WATER QUALITY SAMPLING AND ANALYSIS AT ST. LUCIE ESTUARY

Final Report

by

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LIST OF FIGURES AND TABLES

I. INTRODUCTION

A temporally-intensive sampling and analysis of selected water quality parameters was conducted at four locations in St. Lucie Estuary during the period July 12 through July 17, 1981. The work was performed according to the guidelines and under the direction of the South Florida Water Management District (SFWMD) to provide baseline data for calibration of a hydrodynamic, simulative model.

II. STUDY PLAN

a) Field Procedures

(i) Logistics:

The twenty-four hour sampling at each location was accomplished by two field crews operating on eight hour shifts. Each crew, consisting of one senior staff member and one technician was responsible for the collection and transport of samples to a field laboratory and base of operations set up at the Florida Oceanography Society in Stuart. The calibration of *in situ* equipment, quality assurance procedures and sample filtration were performed at this site by qualified Mote Marine Laboratory (MML) personnel (a senior staff member present at all times). Samples requiring immediate treatment were processed, and prepared for transport. This field laboratory facility served also as the contact point for all crews to ensure coordination of sampling activities.

(ii) Sampling Locations:

Water column profiles of various physical and chemical parameters were determined for designated stations adjacent to three bridges, the Palm City Bridge, the Port St. Lucie Boulevard Bridge and the A1A Bridge. Stations were marked by SFWMD on the sidewalks of the individual bridges. Samples were taken at a total of 15 discrete locations in all. Additional grab samples were taken at the City of Stuart Sewage Treatment Plant (STP) point of discharge. (See Figure 1.)

Transect 1 (T1) , along the Palm City Bridge , consisted of 3 stations, A, B, and C. Station 3 or the "channel" station was located at mid-span and was sampled at 0.2, 0.5 and 0.8 of the total depth (T1 BO.2, T1 BO.5 and T1 BO.8, respectively. Stations A and C were located to either side of Station B and were each sampled a t a relative depth of 0. 5 (T1 AO.5, T1 CO.5).

The Port St. Lucie Bridge, Transect 2 (T2), was sampled from mid-span only (Station B) and again from relative depths of 0.2, 0.5 and 0.8 (T2 BO.2, T2 BO.5, and T2 B0.8).

At the A1A Bridge, Transect 3 (T3), three stations were sampled. Stations A and C, on either side of the channel were samples at 0.2 and 0.8 of the total depth (T3 AO.2, T3 AO.8, T3 CO.2, and T3 CO.8, respectively). Station B, mid-span, was again sampled at the relative depths of 0.2, 0.5 and 0.8 (T3 BO.2, T3 BO.5, and T3 BO.8).

Samples taken at the STP (S1) were collected from an elevated discharge pipe prior to any mixing with estuarine waters.

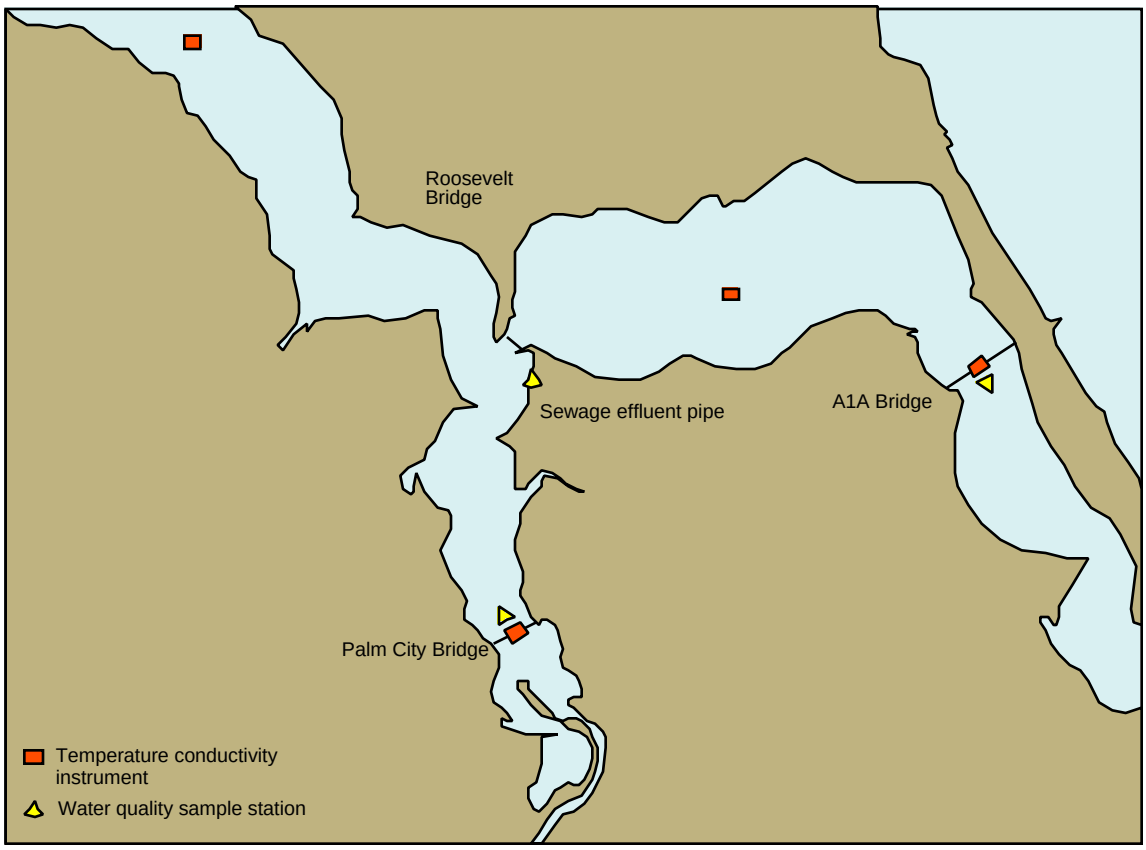

Figure 1. St. Lucie Estuary sampling locations (courtery SFWMD).

(iii) Sampling Dates:

Samplings at the four locations were conducted during the following dates and times:

Palm City Bridge (Transect 1) ; 1600 July 12 to 1624 July 13
Port St. Lucie Boulevard Bridge (Transect 2); 1607 July 14 to 1542 July 15
City of Stuart STP (S1): 1700 July 14 to 1626 July 15
A1A Bridge (Transect 3): 1604 July 16 to 1612 July 17.

(iv) Sampling frequency:

Samples at the three bridge transects were collected every 1.5 hours over a 24-hour period, i.e., samples were collected 17 times at each of 15 sample locations on the three transects.

The treatment plant discharge pipe was sampled once every 3.0 hours over a 24-hour period. A total of 9 samples were collected.

(v) Physical Parameters:

As water quality samples were collected, in situ_measurements of pH, dissolved oxygen (DO), conductivity and temperature were recorded at each station and sampling depth from a Hydrolab 6-D surveyor *in situ* monitor. During daylight hours, water transparencies (Secchi disk method) were also deter-mined. The Hydrolab and Secchi disk were both lowered over the bridge by hand, using a marked cable so that readings could be taken at the proper depths. All readings were recorded on data sheets designed in coordination with and supplied by SWFMD.

As back up instruments for the Hydrolab, the following equipment was available in the field:

- one YSI Model 57 Dissolved Oxygen Meter (with temperature probes);
- one Orion Model 201 pH Meter;
- one YSI Model 33 S-C-T Meter;
- one Hydrolab 6-D Surveyor (provided by SFWMD)

(vi) Collection and preservation of water samples:

Water samples at the three bridge transects were collected from the bridges at stations designated by SFWMD. A 5 L Niskin bottle attached horizontally near the bottom of the marked line was lowered over the bridge by hand. The depth was determined with a marked line and the sample bottle positioned at the appropriate relative depth. The Niskin bottle was then tripped with a fishing pole and the sealed bottle retrieved.

Once the Niskin was recovered, the bridge transect water samples were divided into 5 subsamples, each container type having been appropriately pre-cleaned. Of the subsamples, 3 were left plain, one was preserved with sulfuric acid (H_2SO_4) and the last was preserved with nitric acid (HNO_3). (The parameters requiring the various preservatives are detailed in the ensuing section on laboratory methods.) All samples were immediately iced. At the STP, an additional subsample was preserved with HNO_3 and potassium dichromate ($KMnO_4$).

All sample bottles were labeled with the following information.

Job Number:	Collected by:
Date:	Checked by:
Time:	
Sample Number:	
Preservative:	

The Job Number of 310:110 was MML's project code. The remaining information was completed by sampler at the tine of collection. The sample number, as designed by SFWMD, designated the location, station and relative depth of each sample. In addition each container was uniquely and indelibly numbered. This container identification number, together with SFWMD's sample number and the time of collection were recorded on sample log sheets to ensure reliable sample identification and to document chain-of-custody procedures. A field activities log was also kept by the field supervisor. This log included daily activities performed, any problems that arose and steps taken to alleviate such problems.

b) Field Laboratory Procedures

Iced samples received at the field base of operations were immediately processed to prevent significant degradation upon holding. Samples for chlorophyll 'a' determination were filtered and the filters frozen on dry ice for shipment to MML. Water samples for dissolved nutrient analyses were also filtered, the filtrate aliquoted and appropriately preserved. The analysis of total organic carbon (TOC) was initiated by sealing duplicate sample ampoules. In addition. filtrations for total residual chlorine were performed at this site immediately upon receipt of the S1 or STP samples. Specific procedures are detailed in Section of Laboratory Procedures.

Other field laboratory activities included quality assurance measures such as Winkler titrations of DO and verification of pH measurements on at least 10% of the samples. Pre- and post-calibrations of *in situ* meters according to manufacturer's recommendations were also performed.

c) Laboratory Procedures

The following parameters (255 samples each plus 10% replicate field samples) were analyzed from the three bridge transects:

1. Total Kjeldahl nitrogen
2. Total dissolved Kjeldahl nitrogen
3. Ammonia-nitrogen
4. Nitrate nitrogen
5. Nitrite nitrogen
6. Total phosphorus
7. Orthophosphate
8. Dissolved silica
9. Potassium
10. Chlorophyll 'a'
11. Turbidity
12. Conductivity
13. Total organic carbon
14. BOD_5 (carbonaceous)

In addition, alternate groups of samples i.e., at 3.0 hour intervals rather than 1.5 hour intervals were analyzed for:

15. Total dissolved phosphorus
16. Dissolved orthophosphate

The following parameters (9 samples each plus 10% replicate field samples) were analyzed from the STP point of discharge:

1. Total Kjeldahl nitrogen
2. Total dissolved Kjeldahl nitrogen
3. Ammonia-nitrogen
4. Nitrate nitrogen
5. Nitrite nitrogen
6. Total phosphorus
7. Total dissolved phosphorus
8. Orthophosphate
9. Dissolved orthophosphate
10. Dissolved silica
11. Potassium
12. BOD_5 (carbonaceous)
13. Total residual chlorine
14. Cadmium
15. Copper
16. Lead
17. Mercury
18. Nickel
19. Silver
20. Zinc
21. Total organic carbon
22. Total suspended solids
23. Turbidity

Specific laboratory. procedures were as follows:

Total Kjeldahl Nitrogen and Total Dissolved Kjeldahl Nitrogen

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
351.4-1 to 331.4-3
STORET NO. 00625

Unfiltered and filtered (0.45 p membrane filter) samples, acidified to a pH<2 with H_2SO_4 and maintained at 4 °C, were brought to room temperature and in the presence of sulfuric acid and potassium sulfate, with mercuric sulfate as a catalyst, the organic nitrogen compounds were digested at elevated temperatures, to ammonium sulfate. A pH adjustment converted the ammonium ion to ammonia, measurable by the ion selective probe. Interference from the mercuric ion and hydroxides was prevented by the addition of sodium iodide and EDTA.

The total Kjeldahl nitrogen value was obtained by direct comparison to a 7-point standard curve, digested simultaneously with samples, which ranged from the lower limit of detection, 0.05 mg/L, to 5.0 mg/L NH_4-N. Standards were prepared in distilled and double deionized

water, digested, and then reconstituted with synthetic ocean water to match the ionic strength of the samples.

Ammonia-Nitrogen

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
350.3-1 to 350.3-2
STORET NO. 00610

Acidified and iced samples were brought to room temperature. Addition of sodium hydroxide produced a pH change to convert the ammonium ion to ammonia. Dissolved ammonia then diffused through the hydrophobic gas permeable membrane of the ammonia electrode, allowing measurement of the partial pressure of ammonia from the change in pH of the internal solution and the resultant change in potential of the electrode. Standard curves were run with each group of samples using ammonia-free synthetic ocean water bearing the same level of dissolved species as the samples and ranging in concentration from 0. 05 mg/L , the lower limit of detection to 3.0 mg/L NH_4-N.

Nitrate-Nitrite-Nitrogen and Nitrite-Nitrogen

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
353.3-1 to 353.3-5
STORET No. O0360 (NO_3-NO_2-N) and No. 00615 (NO_2-N)

Iced-samples, filtered (0.45 µ) to remove turbidity interferences and acidified (H_2SO_4) for preservation, were allowed to come to room temperature. Combined nitrate and nitrite values were determined by passing the sample, buffered with ammonium chloride and EDTA, through a column of copper coated cadmium granules to reduce nitrate to nitrite. The nitrite was then diazotized with sulfanilamide and complexed with N-(1-napthyl)-ethylenediamine dihydrochloride to form a diazo dye, measured spectrophotometrically at 540 nm.

Nitrite-nitrogen was determined on unacidified samples, filtered and buffered as above but without reduction. In both cases concentrations were read directly from a 7-point standard addition curve prepared in distilled and deionized water and ranging from 0.005 mg/L to 0.1 mg/L as N.

Orthophosphate and Total Phosphorus
Dissolved Orthophosphate and Total Dissolved Phosphorus

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
365.3-1 to 365.3-4
STORET NO. 70507 (PO_4-P) and NO. 00665 ($\sum$P)

Unacidified and iced samples, both unfiltered and filtered (0.45 µ), were warmed to room temperature from 4 °C, acidified and the reactive or orthophosphate present ccmplexed with ammonium molybdate and a small amount of antimony potassium tartrate. The phosphomolybdic acid formed was then reduced with ascorbic acid to give molybdenum blue, measured at 650 nm on a spectrophotometer. Total phosphorus was determined as all phosphorus present as orthophosphate after the digestion of unfiltered and filtered (0.45 µ) samples with sulfuric acid

and ammonium persulfate and addition of molybdenum and ascorbic acid as above. In both cases, sample concentrations were read directly from a standard curve prepared with distilled and double deionized water and ranging from 0.005 mg/L, the lower limit of detection, to 1.0 mg/L of PO_4-P.

Silica, Dissolved

EPA: Methods for Chemical Analysis of Water and wastes
EPA 600/4-79-020, March 1979
370.1-1 to 370.1-5
STORET NO. 00755

Unacidified, filtered (0.45 µ) samples were warmed to room temperature from 4 0 C. The addition of an acidic molybdate solution formed a yellow complex, molybdosilicic acid. Tannin and phosphate interferences were decreased by the addition of oxalic acid and the yellow complex was then reduced to the intense heteropoly blue with the addition of 1-amino-2-napthol-4-sulfonic acid and measured spectrophotometrically at 650 nm.

Concentrations were read directly from standard curves prepared in distilled and deionized water and ranging from 0.01 mg/L, the lower limit of detection, to 10 mg/L SiO_2-Si.

Potassium

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-040, March 1979
Metals, Total Recoverable - Section 4.1.4
STORET NO. 00937

After a wet digestion with nitric and hydrochloric acids, potassium was determined on preserved samples (HNO_3, 4 °C) by atomic emission of the aspirated sample in an air-acetylene flame. Concentrations were determined directly from a 7-point standard curve ranging from 0 to 600 mg/L K. Additional standards were run after every 10 samples to prevent machine drift and recoveries were checked by the analysis of spiked samples.

Chlorophyll 'a'

American Public Health Association. Standard Methods for the Examination of Water and Wastewater, 14th edition, pg. 1029-1033.
STORET NO. 32230

Cells containing chlorophyll were concentrated by glass fiber filter (GFC), buffered with magnesium carbonate solution, and frozen on dry ice at the time of collection. After homogenization of the filter in 90% acetone-water, pigments were passively extracted in the dark at 4 °C for 12 hours. Centrifugation clarified the extract and the optical density (O.D.) at 663 nm, before and after addition of 0.02 mL of 1N HCl, were used for calculations of chlorophyll 'a'.

This value has been corrected for pheophytin 'a'.

$$\text{Chl 'a'} \ (\text{mg/m}^3) = \frac{26.73(\text{O.D. 663 before-O.D. 663 after}) \ V_1}{V_2 \ l}$$

V_1 = volume of extract, in liters
V_2 = volume of sample filtered, in m^3
l = path length, in cm

Turbidity

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
180.1-1 to 180.1-4
STORET NO. 00076

Unacidified and iced samples were warmed to roam temperature and measured nephelometrically on a Hach Portable Turbidimeter (Model 16800). The turbidimeter was precalibrated before each use with a manufacterer's standard and freshly prepared farmazin solutions were run as standards initially and after every 20 samples.

Specific Conductance (Conductivity

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
120.1-1
STORET NO. 00095

The specific conductance of samples at 25 °C was measured with a Beckman Type TC conductivity bridge, Wheatstone bridge null indicator type, with a platinum electrode conductivity cell. Standard KCl solutions were used for standardization before each -use and for the computation of the cell constant.

Total Organic Carbon

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 19-79L
415.1-1 to 415.1-3
STORET NO. 00680

Total organic carbon (TOC) was determined by the persulfate oxidation method (Fredericks and Sackett, 1970) using the Ocean International Model 524 C Analyzer.

A 50 mL aliquot was transferred to a pre-cleaned (with HNO_3) and sample rinsed glass jar and prepared for TOC analysis within 2 hours of collection. For sample preparation, a 5 mL portion was placed in a precombusted glass ampoule containing 1 mL of potassium persulfate solution, followed by 0.2 mL of 101 phosphoric acid. The ampoule was then purged with oxygen to remove inorganic carbon and sealed with a portable ampoule sealer, The samples were then shipped to the laboratory and stored at room temperature until analysis. Analysis of the TOC samples consisted of autoclaving the ampoules at 130 °C for one hour, then measuring the infrared absorbance of the carbon dioxide generated.

Samples were analyzed in sets of 50 with minimum of 1 duplicate for every 10 samples. Each set was compared with a standard carbon dioxide curve, reagent blanks and 3 samples spiked with a standard amino acid solution to verify accuracy and precision.

Biochemical Oxygen Demand, 5 day, Carbonaceous

U.S. Environmental Protection Agency, Office of Research and Development, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio.
405 1
STORET NO. 30082

Two dilutions of each sample were incubated at 20 °C for 5 days. The difference in dissolved oxygen, measured initially and finally with a YSl Model 57 DO Meter and a BOD bottle probe, was corrected for the ambient salinity, and this difference represented the oxygen required for the biochemical degradation of organic-material and the oxygen necessary for the oxidation of sulfides and ferrous compounds. The oxidation of nitrogenous compounds was prevented by the addition of 2-chloro-6(trichloromethyl) pyridine. Blanks were run on the dilution water and reagents.

Chlorine, Total Residual

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
330.3-1 to 330.3-4
STORET NO. 50060

The iodine stoichiometrically released from a potassium iodide solution by chlorine (hypochlorite ion or hypochlorous acid) and chloramines in a 250-mL aliquot of sample was titrated with a standardized phenylarsine oxide solution to a starch end point. Titrations were performed immediately on collection of sample.

Cadmium, Copper, Lead, Nickel, Silver and Zinc

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
Metals, Total Recoverable - Section 4.1.4, 9.2
STORET NO. 01027, 01402, 01051, 01067, 01077, 01092

During a wet digestion with nitric and hydrochloric acids, concentrations of 1OX of low level samples was effected by gentle evaporation and reduction of sample volume from 200 mL to 20 mL. Standards, spiked samples and blanks accompanied each sample run for the individual metals. Direct aspiration into the air-acetylene flame of the atomic absorption unit and comparison with a 7-point standard curve determined sample concentrations,

Mercury, Total

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
245.1-1 to 245.1-6
STORET NO. 71900

Organomercurial compounds were oxidized with potassium permanganate, potassium persulfate and heat. The resultant mercuric ions were reduced to the elemental state with stannous sulfate and the mercury vapor aerated from solution with nitrogen. The absorbance of the anhydrous mercury-vapor as it is swept through the cell of the atomic absorbtion spectrophotometer was recorded and related directly to the absorbance of standards.

Total Suspended Solids (Residue, Nonfilterable)

EPA: Methods for Chemical Analysis of Water and Wastes
EPA 600/4-79-020, March 1979
160.2-1 to 160.2-3
STORET NO. 00530

Representative 350 mL aliquots of each unacidified and iced sample were filtered through prewashed, dried (at 103-105 °C), and tared glass fiber filters, Reeves Angel 934-AH, and rinsed with distilled water. After drying to constant weight at 103-105 °C (weight loss less than 0.0005 g), the nonfilterable residue was calculated as the difference between final and tare weights in milligrams, divided by the liters of sample volume filtered.

III. QUALITY ASSURANCE

a) General

MML maintains stringent quality assurance procedures on all its projects on a routine basis. A Quality Assurance Committee oversees QA procedures by conducting regular data audits and periodic operations checks. The QA committee is independent of the project team. A project-specific written QA manual was prepared prior to the initiation of the project. After review and approval by the QA committee and MML President, the manual served as the primary guide for all QA procedures. Specific project personnel (Field Coordinator, Principal Investigator) implemented QA procedures while the Project Manager was authorized to audit and impose corrective measures as necessary. Major aspects of MML's QA program are

- Spotchecks and audits by QA committee;
- Written QA manual;
- Individual and project (calibration, maintenance) logs;
- Regular meetings of the Project Manager and Senior Investigators, to discuss and implement QA procedures, problems, and other necessary actions;
- Data records and log duplication with archiving to ensure retention of data;
- Replicate collections of at least 10% of samples for water quality analyses;
- Duplicate analyses of at least 10% of all samples processed in the laboratory;
- Replicate tests and/or supervisor approval of all anomalous results or reports;
- Documentation to adequately establish data traceability from sample collection to final reporting;
- Adequate validation (checks by supervisor) of all data;
- Rechecking of at least 10% of all computer data entries;
- Specifications for data reduction and analysis, and for the presentation and evaluation of results.

MML's QA program has been previously audited by external sources (U.S. Environmental Protection Agency, Region 4, and Stone & Webster Engineering Corporation) and found to be excellent.

b) Specific

Mote Marine Laboratory maintains assurance of quality control through participation in the U.S. EPA and Florida DER analytical interlaboratory quality control programs. To ensure continuous quality control throughout sampling and analysis, reagent blanks, recoveries from spiked samples, and additional standards were incorporated with each set of samples analyzed.

Replicate field samples were collected at a rate of 1 for every 10 samples. Duplicate laboratory analyses were also performed at the same rate. Where standard curves were utilized for colorimetric or absorbtive procedures, they consisted of 7 points bracketing the concentration ranges expected. New curves were prepared for each new batch of reagents and additional standards were analyzed after every 10 samples. Alternatively, the meter being used was recalibrated with fresh standards after every 20 samples. Appropriate blanks also accompanied every analytical run.

Pre- and post-sampling calibrations of the Hydrolab *in situ* monitor were performed according to manufacturer's recommendations. Temperatures were verified with a National Bureau of Standards (NBS) traceable thermometer, potassium chloride solutions were used to calibrate conductivity and the manufacturer's recommended calibration (compensated for conductivity) was used for DO. in addition, field laboratory measurement of pH and DO titration were conducted on more than 10% of the samples to verify accuracy of data collected and conductivity measurements were verified on 100% of the samples with a laboratory potentiometer.

Parameter-specific cleaning procedures were used upon ail sample containers before collection. Polyethylene bottles from which samples for nutrient analysis were to be drawn were acid (H_2SO_4) and distilled water washed. Samples for metals and potassium analyses were placed in nitric acid washed, polyethylene containers. T.O.C. samples were collected in glass, nitric acid washed bottles. The Niskin sampler itself was acid and distilled water washed to minimize organic contaminants.

Preservation techniques and maximum holding times were as shown in Table 1.

IV. RESULTS

a) Sample/Data Inventory

The numbers of *in situ* measurements taken at each transect or station for each parameter are presented in Table 2. Table 3 presents a similar breakdown of laboratory analyses. A total of 5,159 values are reported. Copies of the field data sheets are presented in Section VII.

b) Concentrations of Parameters Analyzed

Tables 4 through 7 present the concentrations of the parameters analyzed.

Table 1. Analysis procedures.

Parameter	Preservation	Holding
BOD_5 (carbonaceous)	4 °C	48 hrs
Conductance	4 °C	28 days
Nitrogen, Nitrate	H_2S0_4, 4 °C	28 days
Nitrogen, Nitrite	4 °C	48 hrs
Nitrogen, Total Kjeldahl	H_2S0_4, 4 °C	28 days
Phosphorus, Ortho	4 °C	48 hrs
Phosphorus, Total	H_2S0_4, 4 °C	28 days
Potassium	HNO_3, 4 °C	6 months
Silica	4 °C	28 days
Total Organic Carbon	H_2S0_4, 4 °C	28 days
Chlorophyll 'a'	Filtered in field and frozen	15 days
Turbidity	4 °C	48 hrs
Residue, Non-filterable	4 °C	28 days
Total Residual Chlorine	-	titrated in field
Metals:		
Cadmium	HNO_3	6 months
Copper	HNO_3	6 months
Lead	HNO_3	6 months
Mercury	HNO_3, 0.05% $K_2Cr_20_7$	28 days
Nickel	HNO_3	6 months
Silver	HNO_3	6 months
Zinc	HNO_3	6 months

Table 2. Sample inventory, Number of *in situ* measurements at each transect.

	Secchi*	Field Conductivity	Temperature	DO	pH
T1	51	85	85	84	83
T2	30	51	48	51	51
T3	30	118	109	107	112
S1	NA	NA	NA	NA	10
TOTAL	111	254	242	242	256

NA - not applicable.
*Secchi only measured during daylight hours.

Table 3. Sample inventory. Number of laboratory analyses for each transect or station.

	Lab. Cond.	Turb.	TSS	Chl "a"	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
T1	85	85	NA	83	85	85	83	85	84	85
T2	51	51	NA	48	51	51	50	51	51	51
T3	118	119	NA	117	119	119	117	119	118	119
Si	NA	10	10	NA	10	10	10	10	10	10
TOTAL	254	265	10	248	265	265	260	265	263	265

	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$	Chl Res	Metals
	45	85	45	85	85	79	85	NA	NA
	29	51	26	51	51	51	51	NA	NA
	84	119	63	119	119	105	118	NA	NA
	10	10	10	10	10	10	10	10	10
TOTAL	168	265	144	265	265	245	264	10	10

T1 = Palm City Bridge
T2 = Port St. Lucie Boulevard Bridge
T3 = A1A Bridge
S1 = Stuart Sewage Treatment Plant
Lab. Cond. = Laboratory Conductivity
Turb. = Turbidity
TSS = Total Suspended Solids
Chl 'a' = Chlorophyll 'a'
NH_4-N = Ammonium-nitrogen
$N0_2$-N = Nitrite Nitrogen
$N0_3$-N = Nitrate Nitrogen
TKN = Total Kheldahl Nitrogen
TDKN = Total Dissolved Kjeldahl Nitrogen
T-$P0_4$ = Total Phosphorus
TD-$P0_4$ = Total Dissolved Phosphorus
T-O-PO_4 = Orthophosphate
TD-O-PO_4 = Dissolved Orthophosphate
$Si0_2$ = Dissolved Silica
K = Potassium
TOC = Total Organic Carbon
$CBOD_5$ = Biochemical Oxygen Demand (5 days, carbonaceous)
Chl Res = Total Residual Chlorine

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.]

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
1600	AO.5	37900	18.8	0.5	<0.05	<0.005	0.018	1.54	0.26	0.225
1611	BO.2	38300	12.8	3.3	<0.05	<0.005	0.018	0.57	0.74	0.207
1615	BO.5	38400	9.4	<0.4	<0.05	<0.005	0.036	0.54	0.17	0.190
1618	B0.8	36300	13.0	1.8	<0.05	<0.005	0.021	0.79	0.46	0.197
1655	CO.5	39000	14.0	5.7	<0.05	<O.005	0.024	0.88	0.61	0.220
1735	AO.5	38500	15.5	1.9	<0.05	<0.005	<0.005	1.06	0.42	0.343
1750	SO.2	38900	15.0	1.0	<0.05	<0.005	<0.005	0.86	0.45	0.221
1752	B0.5	39000	16.0	3.2	<0.05	<0.005	0.034	0.71	0.58	0.218
1755	BO.8	38500	19.0	<0.4	<0.05	<0.005	<0.005	0.98	0.41	0.260
1820	CO.5	39500	24.8	0.5	<0.05	<0.005	0.015	1.05	0.53	0.230
1903	AO.5	39200	13.3	3.0	<0.05	<0.005	<0.005	0.61	0.17	0.204
1919	BO.2	39600	11.0	8.7	<0.05	<0.005	0.017	0.82	0.42	0.193
1921	B0.5	39500	12.5	4.7	<0.05	<0.005	0.012	0.61	0.76	0.211
1923	BO.8	39900	13.3	11.6	<0.05	<0.005	0.012	1.16	0.37	0.226
1946	CO.5	40000	16.0	13.4	<0.05	<0.005	0.018	0.58	0.23	0.183
2032	AO.5	40300	15.0	3.6	<0.05	<0.005	0.018	1.01	0.58	0.211
2047	BO.2	39000	12.0	2.5	<0.05	<0.005	0.006	0.58	0.49	0.204
2050	BO.5	40000	10.5	<0.4	<0.05	<0.005	0.016	0.62	0.29	0.200
2051	BO.8	39100	11.0		<0.05	<0.005	0.013	0.59	0.17	0.207
2120	CO.5	39800	13.8	0.9	<0.05	<0.005	0.065	0.61	0.34	0.200
2205	AO.5	39100	13.0	2.4	<0.05	<0.005	0.155	1.29	1.75	0.191
2226	BO.2	39200	15.0	3.6	<0.05	<0.005	0.010	0.98	0.29	0.239
2228	BO.5	38500	22.5	17.3	<0.05	<0.005	0.034	1.07	0.76	0.186
2230	BO.8	39500	11.0	2.7	<0.05	<0.005	<0.005	0.96	0.76	0.176
2306	CO.5	38700	12.0	1.8	<0.05	<0.005	0.011	0.88	0.63	0.218
2339	AO.5	38800	13.5	3.6	<0.05	<0.005	<0.005	0.69	0.33	0.242
2347	BO.2	37800	10.5	0.5	<0.05	<0.005	<0.005	0.77	0.36	0.216
2347	BO.5	38700	10.0	<0.4	<0.05	<0.005	<0.005	0.97	0.54	0.384
2347	BO.8	39000	11.0	1.9	<0.05	<0.005	0.013	0.67	0.41	0.201
0019	CO.5	38000	13.3	0.5	<0.05	<0.005	0.053	0.94	0.49	0.220
0107	AO.5	38000	14.0	0.9	<0.05	<0.005	<0.005	0.34	0.54	0.211
0125	BO.2	38000	10.0	0.9	<0.05	<0.005	<0.005	0.80	0.57	0.256
0125	B0.5	38100	12.0		<0.05	<0.005	<0.005	0.78	0.31	0.225
0125	B0.8	38100	10.0	3.2	<0.05	<0.005	<0.005	0.69	0.39	0.362
0202	CO.5	38000	10.5	4.6	<0.05	<0.005	<0.005	0.96	0.42	0.200

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
0227	AO.5	38000	12.5	1.4	<0.05	<0.005	<0.005	0.53	0.52	0.384
0242	BO.2	36200	10.5	4.9	<0.05	<0.005	<0.005	0.89	0.38	0.176
0242	BO.5	37400	11.0	2.7	<0.05	<0.005	0.010	0.52	0.36	0.228
0242	BO.8	37800	10.0	3.2	<0.05	<0.005		0.76		0.193
0316	CO.5	37700	10.1	0.5	<0.05	<0.005	0.006	0.42	0.53	0.211
0400	AO.5	38000	15.8	8.2	<0.05	<0.005	<0.005	0.97	0.21	0.218
0415	BO.2	37300	9.0	0.5	<0.05	<0.005	<0.005	0.79	0.68	0.148
0415	B0.5	37200	8.0	0.5	<0.05	<0.005	0.005	0.56	0.46	0.211
0415	BO.8	38100	7.5	4.9	<0.05	<0.005	<0.005	0.76	0.76	0.246
0452	CO.5	37900	10.5	6.0	<0.05	<0.005	0.010	0.79	0.44	0.295
5530	AO.5	37700	9.0	3.7	<0.05	<0.005	<0.005	0.65	0.47	0.191
0606	BO.2	38000	9.5	2.3	<0.05	<0.005	0.013	0.95	0.66	0.188
0554	BO.5	38500	8.6	4.5	<0.05	<0.005	<0.005	0.63	0.26	0.232
0542	BO.8	38900	8.4	0.9	<0.05	<0.005	<0.005	0.85	0.59	0.355
0617	CO.5	38100	9.9	1.2	<0.05	<0.005	0.005	0.62	0.39	0.197
0702	AO.5	38800	8.8	0.5	<0.05	<0.005	0.020	0.75	5.69	0.201
0716	BO.2	38000	9.9	4.0	<0.05	<0.005	0.008	0.72	0.20	0.200
0716	BO.5	38100	8.5	0.5	<0.05	<0.005	0.'006	1.12	0.56	0.197
0716	BO.8	39600	8.0	1.4	<0.05	<0.005	0.020	0.36	0.38	0.209
0744	CO.5	39500	11.5	3.1	<0.05	<0.005	0.013	0.89	0.54	0.404
0825	AO.5	39800	11.0	2.1	<0.05	<0.005	0.018	0.84	0.45	0.329
0859	BO.2	38900	8.8	8.3	<0.05	<0.005	0.008	0.95	0.54	0.200
0853	BO.5	39900	9.6	4.5	<0.05	<0.005	0.008	0.75	0.76	0.373
0837	B0.6	36800	7.0	1.9	<0.05	<0.005	<0.005	0.85	0.60	0.205
0909	CO.5	38000	12.5	4.7	<0.05	<0.005	0.010	0.81	0.42	0.341
0950	A0.5	38000	13.5	15.9	<0.05	<0.005	<0.005	1.08	0.28	0.233
1000	BO.2	38200	11.0	<0.4	<0.05	<0.005		0.52	0.53	0.235
1006	BO.5	38900	10.5	4.9	<0.05	<0.005	<0.005	0.56	0.32	0.204
1007	BO.8	39200	9.5	4.7	<0.05	<0.005	0.010	0.58	0.32	0.250
1034	CO.5	38000	13.0	4.5	<0.05	<0.005	0.007	0.70	0.32	0.225
1116	AO.5	36500	19.0	1.3	<0.05	<0.005	0.024	0.92	0.54	0.211
1126	BO.2	37500	12.5	11.1	<0.05	<0.005	0.022	0.52	0.24	0.207
1128	BO.5	36300	8.5	7.7	<0.05	<0.005	0.007	0.51	0.80	0.257
1130	BO.8	36400	9.0	1.4	<0.05	<0.005	0.018	0.43	0.41	0.193
1158	CO.5	38200	12.5	<0.4	<0.05	<0.005	0.014	0.80	0.31	0.359

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
1245	AO.5	38000	12.5	3.6	'CO.05	<0.005	0.014	1.07	0.56	0.211
1257	BO.2	36300	10.0	0.9	<0.05	<0.005	0.015	0.78	0.61	0.201
1258	B0.5	37800	12.5	9.9	<0.05	<0.005	0.047	0.34	1.00	0.191
1300	B0.8	36100	9.5	0.5	<0.05	<0.005	0.014	0.36	0.74	0.214
1320	CO.5	38100	14.0	12.0	<0.05	<0.005	0.018	0.69	0.21	0.191
1424	AO.5	37900	20.6	4.9	<0.05	<0.005	0.015	1.09	0.24	0.299
1435	BO.2	35100	9.0	5.4	<0.05	<0.005	0.006	0.55	0.37	0.227
1437	BO.5	36000	12.0	4.6	<0.05	<0.005	<0.005	0.42	0.67	0.204
1439	B0.8	35900	10.5	6.8	<0.05	<0.005	0.020	1.20	0.48	0.390
1505	CO.5	37500	12.8	2.9	<0.05	<0.005	0.031	0.82	0.58	0.214
1547	AO.5	37600	17.5	2.4	<0.05	<0.005	0.014	1.44	0.48	0.250
1606	BO.2	36200	11.0	6.7	<0.05	<0.005	<0.005	1.14	0.50	0.216
1602	BO.5	36000	11.0	2.2	<0.05	<0.005	0.013	0.69	0.56	0.207
1603	BO.8	38000	13.5	3.2	<0.05	<0.005	<0.005	0.43	0.37	0.190
1624	CO.5	36900	12.5	0.9	<0.05	<0.005	<0.005	0.29	0.40	0.253

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
1600	AO.5	0.170	0.110	0.133	3.63	375	8.0	3.3
1611	BO.2	0.155	0.126	0.123	3.78	365	5.1	3.5
1615	BO.5	0.145	0.112	0.143	3.76	371	8.4	4.3
1618	B0.8	0.177	0.125	0.156	3.73	386	10.1	4.4
1655	CO.5	0.148	0.131	0.123	3.68	391	8.8	5.0
1735	AO.5		0.117		3.68	385	4.0	3.3
1750	BO.2		0.091		3.61	383	15.7	4.4
1752	B0.5		0.127		3.65	373	11.7	4.4
1755	BO.8		0.089		3.78	391	11.7	3.4
1820	CO.5		0.162		3.68	384	14.5	5.1
1903	AO.5	0.145	0.113	0.119	3.44	378	11.2	3.3
1919	BO.2	0.148	0.131	0.156	3.64	384	11.2	3.6
1921	B0.5	0.152	0.129	0.178	3.58	432	10.7	4.4
1923	BO.8	0.145	0.135	0.134	3.66	396	12.2	5.5
1946	CO.5	0.152	0.122	0.146	3.67	384	10.6	2.7
2032	AO.5		0.133		3.66	386	11.3	2.9
2047	BO.2		0.120		3.55	383	6.9	3.9
2050	BO.5		0.123		3.54	384	8.1	3.6
2051	BO.8		0.130		3.59	388	15.5	4.6
2120	CO.5		0.137		3.71	384	8.7	4.5
2205	AO.5	0.145	0.111	0.141	3.59	370	17.2	3.7
2226	BO.2	0.145	0.120	0.149	3.65	379	8.7	4.1
2228	BO.5	0.134	0.112	0.185	3.60	369	12.3	4.5
2230	BO.8	0.150	0.117	0.116	3.69	414	7.8	4.0
2306	CO.5	0.152	0.150	0.136	3.65	392	10.5	3.2
2339	AO.5		0.204		3.76	366	10.2	1.5
2347	BO.2		0.169		3.66	366	9.2	2.0
2347	BO.5		0.141		3.71	386	11.3	2.1
2347	BO.8		0.152		3.73	379	8.5	1.9
0019	CO.5		0.152		3.70	391	10.3	3.0
0107	AO.5	0.141	0.142	0.116	3.64	362		2.5
0125	BO.2	0.152	0.145	0.122	3.79	386	8.5	2.2
0125	B0.5	0.138	0.157	0.129	3.73	388	8.7	2.3
0125	B0.8	0.143	0.140	0.125	3.82	377	9.6	2.3
0202	CO.5	0.134	0.121	0.124	3.70	341	12.7	3.0

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
0227	AO.5		0.115		3.62	370		1.9
0242	BO.2		0.131		3.81	399	12.1	1.9
0242	BO.5		0.178		3.79	390	7.9	2.2
0242	BO.8		0.176		3.74	361		2.1
0316	CO.5		0.156		3.74	363	11.3	2.8
0400	AO.5	0.138	0.147	0.115	3.62	361	12.3	1.8
0415	BO.2	0.136	0.119	0.121	3.69	340	12.0	2.3
0415	B0.5	0.169	0.194	0.123	3.85	357		2.7
0415	BO.8	0.169	0.121	0.123	3.72	413	13.0	2.8
0452	CO.5	0.134	0.164	0.129	3.70	391	15.0	3.0
0530	AO.5		0.135		3.67	360	12.2	2.1
0606	BO.2		0.140		3.68	378	10.7	1.3
0554	BO.5		0.154		3.73	382	11.8	2.9
0542	BO.8		0.107		3.69	393	11.8	2.1
0617	CO.5		0.140		3.69	379	10.6	2.1
0702	AO.5	0.128	0.145	0.124	3.64	366		2.8
0716	BO.2	0.145	0.142	0.118	3.68	380	10.6	3.0
0716	BO.5	0.152	0.140	0.120	3.74	386		2.6
0716	BO.8	0.161	0.133	0.124	3.74	384	10.9	2.6
0744	CO.5	0.195	0.160	0.128	3.83	418	11.1	3.8
0825	AO.5		0.173		3.66	445	9.1	2.1
0859	BO.2		0.138		3.62	386	9.9	2.9
0853	BO.5		0.177		3.69	420	6.0	2.3
0837	H0.6		0.122		3.59	379	10.3	3.4
0909	CO.5		0.173		3.69	392	11.2	5.4
0950	A0.5	0.141	0.184	0.124	3.68	432	10.6	2.0
1000	BO.2	0.167	0.126	0.123	3.69	416	9.1	3.3
1006	BO.5	0.141	0.135	0.143	3.65	382	9.2	3.0
1007	BO.8	0.138	0.161	0.117	3.68	402	11.8	2.7
1034	CO.5	0.145	0.170	0.120	3.58	374	12.3	2.9
1116	AO.5		0.172		3.66	420	11.1	2.5
1126	BO.2		0.233		3.69	404	12.9	2.6
1128	BO.5		0.150		3.72	371	10.5	3.1
1130	BO.8		0.209		3.70	365	11.7	3.0
1158	CO.5		0.162		3.68	387	12.4	3.0

Table 4. Water quality data, Transect 1 - Palm City Bridge, 1600 7/12/81 to 1624 7/13/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
1245	AO.5	0.134	0.150	0.114	3.53	316	12.9	2.9
1257	BO.2	0.152	0.145	0.119	3.78	363	11.4	2.5
1258	80.5	0.177	0.178	0.127	3.90	344	9.3	2.5
1300	B0.8	0.145	0.154	0.121	3.75	383	11.4	3.4
1320	CO.5	0.118	0.136	0.126	3.70	379	6.7	2.7
1424	AO.5		0.152		3.53	398	12.1	4.6
1435	BO.2		0.166		3.72	348	13.2	3.5
1437	BO.5		0.152		3.75	344	12.9	2.3
1439	B0.8		0.123		3.71	345	13.6	4.1
1505	CO.5		0.110		3.67	390	11.3	2.9
1547	AO.5	0.148	0.116	0.110	3.58	342	12.2	3.1
1606	BO.2	0.138	0.116	0.125	3.72	348	14.3	4.4
1602	BO.5	0.145	0.121	0.121	3.73	329	10.8	3.4
1603	BO.8	0.148	0.125	0.122	3.76	347	10.4	3.7
1624	CO.5	0.141	0.180	0.117	3.74	345	14.4	4.1

Table 5. Water quality data, Transect 2 - Port St. Lucie Boulevard Bridge, 1607 7/14/81 to 1542 - 7/15/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.]

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
1607	BO.2	26700	9.0	2.4	<0.05	<0.005	0.010	1.34	0.73	0.383
1607	BO.5	27900	9.3	7.1	<0.05	<0.005	0.012	0.83	0.62	0.395
1607	BO.8	20300	9.5	0.6	<0.05	<0.005	<0.005	0.82	0.56	0.340
1731	BO.2	27200	8.0	1.4	<0.05	<0.005	0.042	1.11	0.95	0.471
1731	BO.5	27000	9.2	1.6	<0.05	<0.005	<0.005	0.83	0.93	0.439
1731	BO.8	28200	9.5	2.6	<0.05	<0.005	<0.005	0.72	0.73	0.342
1853	BO.2	28200	7.5	4.5	<0.05	<0.005	0.027	1.04	1.40	0.311
1853	BO.5	28300	8.5	5.2	<0.05	<0.005	<0.005	1.07	0.99	0.396
1853	BO.8	28500	9.2	2.8	<0.05	<0.005	0.009	1.42	0.81	0.383
2025	BO.2	28800	7.0	1.5	<0.05	<0.005	0.018	0.99	0.70	0.432
2025	B0.5	28800	7.7	3.1	<0.05	<0.005	<0.005	0.70	0.44	0.324
2025	BO.8	31100	10.0	7.0	<0.05	<0.005	<0.005	1.04	0.70	0.372
2205	BO.2	29100	7.0	3.6	<0.05	<0.005	0.007	0.67	0.59	0.371
2205	BO.5	31200	7.5	0.5	<0.05	<0.005	0.021	0.86	0.55	0.317
2205	BO.8	23200	10.0	1.1	<0.05	<0.005	<0.005	1.00	0.51	0.337
2335	BO.2	32000	7.0	3.7	<0.05	<0.005	0.006	0.90	0.73	0.294
2332	BO.5	32300	7.0	1.3	<0.05	<0.005	<0.005	0.69	0.68	0.313
2326	BO.8	32200	7.0	7.9	<0.05	<0.005	0.020	0.84	0.85	0.362
0112	BO.2	29800	7.8	6.8	<0.05	<0.005	0.093	0.71	0.62	0.315
0110	BO.5	31200	7.3	5.1	<0.05	<0.005	0.019	0.90	0.79	0.411
0105	BO.8	30800	8.0	1.1	<0.05	<0.005	<0.005	0.92	0.68	0.390
0228	B0.2	28700	7.6	3.6	<0.05	<0.005	0.471	0.85	0.65	0.345
0226	BO.5	29300	13.1	2.7	<0.05	<0.005	0.018	1.15	0.85	0.378
0225	BO.8	30000	7.5	1.1	<0.05	<0.005	0.012	0.94	0.71	0.323
0358	BO.2	29200	7.6	1.8	<0.05	<0.005	0.006	1.07	0.55	0.347
0356	BO.5	28200	7.0	2.3	<0.05	<0.005	0.019	0.85	0.45	0.347
0355	BO.8	27500	8.0		<0.05	<0.005	0.020	0.86	0.76	0.352
0527	BO.2	8800	7.3	1.6	<0.05	<0.005	0.024	1.72	0.38	0.400
0527	BO.5	25300	7.8	0.5	<0.05	<0.005	0.087	1.19	0.55	0.453
0527	BO.8	25800	7.5	1.2	<0.05	<0.005	0.045	0.81	0.40	0.426
0651	B0.2	28200	8.4	0.5	<0.05	<0.005	0.024	1.64	0.57	0.347
0649	BO.5	27500	7.5	1.1	<0.05	<0.005	0.008	1.09	0.43	0.386
0647	BO.8	29200	7.1	2.3	<0.05	<0.005	0.032	1.53	0.50	0.389

Table 5. Water quality data, Transect 2 - Port St. Lucie Boulevard Bridge, 1607 7/14/81 to 1542 - 7/15/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
0817	BO.2	29500	7.3	0.4	<0.05	<0.005	0.012	1.59	0.64	0.393
0815	BO.5	28000	7.4		<0.05	<0.005	0.019	1.22	0.53	0.443
0812	BO.8	29500	7.5	3.1	<0.05	<0.005	0.020	0.98	0.41	0.426
0944	BO.2	28200	12.0	3.1	<0.05	<0.005	0.026	1.03	0.49	0.395
0944	BO.5	31000	8.2	2.9	<0.05	<0.005	0.017	1.18	0.46	0.337
0944	BO.8	31500	8.7	0.7	<0.05	<0.005	0.006	1.21	0.59	0.337
1120	BO.2	30500	9.0	1.1	<0.05	<0.005	0.008	1.25	0.60	0.405
1120	BO.5	30800	7.0	<0.4	<0.05	<0.005	0.014	0.78	0.46	0.354
1120	BO.8	32000	8.8	<0.4	<0.05	<0.005	0.034	0.95	0.41	0.350
1253	BO.2	29800	8.0	0.4	<0.05	<0.005	0.016	0.85	0.41	0.373
1253	BO.5	26500	8.0	1.6	<0.05	<0.005	0.010	1.32	0.31	0.354
1253	BO.8	31000	8.5		<0.05	<0.005	0.005	0.67	0.43	0.340
1422	BO.2	28800	8.0	<0.4	<0.05	<0.005	0.009	1.03	0.69	0.376
1422	BO.5	27200	8.0	15.3	<0.05	<0.005	0.018	1.46	0.65	0.372
1422	BO.8	29500	8.0	3.6	<0.05	<0.005		1.17	0.61	0.355
1542	BO.2	28000	8.0	1.4	<0.05	<0.005	0.020	0.84	0.43	0.373
1542	BO.5	27000	8.1	2.2	<0.05	<0.005	0.008	1.19	0.56	0.386
1542	BO.8	28500	6.9	0.4	<0.05	<0.005	0.013	0.84	0.69	0.373

Table 5. Water quality data, Transect 2 - Port St. Lucie Boulevard Bridge, 1607 7/14/81 to 1542 - 7/15/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
1607	BO.2	0.317	0.291	0.292	5.21	269	15.0	2.9
1607	BO.5	0.317	0.309		5.56	261	13.6	3.8
1607	BO.8	0.387	0.304	0.278	5.03	293	15.0	3.5
1731	BO.2		0.304		5.07	251	15.1	5.3
1731	BO.5		0.309		5.38	277	8.8	7.0
1731	BO.8		0.305		5.40	263	15.0	11.5
1853	BO.2	0.286	0.303	0.285	5.30	265	13.6	9.5
1853	BO.5	0.275	0.298	0.280	5.32	299	13.3	4.6
1853	BO.8	0.294	0.294	0.277	5.21	274	14.3	6.9
2025	BO.2		0.343		5.12	272	13.6	3.7
2025	B0.5		0.296		4.99	272	13.0	5.1
2025	BO.8		0.300		5.03	311	13.1	3.1
2205	BO.2	0.275	0.321	0.252	4.99	266	13.3	5.1
2205	BO.5	0.285	0.282	0.242	5.31	291	10.2	3.3
2205	BO.8	0.250	0.254	0.326	4.80	320	10.8	7.1
2335	BO.2		0.249		5.23	333	10.4	3.5
2332	BO.5		0.289		5.13	114	9.5	5.3
2326	BO.8		0.243		4.93	326	10.0	3.6
0112	BO.2	0.313	0.245	0.258	4.98	289	10.4	3.0
0110	BO.5	0.282	0.268	0.257	5.23	294	10.0	7.1
0105	BO.8	0.271	0.258	0.251	5.01	311	10.2	3.4
0228	B0.2		0.297		4.93	305	9.2	7.5
0226	BO.5		0.294		4.76	293	10.5	4.6
0225	BO.8		0.282		4.91	312	8.2	4.0
0358	BO.2	0.320	0.302	0.307	5.04	264	9.2	4.9
0356	BO.5	0.313	0.313	0.356	4.98	273	8.3	2.8
0355	BO.8	0.334	0.294	0.319	5.27	287	9.0	5.5
0527	BO.2	0.299	0.330		5.30	275	9.3	5.3
0527	BO.5	0.383	0.295		5.08	273	8.0	5.7
0527	BO.8		0.315		5.24	262	9.9	5.8
0651	B0.2	0.304	0.319	0.306	5.28	276	10.3	5.6
0649	BO.5	0.310	0.307	0.289	5.20	287	13.1	5.8
0647	BO.8	0.303	0.328	0.283	5.42	276	11.9	5.6

Table 5. Water quality data, Transect 2 - Port St. Lucie Boulevard Bridge, 1607 7/14/81 to 1542 - 7/15/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
0817	BO.2		0.325		5.50	275	9.6	6.2
0815	BO.5		0.316		5.20	290	9.0	5.7
0812	BO.8		0.311		5.56	307	9.5	7.2
0944	BO.2	0.291	0.305	0.325	5.19	273	9.1	10.9
0944	BO.5	0.262	0.295	0.302	5.03	300	9.0	6.5
0944	BO.8	0.285	0.293	0.257	5.39	298	9.3	6.7
1120	BO.2		0.296		5.30	293	12.5	9.1
1120	BO.5		0.300		5.54	292	10.6	6.1
1120	BO.8		0.289		5.17	307	12.7	10.9
1253	BO.2	0.307	0.312	0.274	5.51	260	10.9	6.9
1253	BO.5	0.305	0.311	0.271	5.50	292	10.1	12.7
1253	BO.8	0.292	0.266	0.269	5.34	311	10.7	9.3
1422	BO.2		0.300		5.62	286	9.6	8.1
1422	BO.5		0.321		5.40	279	10.8	6.7
1422	BO.8		0.341		5.65	275	9.1	6.4
1542	BO.2	0.335	0.306	0.335	5.00	304	9.2	6.3
1542	BO.5	0.322	0.312	0.299	5.46	260	9.1	7.5
1542	BO.8	0.331	0.325	0.396	5.51	274	8.9	10.0

Table 6. Water quality results from Station S1 - City of Stuart Sewage Treatment Plant, 1700 - 7/14/81 to 1625 - 7/15/81.

Actual Time	Turbid-ity	Total Sus. Solids
1700	12.5	15.7

NH_4 -N	NO_2 - N	NO_3 -N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.63	0.166	10.33	7.98	6.21	4.94	4.38	4.44	3.99	10.35	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
18.7	366	1.08	0.015	<0.02	0.047	0.001	0.0005	<0.005	0.004

Actual Time	Turbid-ity	Total Sus. Solids
2000	9.0	15.6

NH_4 -N	NO_2 - N	NO_3 -N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.76	0.148	8.65	7.80	5.31	5.11	4.39	4.71	3.71	9.78	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
17.9	381	2.13	0.013	<0.02	0.047	0.002	0.0001	0.005	0.004

Actual Time	Turbid-ity	Total Sus. Solids
0453	7.0	14.0

NH_4 -N	NO_2 - N	NO_3 -N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.01	0.085	8.99	6.84	12.14	6.51	6.39	6.68	6.30	10.83	6

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
13.6	185	1.79	0.013	<0.02	0.039	0.002	0.0003	0.005	0.003

Table 6. Water quality results from Station S1 - City of Stuart Sewage Treatment Plant, 1700 - 7/14/81 to 1625 - 7/15/81 (cont.).

Actual Time	Turbidity	Total Sus. Solids
0800	15.0	23.0

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
0.89	0.064	8.09	11.48	6.00	8.15	7.29	7.74	7.44	10.76	8

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
20.9	200	0.75	0.021	<0.02	0.054	0.002	0.0002	<0.005	0.011

Actual Time	Turbidity	Total Sus. Solids
2300	11.0	16.3

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.38	0.148	8.99	9.97	3.26	5.88	4.92	5.23	4.61	10.88	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
18.3	381	2.08	0.017	<0.02	0.048	0.002	0.0008	<0.005	0.004

Actual Time	Turbidity	Total Sus. Solids
0200	7.0	11.1

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.31	0.106	9.90	5.69	6.67	6.44	5.91	6.03	5.58	10.60	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
12.6	388	1.29	0.019	<0.02	0.046	0.002	0.0004	<0.005	0.004

Table 6. Water quality results from Station S1 - City of Stuart Sewage Treatment Plant, 1700 - 7/14/81 to 1625 - 7/15/81 (cont.).

Actual Time	Turbidity	Total Sus. Solids
1100	7.0	13.3

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
0.58	0.059	9.56	6.17	4.73	6.94	6.24	6.58	5.99	10.60	8

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
17.5	218	0.60	0.014	<0.02	0.042	0.002	<0.001	<0.005	0.004

Actual Time	Turbidity	Total Sus. Solids
1400	15.0	30.0

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
0.77	0.075	11.86	9.14	3.36	6.57	5.42	5.68	4.97	10.49	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
16.3	253	1.05	0.018	<0.02	0.051	0.003	0.0007	<0.005	0.008

Actual Time	Turbidity	Total Sus. Solids
1405	12.0	20.4

NH_4-N	NO_2 - N	NO_3-N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
0.77	0.074	11.28	6.38	2.71	6.15	5.27	5.51	5.13	11.14	7

Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag
14.4	118	1.08	0.030	<0.02	0.085	0.003	0.0001	<0.005	0.017

Table 6. Water quality results from Station S1 - City of Stuart Sewage Treatment Plant, 1700 - 7/14/81 to 1625 - 7/15/81 (cont.).

Actual Time	Turbid-ity	Total Sus. Solids								
1626	25.3	48.0								
NH_4 -N	NO_2 - N	NO_3 -N	TKN	TDKN	T-PO_4	TD-PO_4	T-O-$P0_4$	TD-O-$P0_4$	SiO_2	K
1.29	0.154	12.01	17.08	3.69	7.31	6.01	6.82	5.85	10.57	8
Org C	$CBOD_5$	Chl. Res	Cu	Pb	Zn	Cd	Hg	Ni	Ag	
19.3	265	1.68	0.035	<0.02	0.082	0.002	0.0002	<0.005	0.011	

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.]

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
1605	AO.2	47000	5.0	0.8	<0.05	<0.005	<0.005	0.53	0.24	0.119
1604	AO.8	47000	6.0	1.5	<0.05	<0.005	<0.005	0.70	0.18	0.137
1628	BO.2	46200	5.5	3.9	<0.05	<0.005	0.085	0.33	0.25	0.136
1626	BO.5	46100	5.6	1.3	<0.05	<0.005	0.044	0.78	0.20	0.136
1624	B0.8	47000	7.5	2.7	<0.05	<0.005	0.032	0.70	0.30	0.141
1648	CO.2	46000	4.4	1.9	<0.05	<0.005	0.009	0.64	0.82	0.151
1646	CO.8	47200	6.4	3.8	<0.05	<0.005	<0.005	0.77	0.22	0.148
1737	AO.2	46300	7.9	2.1	<0.05	<0.005	0.012	0.99	0.40	0.162
1723	AO.8	46500	7.9	<0.4	<0.05	<0.005	0.008	1.18	0.30	0.183
1757	BO.2	45700	5.5	0.9	<0.05	<0.005	0.032	0.66	0.35	0.162
1755	BO.5	46500	7.2	3.1	<0.05	<0.005	0.017	0.72	0.32	0.151
1753	B0.8	40100	7.3	<0.4	<0.05	<0.005	0.036	0.49	0.42	0.141
1814	CO.2	45800	4.9	1.0	<0.05	<0.005	0.048	0.38	0.25	0.141
1612	CO.8	47000	6.3	<0.4	<0.05	<0.005	0.018	0.50	0.45	0.183
1853	AO.2	46500	7.8	<0.4	<0.05	<0.005	0.018	0.58	0.25	0.114
1851	AO.8	47900	7.3	3.6	<0.05	<0.005	0.013	0.69	0.21	0.130
1906	BO.2	46000	5.8	1.1	<0.05	<0.005	0.017	0.95	0.21	0.130
1904	B0.5	47500	5.4	0.7	<0.05	<0.005	0.018	0.66	0.38	0.113
1902	BO.8	48900	8.6	1.1	<0.05	<0.005	0.026	0.93	0.23	0.119
1921	CO.2	46800	6.2	0.9	<0.05	<0.005	0.051	0.72	0.36	0.150
1920	CO.8	46800	6.8	1.0	<0.05	<0.005	0.018	0.60	0.15	0.119
2021	AO.2	49000	10.5	1.6	<0.05	<0.005	<0.005	0.55	0.28	0.112
2020	AO.8	47500	10.6	<0.4	<0.05	<0.005	0.156	0.44	0.24	0.126
2118	BO.2	49000	7.5	1.7	<0.05	<0.005	0.042	0.34	0.30	0.102
2118	BO.5	49500	8.8	1.5	<0.05	<0.005	0.012	0.59	0.18	0.109
2116	BO.8	50200	12.0	0.4	<0.05	<0.005	0.029	0.79	0.18	0.123
2135	CO.2	50000	7.0	<0.4	<0.05	<0.005	0.017	0.44	0.21	0.087
2133	CO.8	50000	8.2	6.2	<0.05	<0.005	0.014	0.28	0.29	0.119
2219	A0.2	50100	8.9	0.9	<0.05	<0.005	0.025	0.46	0.69	0.091
2217	AO.6	51000	11.5	1.4	<0.05	<0.005	<0.005	0.27	0.18	0.074
2234	BO.2	50200	6.8	4.3	<0.05	<0.005	<0.005	0.46	0.20	0.086
2232	BO.5	50500	6.6	1.1	<0.05	<0.005	0.005	0.41	0.21	0.077
2230	BO.B	50500	7.8	1.5	<0.05	<0.005	0.012	0.34	0.21	0.070
2256	CO.2	50000	6.0	2.0	<0.05	<0.005	0.011	0.41	0.22	0.094
2254	CO.8	49900	6.7	0.8	<0.05	<0.005	0.024	0.30	0.19	0.095

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
2356	AO.2	49500	9.0	1.3	<0.05	<0.005	0.018	0.35	0.33	0.105
2356	AO.8	49800	9.2	0.9	<0.05	<0.005	0.010	0.39	0.23	0.095
0017	BO.2	50000	6.9	1.1	<0.05	<0.005	0.015	0.39	0.22	0.079
0017	BO.5	49800	7.0	1.3	<0.05	<0.005	0.026	0.29	0.20	0.077
0017	BO.8	50500	7.0	1.6	<0.05	<0.005	0.010	0.30	0.16	0.076
0051	CO.2	49800	5.5	1.1	<0.05	<0.005	0.010	0.26	0.24	0.091
0051	CO.8	51000	7.0	3.3	<0.05	<0.005	0.024	0.34	0.18	0.052
0131	AO.2	49000	7.0	1.5		<0.005	<0.005	0.35	0.20	0.109
0131	A0.8	51000	8.0	2.0	<0.05	<0.005	0.006	0.25	0.14	0.098
0148	BO.2	51000	7.0	3.4	<0.05	<0.005	0.012	0.44	0.20	0.130
0148	BO.5	50000	6.0	1.0	10.05	<0.005	0.024	0.37	0.30	0.095
0148	BO.8	49900	7.4	0.5	<0.05	<0.005	0.102	0.29	0.29	0.086
0212	CO.2	49000	6.7	2.5	<0.05	<0.005	<0.005	1.11	0.24	0.102
0212	CO.8	50000	6.2	0.4	<0.05	<0.005	0.024	0.28	0.19	0.088
0252	AO.2	48500	7.7	1.3	<0.05	<0.005	<0.005	0.34	0.30	0.092
0252	AO.8	50000	7.8	1.7	<0.05	<0.005	0.026	0.40	0.31	0.092
0316	B0.2	47800	6.1	1.6	<0.05	<0.005	0.021	0.27	0.46	0.112
0316	BO.5	47500	6.6	1.5	<0.05	<0.005	0.016	0.44	0.31	0.119
0316	B0.8	49000	6.4	1.3	<0.05	<0.005	0.030	0.46	0.54	0.098
0338	CO.2	47800	5.7	2.9	<0.05	<0.005	0.027	0.34	0.51	0.116
0338	C0.8		6.5	0.6	<0.05	<0.005	0.024	0.30	0.31	0.116
0412	AO.2	47500	5.7		<0.05	<0.005	0.006	0.41	0.46	0.158
0417	AO.8	48000	6.2	2.3	<0.05	<0.005	0.016	0.46	0.33	0.109
0434	B0.2	46000	5.4	1.2	<0.05	<0.005	0.716	0.46	0.56	0.137
0434	BO.5	47200	6.2	2.2	<0.05	<0.005	0.015	0.49	0.34	0.128
0434	B0.8	47800	6.9	2.5	<0.05	<0.005	0.683	0.46	0.41	0.112
0503	CO.2	49800	5.0	0.5	<0.05	<0.005	0.014	0.49		0.144
0503	CO.8	49500	6.6	1.8	<0.05	<0.005	0.043	0.41	0.56	0.116
0547	AO.2	47500	6.6	1.4	<0.05	<0.005	0.012	0.39	0.35	0.141
0547	AO.8	40200	6.7	1.3	<0.05	<0.005	0.012	0.35	0.51	0.116
0607	BO.2	45600	5.5	5.2	<0.05	<0.005	0.012	0.61	0.29	0.132
0607	BO.5	46000	5.8	1.9	<0.05	<0.005	0.008	0.62	0.23	0.137
0607	B0.8	46000	4.2	1.5	<0.05	<0.005	<0.005	0.43	0.33	0.165
0627	CO.2	45800	5.2	1.7	<0.05	<0.005	0.013	0.51	0.42	0.133
0627	CO.8	48500	6.2	1.5	<0.05	<0.005	0.018	0.47	0.43	0.117

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
0718	AO.2	47500	6.1	<0.4	<0.05	<0.005	<0.005	0.47	0.45	0.126
0715	AO.8	47500	7.4	3.3	<0.05	<0.005	<0.005	0.42	0.31	0.144
0737	BO.2	46200	6.4	2.1	<0.05	<0.005	<0.005	0.78	0.48	0.134
0737	B0.5	47500	5.4	3.1	<0.05	<0.005	0.052	0.77	0.50	0.116
0737	BO.8	49000	7.2	2.8	<0.05	<0.005	0.006	0.39	0.41	0.119
0751	CO.2	47500	5.7	3.1	<0.05	<0.005	<0.005	0.51	0.53	0.169
0751	CO.8	50500	9.8	1.0	<0.05	<0.005	0.006	0.33	0.25	0.088
0837	AO.2	47000	6.0	0.9	<0.05	<0.005	0.009	0.39	0.44	0.162
0832	AO.8	47900	9.4	2.4	<0.05	<O.OOS	0.012	0.58	0.36	0.134
0853	BO.2	48500	5.0	1.6	<0.05	<0.005	<0.005	0.33	0.34	0.105
0853	B0.5	48500	6.0	1.5	<0.05	<0.005	0.006	0.30	0.33	0.123
0853	B0.8	49300	6.5	2.7	<0.05	<0.005	0.011	0.26	0.35	0.137
0918	CO.2	47500	5.0	1.6	<0.05	<0.005	0.066	0.43	0.28	0.106
0918	CO.8	47500	6.1	0.5	<0.05	<0.005	0.010	0.52	0.28	0.306
0959	AO.2	47000	8.1	1.5	<0.05	<0.005	0.015	0.41	0.35	0.253
0958	AO.8	48500	7.5	1.6	<0.05	<0.005	0.012	0.46	0.48	0.116
1013	BO.2	48500	5.5	1.0	<0.05	<0.005	<0.005	0.49	0.33	0.084
1012	B0.5	49500	6.0	3.1	<0.05	<0.005	<0.005	0.34	0.28	0.106
1011	BO.8	49500	6.8	3.6	<0.05	<0.005	0.006	0.29	0.49	0.205
1032	CO.2	49000	4.5	1.3	<0.05	<0.005	0.008	0.38	0.45	0.088
1030	C0.8	47500	5.6	3.1	<0.05	<0.005	0.005	0.46	0.39	0.097
1120	AO.2	48000	7.1	0.8	<0.05	<0.005	0.011	0.38	0.51	0.109
1118	AO.8	49500	9.2	1.6	<0.05	<0.005	0.008	0.40	0.39	0.109
1139	RO.2	49000	6.5	1.8	<0.05	<0.005	0.010	0.41	0.40	0.095
1137	BO.5	48000	6.2	2.5	<0.05	<0.005	0.032	0.47	0.40	0.112
1135	BO.8	49800	9.0	2.3	<0.05	<0.005	0.006	0.37	0.23	0.112
1151	CO.2	47000	4.2	2.4	<0.05	<0.005	0.022	0.36	0.25	0.155
1150	CO.8	49500	5.6	2.1	<0.05	<0.005	0.012	0.27	0.47	0.088
1252	AO.2	47500	6.2	3.4	<0.05	<0.005	0.014	0.48	0.31	0.119
1250	AO.8	47000	6.7	1.4	<0.05	<0.005	0.010	0.50	0.34	0.097
1308	BO.2	47500	4.9	1.3	<0.05	<0.005	0.015	0.39	0.32	0.116
1305	BO.5	49000	6.3	2.1	<0.05	<0.005	0.026	0.33	0.34	0.091
1305	BO.8	49800	10.3	1.4	<0.05	<0.005	0.015	0.29	0.25	0.095
1325	CO.2	47000	5.0	4.6	<0.05	<0.005	0.018	0.37	0.40	0.112
1325	C0.8	49000	6.1		<0.05	<0.005		0.33	0.34	0.067

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	Cond. Lab.	Turbidity	Chl. 'a'	NH_4 -N	NO_2 -N	NO_3 -N	TKN	TDKN	T-PO_4
1423	AO.2	48000	8.9	2.1	<0.05	<0.005	0.010	0.53	0.43	0.130
1421	AO.B	46500	7.1	0.9	<0.05	<0.005	<0.005	0.80	0.43	0.126
1435	BO.2	47000	5.0	5.9	<0.05	<0.005	0.005	0.52	0.48	0.126
1433	BO.5	47500	5.8	2.8	<0.05	<0.005	<0.005	0.45	0.26	0.102
1431	BO.8	49500	6.5	2.7	<0.05	<0.005	0.016	0.66	0.42	0.107
1452	CO.2	46500	5.0	2.1	<0.05	<0.005	0.008	0.42	0.70	0.118
1450	C0.8	47900	6.3	1.4	<0.05	<0.005	0.010	0.83	0.51	0.133
1544	AO.2	47500	5.7	1.0	<0.05	<0.005	0.073	0.52	0.35	0.109
1543	AO.8	47800	5.8	2.0	<0.05	<0.005	<0.005	0.56	0.40	0.122
1559	BO.2	47500	4.5	1.5	<0.05	<0.005		0.49	0.50	0.134
1557	BO.5	48500	7.0	1.7	<0.05	<0.005	<0.005	0.43	0.42	0.134
1555	BO.8	49500	8.9	4.2	<0.05	<0.005	0.008	0.34	0.04	0.123
1612	CO.2	47000	5.3	1.0	<0.05	<0.005	0.008	0.50	0.46	0.140
1610	C0.8	46500	5.5	1.1	<0.05	<0.005	0.005	0.40	0.55	0.119

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
1605	AO.2	0.099	0.087	0.066	2.65	460		2.6
1604	AO.8	0.096	0.092	0.066	2.54	450	5.4	2.6
1628	BO.2	0.091	0.089	0.070	2.96	459	1.5	
1626	BO.5	0.056	0.088	0.075	2.51	467	5.7	1.4
1624	B0.8	0.088	0.076	0.064	2.48	487		
1648	CO.2	0.107	0.085	0.085	2.68	475	5.8	1.4
1646	CO.8	0.081	0.086	0.068	2.53	463	6.1	1.4
1737	AO.2	0.098	0.094		2.63	479	6.1	2.1
1723	AO.8	0.103	0.094		2.99	474	6.0	3.2
1757	BO.2	0.113	0.094		2.87	436	5.4	4.8
1755	BO.5	0.093	0.083		2.80	441	6.6	4.0
1753	B0.8	0.098	0.088		2.77	482	5.5	2.4
1814	CO.2	0.115	0.094		2.42	442	4.9	6.5
1612	CO.8	0.025	0.082		2.62	452	5.0	3.9
1853	AO.2	0.085	0.074	0.068	2.13	478	5.7	1.2
1851	AO.8	0.086	0.076	0.068	2.58	488	5.1	2.7
1906	BO.2	0.088	0.079	0.072	2.24	506	5.0	4.0
1904	B0.5	0.091	0.087	0.069	2.36	475	5.1	2.3
1902	BO.8	0.076	0.062	0.062	2.07	487	5.1	2.0
1921	CO.2	0.091	0.074	0.057	2.37	496	5.0	1.9
1920	CO.8	0.067	0.073	0.053	2.16	484	3.8	1.1
2021	AO.2	0.071	0.058		1.51	493	3.7	1.1
2020	AO.8	0.105	0.072		2.35	499	3.7	1.1
2118	BO.2	0.073	0.053		1.90	515	3.7	2.2
2118	BO.5	0.056	0.056		1.64	462	3.2	0.6
2116	BO.8	0.053	0.045		1.57	518	3.4	1.0
2135	CO.2	0.073	0.048		1.89	507	3.5	1.1
2133	CO.8	0.058	0.046		1.36	542	2.8	1.4
2219	A0.2	0.043	0.029	0.032	1.06	492	2.2	0.7
2217	AO.6	0.031	0.052	0.025	0.94	529		0.6
2234	BO.2	0.049	0.039	0.032	1.19	492	15.6	0.7
2232	BO.5	0.039	0.035	0.027	0.89	530	2.3	0.7
2230	BO.B	0.033	0.040	0.026	0.99	486	2.0	1.5
2256	CO.2	0.048	0.041	0.032	1.24	533	2.0	0.7
2254	CO.8	0.036	0.043	0.032	1.13	509	2.3	0.8

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
2356	AO.2	0.053	0.058		1.82	470	2.6	2.9
2356	AO.8	0.053	0.063		1.66	514	3.1	0.9
0017	BO.2	0.049	0.048		1.43	520	2.4	1.2
0017	BO.5	0.038	0.036		1.28	550	2.1	2.8
0017	BO.8	0.029	0.030		0.93	505	1.9	0.6
0051	CO.2	0.030	0.038		1.13	518	2.3	2.3
0051	CO.8	0.019	0.030		2.30	503	1.7	2.0
0131	AO.2	0.060	0.047	0.036	1.31	528	3.1	0.6
0131	A0.8	0.040	0.038	0.029	0.99	507	2.1	2.7
0148	BO.2	0.056	0.058	0.041	1.84	496	2.7	2.1
0148	BO.5	0.041	0.047	0.038	1.32	510	2.7	1.0
0148	BO.8	0.062	0.047	0.031	1.29	503	2.3	2.7
0212	CO.2	0.053	0.024	0.048	1.71	516	2.8	0.5
0212	CO.8	0.046	0.046	0.035	1.53	507	1.7	0.6
0252	AO.2		0.052		1.59	510	3.1	1.3
0252	AO.8		0.050		1.53	500	2.9	0.6
0316	B0.2		0.055		1.72	419	3.5	1.0
0316	BO.5		0.063		2.25	484	3.4	1.1
0316	B0.8		0.052		1.42	535	3.1	1.2
0338	CO.2		0.063		1.84	473	4.1	0.3
0338	C0.8		0.046		1.46	522		0.5
0412	AO.2	0.067	0.061	0.064	1.84	491	3.9	0.6
0417	AO.8	0.053	0.051	0.050	1.57	491	4.2	0.3
0434	B0.2	0.110	0.074	0.078	2.41	456	4.2	1.0
0434	BO.5	0.076	0.060	0.059	2.12	489	3.5	1.0
0434	B0.8	0.094	0.059	0.057	1.50	526	3.4	1.1
0503	CO.2	0.081	0.069	0.083	2.35	457	3.8	2.0
0503	CO.8	0.089	0.096	0.060	1.43	493	3.4	0.9
0547	AO.2		0.066		2.01	481	4.2	0.3
0547	AO.8		0.085		2.30	477	3.4	2.5
0607	BO.2		0.082		2.74	480	4.5	1.1
0607	BO.5		0.074		2.29	470	4.2	1.9
0607	B0.8		0.081		1.89	483	5.0	3.7
0627	CO.2		0.081		2.32	460	4.2	2.0
0627	CO.8		0.066		1.56	480	3.6	0.9

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
0718	AO.2	0.082	0.067	0.059	2.00	516	3.9	1.9
0715	AO.8	0.083	0.063	0.054	2.08	515	3.7	1.7
0737	BO.2	0.066	0.063	0.059	1.97	466	3.9	1.7
0737	B0.5	0.067	0.061	0.050	2.24	496	3.8	1.5
0737	BO.8	0.069	0.050	0.043	1.32	526	3.5	2.0
0751	CO.2	0.085	0.071	0.064	1.99	478	4.4	0.6
0751	CO.8	0.041	0.038	0.030	0.99	522	2.7	0.9
0837	AO.2		0.068		2.07	503		1.5
0832	AO.8		0.067		1.79	497		3.0
0853	BO.2		0.060		1.53	507		0.9
0853	B0.5		0.056		1.66	544		1.1
0853	B0.8		0.052		1.80	494		1.2
0918	CO.2		0.064		1.66	501		1.3
0918	CO.8		0.053		1.61	500		1.1
0959	AO.2	0.062	0.062	0.053	1.59	480	3.8	1.3
0958	AO.8	0.068	0.072	0.048	1.59	486	3.7	2.0
1013	BO.2	0.051	0.045	0.045	1.50	477	3.0	1.4
1012	B0.5	0.043	0.033	0.035	1.43	520	3.0	1.9
1011	BO.8	0.054	0.047	0.037	1.19	511	3.3	1.4
1032	CO.2	0.046	0.047	0.041	1.74	514	3.1	1.1
1030	C0.8	0.050	0.047	0.040	1.59	497	3.1	1.4
1120	AO.2		0.057		1.69	499	3.6	1.7
1118	AO.8		0.062		1.41	527	3.7	2.8
1139	RO.2		0.067		1.70	539	3.3	2.4
1137	BO.5		0.053		2.10	482	3.2	0.6
1135	BO.8		0.067		1.28	519	2.8	2.3
1151	CO.2		0.056		2.19	482	3.7	2.2
1150	CO.8		0.045		1.41	481	3.1	0.3
1252	AO.2	0.078	0.076	0.063	1.86	489	3.7	1.4
1250	AO.8	0.066	0.058	0.062	1.97	490	3.7	1.1
1308	BO.2	0.068	0.069	0.068	2.26	458	3.5	2.0
1305	BO.5	0.062	0.053	0.049	1.49	507	3.1	1.3
1305	BO.8	0.038	6.049	0.040	1.26	495	3.5	1.2
1325	CO.2	0.078	0.069	0.063	2.33	480		2.0
1325	C0.8	0.064	0.048	0.050	1.74	520		1.1

Table 7. Water quality data, Transect 3 - A1A Bridge, 1604 - 7/16/81 to 1612 - 7/17/81. [NOTE: TABLE WAS SPLIT INTO TWO PARTS FOR CLARITY.] (cont.)

Actual Time	Station & Rel. Depth	TD-PO_4	T-O-PO_4	TD-O-PO_4	SiO_2	K	TOC	$CBOD_5$
1423	AO.2		0.062		1.93	496	4.0	2.3
1421	AO.B		0.062		1.68	522	3.8	2.3
1435	BO.2		0.078		2.42	450	4.4	2.0
1433	BO.5		0.070		2.15	492	4.4	2.3
1431	BO.8		0.056		1.66	486		2.1
1452	CO.2		0.076		2.12	484	4.4	2.8
1450	C0.8		0.066		1.89	469	4.4	1.7
1544	AO.2	0.082	0.071	0.060	2.29	500	4.2	2.9
1543	AO.8	0.073	0.067	0.058	2.25	462	4.3	2.7
1559	BO.2	0.082	0.067	0.055	2.18	469	10.3	2.6
1557	BO.5	0.061	0.056	0.049	2.18	512	3.9	2.7
1555	BO.8	0.060	0.056	0.049	2.03	476	4.2	1.9
1612	CO.2	0.074	0.065	0.052	2.08	477	4.9	1.8
1610	C0.8	0.071	0.062	0.056	2.07	477	3.7	2.6

V. SUMMARY AND CONCLUSIONS

Detailed computer data analysis is to be performed by SFWMD. However, the following statements are presented as an overview of the study results.

In Situ Parameters

Secchi

Both forks of the St. Lucie River appeared to have a combination of tannin-laden water and turbidities resulting in typical Secchi measurements of less than 1 meter. Water at the A1A Bridge (Transect 3) showed the presumed influence of oceanic water (via St. Lucie Inlet) as measurements were in the 1 to 2.4 meter range.

Conductivity

Conductivities, as expected, were lowest at Transect 2 and highest at Transect 3 (disregarding the STP). The differences between field and laboratory conductivity measurements were inconsistent but examination of laboratory data show two clear conductivity maxima at both Transects 1 and 2 during the 24-hour sampling period. Transect 3 exhibits only one obvious maximum. A-more definitive response to tidal influence will be determined through computer manipulation of data.

Temperature

Measured water temperatures at the two upper estuarine locations (Transects 1 and 21 remained within the relatively narrow range of 31.0 to 33.0 °C C disregarding an anomalous 38 0 due to equipment malfunction).

Temperature measurements at the A1A Bridge ranged from 29.0 to 34.0 and again may show tidal effects in the computer analysis.

Dissolved Oxygen

Dissolved oxygen measurements on Transect 1, with the exception of the initial two sampling intervals, were above 4 mg/L for Stations A0.5, B0.2, B0.5, and C0.5. The channel bottom, T1 BO.8, however, was typically in the range of 3-4 mg/L. Dissolved oxygen levels were severely depressed at Transect 2 with -most ('86%) -measurements being below 4 ppm and one at 0.8 ppm. Transect 3 had excellent DO conditions with many measurements above 8 ppm and the lowest observed being 6 ppm during the 24 hour study. All DO determinations were corrected for conductivity effects on the DO probe.

pH

Numerous equipment-malfunctions resulted in several gaps in the pH data. While every effort was made to correct the problems and continue collecting pH data, caution is suggested for pH interpretations and correlations. It is unlikely that pH actually varied over the range of 5.9 to 9.9 and many of the measurements were more within the expected estuarine range of 7.0 to 9.8 04 (Mahadevan *et al.*, 1980; Mahadevan *et al.*, 1981)

Laboratory Analyses

The laboratory data for samples collected at the four sampling locations within the St. Lucie Estuary during the period July 12 - July 17, 1981 is presented in Tables 4 through 7. Cursory impressions gathered from inspections of interbridge comparisons indicate several points and potential trends which should be further investigated and subjected to statistical analysis.

Ammonia and Nitrite

Two of the most striking points are the consistently low levels of nitrite and ammonia nitrogen. In virtually all samples investigated, STP samples excluded, the levels were below the detection limits of U.S. EPA approved methodologies. These low levels appear typical of other similar Florida estuaries examined by this laboratory. Further characterization of the role of nitrogen in the St. Lucie system should include determinations of N:P ratios and identification of the limiting element.

Nitrate

Nitrate levels encountered at all three bridges indicate wide fluctuations of over one order of magnitude and no obvious relationship to conductivity values. It is unknown whether this variation is due to mixing or to biological activity. The relationship of this parameter to others such as chlorophyll, CBOD,, and conductivity should be more closely evaluated.

Kjeldahl Nitrogen

Total and dissolved Kjeldahl nitrogen levels measured at the Port St. Lucie Boulevard Bridge, the Palm City Bridge and at the A1A Bridge (T2, T1, T3) in general appeared to be progressively lower with increased conductivities. Intra location evaluations are more suited to computerized data manipulation and may support this observation. In addition, a substantial fraction of the Kjeldahl nitrogen appeared associated with the particulate load. Regression analysis of this parameter with respect to turbidities, chlorophyll 'a' and particulate phosphorus will doubtless be performed.

Phosphorus

At all stations, Stuart STP included, the majority of phosphorus appears to be in the form of soluble orthophosphate. Particulate fractions of both total phosphorus and orthophosphate are small but should be examined in relation to the parameters discussed with respect to particulate nitrogen. Interbridge comparisons of all four phosphorus entities again indicate an inverse relationship with conductivity. More rigid evaluation may support this trend at the individual bridges, even given the relatively small conductivity fluctuations observed.

Silica

Initial plots of dissolved silica *concentrations versus* conductivity again show an inverse relationship that appears linear within systemic and experimental variations. Deviations of data points from this line may be the result of biological activity and chlorophyll concentrations should be examined concurrently. If data reduction continues to support this linearity, then dissolved silica may be a useful indicator of dynamics within the estuary as the detection limit of 0.01 mg/L SiO_2 would magnify the differences seen using conductivity data.

Potassium

Potassium concentrations, on the other hand, appear to be directly proportional to conductivities. Initial plots indicate that the experimental uncertainty surrounding this line may be even smaller than on similar plots of silica and conductivity values. If this is supported on continued analysis potassium may be an even more conservative parameter than silica for observing the flow and mixing characteristics of the St. Lucie Estuary. 'Sensitivity, however, would not appear to be enhanced over that obtained using conductivity values.

Total Organic Carbon

Interbridge variations in organic carbon ranges were again inversely related to conductivity. This trend may become apparent as well as the individual bridges with continued data manipulation. Organic carbon should also be examined together with $CBOD_5$ and particulate nitrogen and phosphorus data.

Carbonaceous Biochemical Oxygen Demand

The inverse relationship of $CBOD_5$ to conductivity is again apparent when examining the ranges of demand at the three bridges. This likely reflects the decreasing life span of demand organisms in waters of increasing salt content as well as dilution effects. Variations in demand at any individual bridge, however, do not show an obvious association with conductivity. A comparison with TOC, chlorophyll 'a', or the readily assimilated nutrients (nitrate nitrogen, dissolved orthophosphate) may be more productive.

Chlorophyll 'a'

Chlorophyll 'a' concentrations are extremely variable but from T2 to T1 to T3 appear to generally decrease with the increasing conductivity range. The possible dependence of chlorophyll concentrations on the available nutrients (silica, nitrate, orthophosphate) should be examined more closely.

Turbidity

Sample turbidities also generally decreased from T2 to T1 to T3, paralleling in situ Secchi observations. At a single bridge, a dependence of turbidity on conductivity was not immediately evident. Particulate settling and dilution effects are most likely to be the controlling factors of this parameter. A comparison with particulate nitrogen and phosphorus loads may be productive.

V. LITERATURE CITED

American Public Health Association. 1981. Standard Methods for the Examination of Water and Waste Water, 15th Edition, American Public Health Association, 1015 Fifteenth St. NW, Washington, DC.

Mahadevan, S. 1980. A Biological and Water Quality Evaluation of a Proposed Organism Return Canal at Big Bend, Tampa Bay, Florida. A Technical Report submitted to Stone & Webster Engineering Corporation. viii + 81 pp.

Mahadevan, S. et al. 1981. A Preliminary Survey of Meteorological, Hydrological and water Quality Conditions in Clearwater HarborSt. Josephs Sound, Florida. A Technical Report submitted to Gannett Fleming Corddry & Carpenter, Inc. v + 42 pp.

U.S. Environmental Protection Agency. 1979. Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, March 1979, United States Environmental Protection Agency, Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.