Date: 06-17,18-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	NC-6	SC-1	SC-2	Units
Laboratory Number	03213	03199	03200	-----
Sample Time	10:15	11:00	10:35	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	1.6	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	1.8	4.3	2.4	mg/l
Fecal Coliform Bacteria	130	300	600	No./100ml
Total Coliform Bacteria	3000*	2200	5000*	No./100ml
Ammonia Nitrogen	0.04	<0.02	0.04	mg/l
Nitrate Nitrogen	<0.01	<0.01	0.01	mg/l
Nitrite Nitrogen	<0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.26	1.93	1.52	mg/l
Total Nitrogen	1.26	1.93	1.53	mg/l
Total Phosphorus	0.22	0.42	0.59	mg/l
Total Reactive Phosphate	0.18	0.25	0.52	mg/l
Total Suspended Solids	4	19	2	mg/l
Turbidity	5.3	11.3	2.0	NTU
Dissolved Oxygen (field)	0.8*	2.8*	1.9*	mg/l
pH (field)	6.7	7.3	7.0	pH units
Specific Conductivity, (field)	719*	890*	768*	µmhos/cm
Temperature (field)	25.5	28.6	27.9	°C

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 775/JUL1091
Project Number: 0380-556
Sampling Date: 06-17,18-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	03201	03202	03203	-----
Sample Time	12:00	11:35	10:20	24 hours
ANALYSIS PERFORMED BY CCI				
Oil And Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	2.9	3.0	1.0	mg/l
Fecal Coliform Bacteria	5000*	5000*	500	No./100ml
Total Coliform Bacteria	≥16000	≥16000*	≥16000	No./100ml
Ammonia Nitrogen	0.26	0.41	0.03	mg/l
Nitrate Nitrogen	0.06	0.01	0.04	mg/l
Nitrite Nitrogen	0.03	0.06	0.01	mg/l
Total Kjeldahl Nitrogen	1.75	2.34	1.32	mg/l
Total Nitrogen	1.84	2.41	1.37	mg/l
Total Phosphorus	0.81	0.65	0.64	mg/l
Total Reactive Phosphate	0.67	0.53	0.59	mg/l
Total Suspended Solids	8	13	<1	mg/l
Turbidity	4.7	15.2	1.1	NTU
Dissolved Oxygen (field)	1.8*	3.6*	1.0*	mg/l
pH (field)	7.0	7.3	6.8	pH units
Specific Conductivity, (field)	824*	1070*	739*	µmhos/cm
Temperature (field)	27.0	26.2	26.4	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

FDHRS Drinking Water Certification # 84243
FDHRS Environmental Certification # E84017

Analysis performed in accordance with E.P.A., Standard Methods or other FDHRS approved methodology.

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 775/JUL1091
Project Number: 0380-556
Sampling Date: 06-17,18-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	03204	-----
Sample Time	09:35	24 hours
ANALYSIS PERFORMED BY CCI		
Oil and Grease	<1.0	mg/l
Biochemical Oxygen Demand	0.9	mg/l
Fecal Coliform Bacteria	80	No./100ml
Total Coliform Bacteria	3000*	No./100ml
Ammonia Nitrogen	<0.02	mg/l
Nitrate Nitrogen	<0.01	mg/l
Nitrite Nitrogen	<0.01	mg/l
Total Kjeldahl Nitrogen	1.07	mg/l
Total Nitrogen	1.07	mg/l
Total Phosphorus	0.28	mg/l
Total Reactive Phosphate	0.26	mg/l
Total Suspended Solids	<1	mg/l
Turbidity	0.9	NTU
Dissolved Oxygen (field)	2.9*	mg/l
pH (field)	6.9	pH units
Specific Conductivity (field)	801*	µmhos/cm
Temperature (field)	27.6	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

Joni L. Macy
Laboratory Supervisor

FDHRS Drinking Water Certification # 84243
FDHRS Environmental Certification # E84017

Analysis performed in accordance with E.P.A. Standard Methods or other FDHRS approved methodology.

LABORATORY REPORT

CONSERVATION CONSULTANTS, INC.

5010 U.S. HIGHWAY 19 NORTH
POST OFFICE BOX 35
PALMETTO, FLORIDA 34220

ENVIRONMENTAL BIOLOGISTS, CHEMISTS,
AND WATER RESOURCE SCIENTISTS

Palmetto (813) 722-6667 Bradenton (813) 747-0006
Tampa (813) 229-3516 FAX (813) 722-8384

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	03996	03997	03998	-----
Sample Time	09:35	10:00	12:15	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	1.5	2.5	0.6	mg/l
Fecal Coliform Bacteria	16,000*	9,000	300	No./100ml
Total Coliform Bacteria	>16,000*	>16000*	3,000*	No./100ml
Ammonia Nitrogen	0.65	<0.02	0.09	mg/l
Nitrate Nitrogen	0.13	0.01	0.16	mg/l
Nitrite Nitrogen	0.04	<0.01	0.02	mg/l
Total Kjeldahl Nitrogen	1.50	1.95	0.91	mg/l
Total Nitrogen	1.67	1.96	1.09	mg/l
Total Phosphorus	0.26	0.62	0.08	mg/l
Total Reactive Phosphate	0.22	0.26	0.06	mg/l
Total Suspended Solids	5	87	3	mg/l
Turbidity	6.1	29	21	NTU
Dissolved Oxygen (field)	4.0*	3.3*	1.5*	mg/l
pH (field)	6.9	7.2	6.7	pH units
Specific Conductivity, (field)	628*	935*	1163*	µmhos/cm
Temperature (field)	25.3	25.7	26.8	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

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Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	03996	03997	03998	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Arsenic	<0.005	<0.005	<0.005	mg/l
Cadmium	<0.0005	<0.0005	<0.0005	mg/l
Chromium	<0.005	<0.005	<0.005	mg/l
Copper	<0.005	<0.005	<0.005	mg/l
Mercury	<0.0001	<0.0001	<0.0001	mg/l
Nickel	<0.02	<0.02	<0.02	mg/l
Lead	<0.005	<0.005	<0.005	mg/l
Zinc	<0.005	<0.005	<0.005	mg/l
EPA - 608				
4,4'-DDE	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDT	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDD	<0.0001	<0.0001	<0.0001	µg/l
alpha-BHC	<0.0001	<0.0001	<0.0001	µg/l
Aldrin	<0.0001	<0.0001	<0.0001	µg/l
beta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Chlordane	<0.0001	<0.0001	<0.0001	µg/l
delta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Dieldrin	<0.0001	<0.0001	<0.0001	µg/l

All analysis performed in accordance with E.P.A., Standard Methods or other FDHRS approved methodology

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PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	03996	03997	03998	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Endosulfan I	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan II	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan Sulfate	<0.0001	<0.0001	<0.0001	µg/l
Endrin	<0.0001	<0.0001	<0.0001	µg/l
Endrin Aldehyde	<0.0001	<0.0001	<0.0001	µg/l
gamma-BHC	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor Epoxide	<0.0001	<0.0001	<0.0001	µg/l
Methoxychlor	<0.0001	<0.0001	<0.0001	µg/l
Toxaphene	<0.0002	<0.0002	<0.0002	µg/l
PCB 1016	<0.0001	<0.0001	<0.0001	µg/l
PCB 1221	<0.0001	<0.0001	<0.0001	µg/l
PCB 1232	<0.0001	<0.0001	<0.0001	µg/l
PCB 1242	<0.0001	<0.0001	<0.0001	µg/l
PCB 1248	<0.0001	<0.0001	<0.0001	µg/l
PCB 1254	<0.0001	<0.0001	<0.0001	µg/l
PCB 1260	<0.0001	<0.0001	<0.0001	µg/l

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7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	NC-6	Units
Laboratory Number	03999	04000	04001	-----
Sample Time	12:00	11:10	11:40	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	2.5	0.7	0.7	mg/l
Fecal Coliform Bacteria	240	500	240	No./100ml
Total Coliform Bacteria	2,400	5000*	3,000*	No./100ml
Ammonia Nitrogen	<0.02	<0.02	0.09	mg/l
Nitrate Nitrogen	<0.01	0.07	<0.01	mg/l
Nitrite Nitrogen	<0.01	0.02	<0.01	mg/l
Total Kjeldahl Nitrogen	1.17	1.07	1.22	mg/l
Total Nitrogen	1.17	1.16	1.22	mg/l
Total Phosphorus	0.16	0.13	0.19	mg/l
Total Reactive Phosphate	0.08	0.06	0.16	mg/l
Total Suspended Solids	8	3	1	mg/l
Turbidity	10.7	3.2	4.0	NTU
Dissolved Oxygen (field)	6.7	3.4*	1.5*	mg/l
pH (field)	6.9	7.3	6.1	pH units
Specific Conductivity, (field)	787*	838*	723*	µmhos/cm
Temperature (field)	29.2	29.4	24.9	°C

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PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	NC-6	Units
Laboratory Number	03999	04000	04001	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Arsenic	<0.005	<0.005	<0.005	mg/l
Cadmium	<0.0005	<0.0005	<0.0005	mg/l
Chromium	<0.005	<0.005	<0.005	mg/l
Copper	<0.005	<0.005	<0.005	mg/l
Mercury	<0.0001	<0.0001	<0.0001	mg/l
Nickel	<0.02	<0.02	<0.02	mg/l
Lead	<0.005	<0.005	<0.005	mg/l
Zinc	<0.005	0.010	<0.005	mg/l
EPA - 608				
4,4'-DDE	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDT	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDD	<0.0001	<0.0001	<0.0001	µg/l
alpha-BHC	<0.0001	<0.0001	<0.0001	µg/l
Aldrin	<0.0001	<0.0001	<0.0001	µg/l
beta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Chlordane	<0.0001	<0.0001	<0.0001	µg/l
delta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Dieldrin	<0.0001	<0.0001	<0.0001	µg/l

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Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	NC-6	Units
Laboratory Number	03999	04000	04001	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Endosulfan I	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan II	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan Sulfate	<0.0001	<0.0001	<0.0001	µg/l
Endrin	<0.0001	<0.0001	<0.0001	µg/l
Endrin Aldehyde	<0.0001	<0.0001	<0.0001	µg/l
gamma-BHC	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor Epoxide	<0.0001	<0.0001	<0.0001	µg/l
Methoxychlor	<0.0001	<0.0001	<0.0001	µg/l
Toxaphene	<0.0002	<0.0002	<0.0002	µg/l
PCB 1016	<0.0001	<0.0001	<0.0001	µg/l
PCB 1221	<0.0001	<0.0001	<0.0001	µg/l
PCB 1232	<0.0001	<0.0001	<0.0001	µg/l
PCB 1242	<0.0001	<0.0001	<0.0001	µg/l
PCB 1248	<0.0001	<0.0001	<0.0001	µg/l
PCB 1254	<0.0001	<0.0001	<0.0001	µg/l
PCB 1260	<0.0001	<0.0001	<0.0001	µg/l

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CONSERVATION CONSULTANTS, INC.

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	EL-1A	SC-1	SC-2	Units
Laboratory Number	04002	03977	03878	-----
Sample Time	10:40	12:10	11:50	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	7.4	0.8	0.6	mg/l
Fecal Coliform Bacteria	900	170	22	No./100ml
Total Coliform Bacteria	>16,000*	2,400	5,000*	No./100ml
Ammonia Nitrogen	0.04	0.10	0.02	mg/l
Nitrate Nitrogen	0.02	0.01	0.02	mg/l
Nitrite Nitrogen	0.01	0.01	0.01	mg/l
Total Kjeldahl Nitrogen	4.86	1.54	1.37	mg/l
Total Nitrogen	4.89	1.56	1.40	mg/l
Total Phosphorus	2.59	0.26	0.35	mg/l
Total Reactive Phosphate	0.14	0.17	0.31	mg/l
Total Suspended Solids	280	8	8	mg/l
Turbidity	106*	3.2	4.1	NTU
Dissolved Oxygen (field)	1.8*	2.3*	3.4*	mg/l
pH (field)	5.8*	7.3	7.2	pH units
Specific Conductivity, (field)	964*	818*	735*	µmhos/cm
Temperature (field)	26.6	27.2	26.3	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

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Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	EL-1A	SC-1	SC-2	Units
Laboratory Number	04002	03977	03978	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Arsenic	0.012	0.006	0.005	mg/l
Cadmium	0.0032*	<0.0005	<0.0005	mg/l
Chromium	0.021	<0.005	<0.005	mg/l
Copper	0.006	<0.005	<0.005	mg/l
Mercury	<0.0001	<0.0001	<0.0001	mg/l
Nickel	<0.02	<0.02	<0.02	mg/l
Lead	<0.005	<0.005	<0.005	mg/l
Zinc	0.008	<0.005	<0.005	mg/l
EPA - 608				
4,4'-DDE	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDT	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDD	<0.0001	<0.0001	<0.0001	µg/l
alpha-BHC	<0.0001	<0.0001	<0.0001	µg/l
Aldrin	<0.0001	<0.0001	<0.0001	µg/l
beta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Chlordane	<0.0001	<0.0001	<0.0001	µg/l
delta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Dieldrin	<0.0001	<0.0001	<0.0001	µg/l

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Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	EL-1A	SC-1	SC-2	Units
Laboratory Number	04002	03977	03978	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Endosulfan I	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan II	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan Sulfate	<0.0001	<0.0001	<0.0001	µg/l
Endrin	<0.0001	<0.0001	<0.0001	µg/l
Endrin Aldehyde	<0.0001	<0.0001	<0.0001	µg/l
gamma-BHC	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor Epoxide	<0.0001	<0.0001	<0.0001	µg/l
Methoxychlor	<0.0001	<0.0001	<0.0001	µg/l
Toxaphene	<0.0002	<0.0002	<0.0002	µg/l
PCB 1016	<0.0001	<0.0001	<0.0001	µg/l
PCB 1221	<0.0001	<0.0001	<0.0001	µg/l
PCB 1232	<0.0001	<0.0001	<0.0001	µg/l
PCB 1242	<0.0001	<0.0001	<0.0001	µg/l
PCB 1248	<0.0001	<0.0001	<0.0001	µg/l
PCB 1254	<0.0001	<0.0001	<0.0001	µg/l
PCB 1260	<0.0001	<0.0001	<0.0001	µg/l

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Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	04005	04006	04007	-----
Sample Time	13:00	12:35	11:30	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	<1.0	<1.0	<1.0	mg/l
Biochemical Oxygen Demand	0.9	0.7	0.3	mg/l
Fecal Coliform Bacteria	500	500	80	No./100ml
Total Coliform Bacteria	9,000*	1,600	1,400	No./100ml
Ammonia Nitrogen	0.02	0.06	<0.02	mg/l
Nitrate Nitrogen	0.02	0.04	0.06	mg/l
Nitrite Nitrogen	0.02	0.04	0.01	mg/l
Total Kjeldahl Nitrogen	1.00	1.40	1.40	mg/l
Total Nitrogen	1.04	1.48	1.47	mg/l
Total Phosphorus	0.51	0.31	0.30	mg/l
Total Reactive Phosphate	0.43	0.27	0.25	mg/l
Total Suspended Solids	1	4	3	mg/l
Turbidity	1.5	4.5	2.3	NTU
Dissolved Oxygen (field)	1.9*	2.6*	3.7*	mg/l
pH (field)	8.3	6.1	8.3	pH units
Specific Conductivity, (field)	707*	809*	707*	µmhos/cm
Temperature (field)	28.7	28.0	25.8	°C

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Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	03979	03980	03981	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Arsenic	0.008	0.006	0.006	mg/l
Cadmium	<0.0005	<0.0005	<0.0005	mg/l
Chromium	<0.005	<0.005	<0.005	mg/l
Copper	<0.005	<0.005	<0.005	mg/l
Mercury	<0.0001	<0.0001	<0.0001	mg/l
Nickel	<0.02	<0.02	<0.02	mg/l
Lead	<0.005	<0.005	<0.005	mg/l
Zinc	0.014	<0.005	<0.005	mg/l
EPA - 608				
4,4'-DDE	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDT	<0.0001	<0.0001	<0.0001	µg/l
4,4'-DDD	<0.0001	<0.0001	<0.0001	µg/l
alpha-BHC	<0.0001	<0.0001	<0.0001	µg/l
Aldrin	<0.0001	<0.0001	<0.0001	µg/l
beta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Chlordane	<0.0001	<0.0001	<0.0001	µg/l
delta-BHC	<0.0001	<0.0001	<0.0001	µg/l
Dieldrin	<0.0001	<0.0001	<0.0001	µg/l

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	03879	03980	03981	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY				
Endosulfan I	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan II	<0.0001	<0.0001	<0.0001	µg/l
Endosulfan Sulfate	<0.0001	<0.0001	<0.0001	µg/l
Endrin	<0.0001	<0.0001	<0.0001	µg/l
Endrin Aldehyde	<0.0001	<0.0001	<0.0001	µg/l
gamma-BHC	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor	<0.0001	<0.0001	<0.0001	µg/l
Heptachlor Epoxide	<0.0001	<0.0001	<0.0001	µg/l
Methoxychlor	<0.0001	<0.0001	<0.0001	µg/l
Toxaphene	<0.0002	<0.0002	<0.0002	µg/l
PCB 1016	<0.0001	<0.0001	<0.0001	µg/l
PCB 1221	<0.0001	<0.0001	<0.0001	µg/l
PCB 1232	<0.0001	<0.0001	<0.0001	µg/l
PCB 1242	<0.0001	<0.0001	<0.0001	µg/l
PCB 1248	<0.0001	<0.0001	<0.0001	µg/l
PCB 1254	<0.0001	<0.0001	<0.0001	µg/l
PCB 1260	<0.0001	<0.0001	<0.0001	µg/l

LABORATORY REPORT

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CONSERVATION CONSULTANTS, INC.

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	03982	-----
Sample Time	10:45	24 hours
ANALYSIS PERFORMED BY CCI		
Oil and Grease	<1.0	mg/l
Biochemical Oxygen Demand	0.6	mg/l
Fecal Coliform Bacteria	30	No./100ml
Total Coliform Bacteria	500	No./100ml
Ammonia Nitrogen	<0.02	mg/l
Nitrate Nitrogen	0.07	mg/l
Nitrite Nitrogen	0.02	mg/l
Total Kjeldahl Nitrogen	1.36	mg/l
Total Nitrogen	1.45	mg/l
Total Phosphorus	0.37	mg/l
Total Reactive Phosphate	0.37	mg/l
Total Suspended Solids	11	mg/l
Turbidity	3.8	NTU
Dissolved Oxygen (field)	2.1*	mg/l
pH (field)	6.7	pH units
Specific Conductivity, (field)	472	µmhos/cm
Temperature (field)	26.6	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

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Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	03982	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY		
Arsenic	0.007	mg/l
Cadmium	<0.0005	mg/l
Chromium	<0.005	mg/l
Copper	<0.005	mg/l
Mercury	<0.0001	mg/l
Nickel	<0.02	mg/l
Lead	<0.005	mg/l
Zinc	<0.005	mg/l
EPA - 608		
4,4'-DDE	<0.0001	µg/l
4,4'-DDT	<0.0001	µg/l
4,4'-DDD	<0.0001	µg/l
alpha-BHC	<0.0001	µg/l
Aldrin	<0.0001	µg/l
beta-BHC	<0.0001	µg/l
Chlordane	<0.0001	µg/l
delta-BHC	<0.0001	µg/l
Dieldrin	<0.0001	µg/l

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Report Number: 938/OCT2391
Project Number: 0380-556
Sampling Date: 09-9,10-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	03982	-----
ANALYSIS PERFORMED BY SUBCONTRACT LABORATORY		
Endosulfan I	<0.0001	µg/l
Endosulfan II	<0.0001	µg/l
Endosulfan Sulfate	<0.0001	µg/l
Endrin	<0.0001	µg/l
Endrin Aldehyde	<0.0001	µg/l
gamma-BHC	<0.0001	µg/l
Heptachlor	<0.0001	µg/l
Heptachlor Epoxide	<0.0001	µg/l
Methoxychlor	<0.0001	µg/l
Toxaphene	<0.0002	µg/l
PCB 1016	<0.0001	µg/l
PCB 1221	<0.0001	µg/l
PCB 1232	<0.0001	µg/l
PCB 1242	<0.0001	µg/l
PCB 1248	<0.0001	µg/l
PCB 1254	<0.0001	µg/l
PCB 1260	<0.0001	µg/l

Joni L. Macy
Laboratory Supervisor

FDHRS Drinking Water Certification # 84243
FDHRS Environmental Certification # E84017

Analysis performed in accordance with E.P.A., Standard Methods or other FDHRS approved methodology.

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 132/JAN0892
Project Number: 0380-556
Sampling Date: 12-09-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-1	CC-2	CC-3	Units
Laboratory Number	04809	-----	04810	-----
Sample Time	12:45	12:25	11:35	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	<1		<1	mg/l
Biochemical Oxygen Demand	1.5	|	0.4	mg/l
Fecal Coliform Bacteria	1600*		900*	No./100ml
Total Coliform Bacteria	9000*	|	9000*	No./100ml
Ammonia Nitrogen	0.05		0.03	mg/l
Nitrate Nitrogen	0.13	|	0.23	mg/l
Nitrite Nitrogen	<0.01		<0.01	mg/l
Total Kjeldahl Nitrogen	0.60	D	0.75	mg/l
Total Nitrogen	0.73		0.98	mg/l
Total Phosphorus	0.16	R	0.04	mg/l
Total Reactive Phosphate	0.14		0.02	mg/l
Total Suspended Solids	<1	Y	<1	mg/l
Turbidity	2.3		3.8	NTU
Dissolved Oxygen (field)	4.4*	|	5.5	mg/l
pH (field)	7.6		7.5	pH units
Specific Conductivity, (field)	770*	|	1215*	µmhos/cm
Temperature (field)	18.9	|	21.1	°C

*Noncompliance with Florida Administrative Code 17-302 and/or Sarasota County Ordinance 72-37, Class III surface waters.

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REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 132/JAN0892
Project Number: 0380-556
Sampling Date: 12-09-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	CC-4	CC-5	EL1-A	Units
Laboratory Number	04811	04812	04813	-----
Sample Time	11:55	10:40	12:15	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	1.0	2.0	1.8	mg/l
Biochemical Oxygen Demand	1.7	1.8	3.7	mg/l
Fecal Coliform Bacteria	17	9	30	No./100ml
Total Coliform Bacteria	280	1600	≥16000*	No./100ml
Ammonia Nitrogen	0.04	0.02	0.03	mg/l
Nitrate Nitrogen	0.02	<0.01	<0.01	mg/l
Nitrite Nitrogen	0.01	<0.01	<0.01	mg/l
Total Kjeldahl Nitrogen	1.17	0.92	1.68	mg/l
Total Nitrogen	1.20	0.92	1.68	mg/l
Total Phosphorus	0.03	0.01	0.19	mg/l
Total Reactive Phosphate	0.01	<0.01	0.14	mg/l
Total Suspended Solids	4	3	9	mg/l
Turbidity	6.9	4.0	7.2	NTU
Dissolved Oxygen (field)	8.8	7.0	2.7*	mg/l
pH (field)	7.7	8.0	7.4	pH units
Specific Conductivity, (field)	1092*	1055*	1197*	µmhos/cm
Temperature (field)	20.7	21.2	22.6	°C

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PALMER VENTURE
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Report Number: 132/JAN0892
Project Number: 0380-556
Sampling Date: 12-09-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	NC-6	SC-1	SC-2	Units
Laboratory Number	04814	-----	-----	-----
Sample Time	11:15	14:10	14:20	24 hours
ANALYSIS PERFORMED BY CCI				
Oil and Grease	2.0			mg/l
Biochemical Oxygen Demand	1.3	|	|	mg/l
Fecal Coliform Bacteria	3000*			No./100ml
Total Coliform Bacteria	3000*	|	|	No./100ml
Ammonia Nitrogen	0.03			mg/l
Nitrate Nitrogen	<0.01	|	|	mg/l
Nitrite Nitrogen	<0.01			mg/l
Total Kjeldahl Nitrogen	0.98	D	D	mg/l
Total Nitrogen	0.98			mg/l
Total Phosphorus	0.09	R	R	mg/l
Total Reactive Phosphate	0.09			mg/l
Total Suspended Solids	4	Y	Y	mg/l
Turbidity	7.0			NTU
Dissolved Oxygen (field)	0.4*	|	|	mg/l
pH (field)	7.2			pH units
Specific Conductivity, (field)	661*	|	|	µmhos/cm
Temperature (field)	16.9	|	|	°C

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CONSERVATION CONSULTANTS, INC.

REPORT FOR: Mr. Jim Paulmann
PALMER VENTURE
7184 Beneva Road
Sarasota, Florida 34238

Report Number: 132/JAN0892
Project Number: 0380-556
Sampling Date: 12-09-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-3	SC-4	SC-7	Units
Laboratory Number	-----	04815	-----	-----
Sample Time	13:30	13:50	14:50	24 hours
ANALYSIS PERFORMED BY CCI				
Oil And Grease		2.0		mg/l
Biochemical Oxygen Demand	|	3.4	|	mg/l
Fecal Coliform Bacteria		900*		No./100ml
Total Coliform Bacteria	|	900	|	No./100ml
Ammonia Nitrogen		0.06		mg/l
Nitrate Nitrogen	|	0.04	|	mg/l
Nitrite Nitrogen		<0.01		mg/l
Total Kjeldahl Nitrogen	D	1.75	D	mg/l
Total Nitrogen		1.79		mg/l
Total Phosphorus	R	0.19	R	mg/l
Total Reactive Phosphate		0.10		mg/l
Total Suspended Solids	Y	16	Y	mg/l
Turbidity		12.6		NTU
Dissolved Oxygen (field)	|	5.7	|	mg/l
pH (field)		7.9		pH units
Specific Conductivity, (field)	|	1263*	|	µmhos/cm
Temperature (field)	|	23.1	|	°C

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Report Number: 132/JAN0892
Project Number: 0380-556
Sampling Date: 12-09-91
Sample Source: Surface Water
Sampled By: Shindehette

RESULTS OF ANALYSIS:	SC-8	Units
Laboratory Number	-----	-----
Sample Time	14:35	24 hours
ANALYSIS PERFORMED BY CCI		
Oil and Grease		mg/l
Biochemical Oxygen Demand	N	mg/l
Fecal Coliform Bacteria	O	No./100ml
Total Coliform Bacteria	T	No./100ml
Ammonia Nitrogen		mg/l
Nitrate Nitrogen		mg/l
Nitrite Nitrogen	A	mg/l
Total Kjeldahl Nitrogen	C	mg/l
Total Nitrogen	C	mg/l
Total Phosphorus	E	mg/l
Total Reactive Phosphate	S	mg/l
Total Suspended Solids	I	mg/l
Turbidity	B	NTU
Dissolved Oxygen (field)	L	mg/l
pH (field)	E	pH units
Specific Conductivity (field)		µmhos/cm
Temperature (field)		°C

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Joni L. Macy
Laboratory Supervisor

FDHRS Drinking Water Certification # 84243
FDHRS Environmental Certification # E84017

Analysis performed in accordance with E.P.A., Standard Methods or other FDHRS approved methodology.

APPENDIX C:
MONITORING TEAM

Fields of Competence

Chemical Analysis and Quality Control of Water, Sediment, Microbial and Solid Waste Samples, Stormwater Quality and Drainage Impact Assessments, Pollutant Loading Evaluations, Groundwater Quality Monitoring and Evaluations, Environmental Permitting and Monitoring, Soil Chemistry, Data Acquisition and Interpretation, Statistical Analysis of Data, and Computer Programming.

Experience Summary

Dr. G. Garry Payne has eight years of applied research and environmental chemistry experience. Applied research has included effects of common land use practices on water quality and environmental quality in general. He has supervised an analytical laboratory conducting analyses of plant, soil and water samples. Experience includes teaching applied chemistry procedures at the college level, and supervision of lab and field personnel.

Before joining CCI, Dr. Payne worked with research teams from 1981 to 1989, where he investigated nutrient chemistry from field research sites and was responsible for quality control and maintenance of modern analytical equipment. He has investigated the effects of metal-rich wastes on soil chemistry. He has considerable experience in the experimental design of field, greenhouse and lab studies, including effects of acidity and nutrients on plants. After obtaining his doctorate in agronomy with an emphasis in soil chemistry, Dr. Payne's work has centered on applied chemical research and methods of minimizing detrimental environmental impacts resulting from nutrient losses, in Florida.

At CCI, Dr. Payne serves as Director of the Water Resource Management Division and oversees professional staff involved with water quality monitoring, data management and laboratory services. He is directly involved with planning, monitoring and permitting studies for industries, utilities, municipalities, land developers and water management authorities. Many of these projects involve groundwater monitoring programs, pollutant loading evaluations and stormwater impact assessment and management, monitoring of potable water supplies, NPDES permitting, development of nutrient and hydrologic budgets, and diagnostic studies of freshwater and estuarine water bodies.

Education

Year	School
1986	Virginia Polytechnic Institute & State University Ph.D. - Agronomy (Soil Chemistry)
1983	University of Georgia M.S. - Agronomy (Soil Fertility)
1981	Christopher Newport College B.S. - Biology

Employment History

1989 - Present	Conservation Consultants, Inc. Senior Scientist
1987 - 1989	University of Florida Agricultural Research Center: Postdoctoral Fellow
1983 - 1987	Virginia Polytechnic Institute & State University Research & Teaching Assistant
1981 - 1983	University of Georgia: Research Assistant

Key Projects

City of Sarasota: Project Manager for the design and implementation of a FDER-approved Plan of Study for a Water Quality Based Effluent Limitation Study (WQBEL) for the City's Reverse Osmosis Plant and Ion Exchange Facility. Sarasota, Florida.

Palmer Venture: Project Scientist for Storm Event Pollutant Loading Monitoring program in Catfish and South Creeks on Palmer Ranch. Sarasota County, Florida.

Hatchett Creek Development, Ltd.: Project Manager for the implementation of agency approved workscopes for various water resource assessments specified by the DRI Development Order prior to construction of the Hatchett Creek Development. Venice, Florida.

Gulfstream Development Corporation: Project Manager for the implementation of agency approved workscopes for various water resource assessments and construction monitoring programs required by the DRI Development Orders prior to initiating construction of Woodmere Community Center and Woodmere Village. Venice, Florida.

Palmer Venture: Project Manager for an Assessment of Post-Development Pollutant Loading Rates including predictions of stormwater loadings from planned residential, transportation, and other land uses and predictions of pollutant removal rates for planned grassed swales, extended detention basins with long-term residence times and biological filters. Palmer Ranch. Increment VI and East Side. Sarasota County, Florida.

Power Corporation: Project Manager for the implementation of agency approved workscopes for various water resource assessments specified by the DRI Development Order during construction of the Tara Development. Bradenton, Florida.

IMC Fertilizer: Project Manager for the design and implementation of a FDER-approved Plan of Study for a Water Quality Based Effluent Limitation (WQBEL) study for the Hopewell Mining Facility. Study was in support of NPDES permit application. Hillsborough County, Florida.

Key Projects (Continued)

Lake Tarpon Swim Study: Task manager for the assessment of the impacts of groundwater inputs on the quality of Lake Tarpon and the analyses and mapping of sediments to determine their impact on lake quality. Also evaluated stormwater quality and pollutant loadings, sediment nutrient exchange rates, sediment oxygen demand, and nutrient budgets. Pinellas County, Florida.

Selected Publications

Payne, G.G. and J.E. Rechcigl. 1989. Influence of various drying techniques on the extractability of plant nutrients from selected soils. Soils Science.

Payne, G.G. and M.E. Sumner. 1986. Yield and composition of soybeans as influenced by soil pH, phosphorus, zinc and copper. Communications in Soil Science and Plant Analysis 17:257-273.

Payne, G.G. and D.C. Martens. 1988. Form and availability of Cu and Zn following long-term $CuSO_4$ and $ZnSO_4$ applications to a Rhodic Paleudult. Journal of Environmental Quality 17:707-711.

Rechcigl, J.E., P. Mislevy and G.G. Payne. In press. Fertilization of stargrass. In Proceedings of the Internat. Conference on Livestock in the Tropics. Univ. of Florida, Gainesville.

Payne, G.G. and D.C. Martens. 1986. Lead in soils. p. 78-89. In Soils. Brooklyn Botanic Garden, Inc., Brooklyn, NY.

Martens, D.C., G.G. Payne, C. Winarko, E.T. Kornegay and M.D. Lindemann. 1985. Crop response to high levels of copper application. Internat. Copper Research Association, Research Report 292(F). 38 p.

Payne, G.G., J.E. Rechcigl and A.B. Bottcher. 1988. Development of fertilization practices for beef cattle pastures to minimize nutrient loss in runoff. Annual Report. South Florida Water Management District. 125 p.

Payne, G.G., J.E. Rechcigl and R.J. Stephenson. 1990. Development of DRIS norms for bahiagrass. Agronomy Journal 82:711-715.

Payne, G.G. and J.E. Rechcigl. 1989. Influence of phosphorus fertilization on bahiagrass and water quality. p. 43-46. In Proceedings of the XVI International Grassland Congress, Nice, France.

Fields of Competence

Computer Simulations and Mathematical Modeling of Water and Wetland Resources, Pollutant Loadings, Interstitial Water Chemistry, Data Acquisition and Interpretation, Computer Programming.

Experience Summary

Dr. Nenad Iricanin has over six years of applied research and consulting experience in the field of water resource science. His applied research experience includes particulate nutrient investigations in Florida waters, pollutant loading evaluations for both fresh water and marine systems, bulk sediment analyses for trace metals and nutrients, interstitial water analyses for trace metals and nutrients and *in situ* measurements of trace metals, sediment oxygen demand and nutrient fluxes from sediments using cores and chambers.

At Conservation Consultants, Inc., Dr. Iricanin's responsibilities include mathematical modeling of land surface/atmospheric interactions, sediment geochemistry and water/sediment interactions, pollutant loading evaluations, waste load allocations, conceptual stormwater management plans, nutrient exchange rates and nutrient budget determinations. Additionally, he performs statistical analyses and data interpretations of water resources and ecological assessments.

Education

Year	School
1990	Florida Institute of Technology Ph.D - Chemical Oceanography
1984	Florida Institute of Technology M.S. - Chemical Oceanography
1982	Florida Institute of Technology B.S. - Chemical Oceanography

NENAD IRICANIN, Ph.D. Staff Scientist

Employment History

1990 - Present	Conservation Consultants, Inc. Staff Scientist

Key Projects

City of Tampa: Quantified sedimentation and pollution in the lower Hillsborough River. Tampa, Florida.

Florida Department of Environmental Regulation: Particulate nutrient investigations and computer simulation of the Turkey Creek watershed. Brevard County, Florida.

National Oceanic and Atmospheric Administration (NOAA): Pollutant-particle relationships in the marine environment (P-Prime), interstitial water chemistry.

Department of Interior/U.S. Fish and Wildlife Service: The second joint U.S.A.-U.S.S.R. ecosystem investigation of the Bering Sea; sediment geochemistry.

St. Johns River Water Management District: Investigated the quantity, composition, and sources of suspended matter loading to Turkey Creek. Computer simulation of pollutant loadings from urban and rural watersheds. Brevard County, Florida.

Walt Disney EPCOT (The Living Seas): Monthly trace metal and major cation chemistry of artificial seawater to ensure aquaria stability. Orange County, Florida.

King Engineering Associates: Lake Tarpon SWIM Study. Project Scientist for the evaluation of stormwater quality and pollutant loading for the Lake Tarpon watershed. Responsibilities include a bathymetric survey of the lake, sediment nutrient exchange rates, sediment oxygen demand, and evaluation of a nutrient budget for Lake Tarpon. Pinellas County, Florida.

Smally, Wellford & Nalven, Inc.: Project Scientist for a Water Quality Based Effluent Limitation (WQBEL) Study involving stormwater runoff and discharge entering Sarasota Bay. Sarasota, Florida.

Royster Phosphates, Inc.: Responsible for synthesizing water quality data from a Water Quality Based Limitation (WQBEL) study into an "Intensive Survey" document. Manatee County, Florida.

Palmer Venture: Responsible for pollutant loading analysis for pre- and post-development of Palmer East-side property. Sarasota County, Florida.

Key Projects (Continued)

Palmer Venture: Project Manager for Storm Event Pollutant Loading Monitoring program in Catfish and South Creeks on Palmer Ranch. Sarasota County, Florida.

Selected Publications

Iricanin, N., Seasonal trends and benthic fluxes of interstitial manganese. (1984). M.S. Thesis.

Gu, D., N. Iricanin, and J.H. Trefry (1987), The geochemistry of interstitial water for a sediment core from the Indian River Lagoon, Florida, Florida Scient., 50, 99 - 110.

Iricanin, N., J.H. Trefry, R.P. Trocine, T.W. Vetter, and S. Metz, Seasonal and spatial variations of interstitial Mn and Fe in Mississippi Delta Sediments, Geochimica Cosmochimica Acta.

Iricanin, N., The role of storms in the transport and composition of particles in a Florida creek. Ph.D. Dissertation.

Memberships

American Society of Limnology and Oceanography
American Geophysical Union
The Oceanography Society

JONI L. MACY — Chemistry Supervisor

Fields of Competence

Chemical analyses of surface/groundwater, drinking water, wastewater, sludge, and soil samples for permit/regulation requirements following EPA, ASTM, NIOSH, APHA, AWWA, and WPCF approved methodologies.

Experience Summary

Ms. Joni Macy has six years experience in environmental chemistry including proficiency in a wide range of laboratory analyses, sampling techniques, quality control/quality assurance procedures, and laboratory supervision. She worked with Hillsborough County Utilities Laboratory for three years where she was involved with field sampling, bacteriology, biochemical and chemical oxygen demands, solids analyses, and nutrient analyses. Ms. Macy was also responsible for initiating and maintaining a quality control program for this department.

Ms. Macy expanded her expertise in environmental chemistry while working with a private environmental laboratory where she served as both Supervisor and Scientist II. She was responsible for the daily operation and supervision of the Wet Chemistry Department and its seven analysts.

At CCI, Ms. Macy serves as Laboratory Supervisor and Chemist. She is responsible for the daily operation of the laboratory including; sample analyses and reporting, sample tracking, equipment maintenance, and quality control/quality assurance procedures. Additionally, she maintains the laboratory's State certifications.

Education

Year	School
1986	University of South Florida B.S. - Zoology

JONI L. MACY — Chemistry Supervisor

Employment History

1990 - Present	Conservation Consultants, Inc. Staff Chemist
1989 - 1990	Post, Buckley, Schuh, and Jernigan Environmental Laboratory Supervisor/Scientist of Wet Chemistry
1986 - 1989	Hillsborough County Department of Utilities Environmental Scientist
Spring 1985	Florida Department of Environmental Regulation Biological Scientist

Key Projects

Hillsborough County Utilities Lab: Established a QA/QC plan for the nutrient analyses performed on the auto-analyzers. Certified and trained in RFA analyses for purchase of new auto-analyzer system.

PBS & J Laboratory: Involved in purchasing, organization, and training of personnel for new RFA auto-analyzer system which allowed for computerized data generation from both RFA and existing two Technicon systems.

Conservation Consultants, Inc.: Analyses and reports of private well systems for agricultural/business use for Southwest Florida Water Management District permitting. Involved in updating of QA/QC manual and program for Conservation Consultants, Inc. certification requirements.

STEVEN L. SCHINDEHETTE — Associate Scientist

Fields of Competence

Water Quality Sample Collection and Analyses, Surface Water Hydrologic Monitoring, Installation and Maintenance of Field and Laboratory Instruments, Bacteriological Analysis.

Experience Summary

Mr. Schindehette has recently begun working in the field of environmental technical services. He has knowledge of various aspects of surface water investigations including *in-situ* measurements, flow determination and grab and composite sampling. He has monitored groundwater via water level measurements and grab samples. He assists in the day-to-day operations of CCI's chemical laboratory including the routine chemical analyses of ground and surface waters. Prior to joining CCI, he worked for the Florida Department of Natural Resources where he was involved with all aspects of fish mariculture, including water quality sampling and analyses.

Education

Year	School
1987	University of North Carolina at Wilmington B.S. - Marine Biology
1985	Elgin Community College, Illinois Associate of Science - Biology

Employment History

1990 - Present	Conservation Consultants, Inc. Associate Scientist
1989 - 1990	Florida Department of Natural Resources Science Technician III

Key Projects

Coastal Communities & Resorts: Project Scientist for the sampling and analysis of tidally influenced waters. Manatee County, Florida.

King Engineering Associates, Inc.: Project Scientist for Lake Tarpon SWIM studies. Activities include mobilization, implementation and routine maintenance of water quality instrumentation, stratigraphic and bathymetric profiles of water and sediment parameters. Principal diver for retrieving sediment cores for Nutrient Exchange Rates/Sediment Oxygen Demand (NER/SOD) determination as well as deployment and retrieval of sedimentation traps. Pinellas County, Florida.

Smally Wellford & Nalven, Inc.: Project Scientist for Water Quality Based Effluent Limitation (WQBEL) study involving discharge entering Sarasota Bay from the City of Sarasota's Water Treatment Plan. Duties included collection of water samples and hydrographic measurements. Sarasota County, Florida.

Tierra Verde Yacht & Tennis Club: Project Scientist in environmental monitoring and permitting. Activities included mobilization and construction of hydrographic instrumentation, water quality and sediment sampling, and a basin flushing analysis using dye marker study. Pinellas County, Florida.