

Biological Assessment of

Royal Lakes Wastewater Treatment Plant

Duval County

NPDES #FL0026751

Sampled July 1995

November 1995

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Royal Lakes WWTP
County: Duval
NPDES Number: FL0026751
State Permit Expiration Date: 15 April 1998

Toxics Sampling Inspection (**XSI**)

Date Sampled: 24 July 1995

Results: No organic priority pollutants were detected in the effluent. Of the metals analyzed, the concentration of silver (0.17 µg/L) exceeded Class III standards for fresh waters, Rule 62-302.530(60) FAC.

Compliance Biomonitoring Inspection (**CBI**)

Date Sampled: 24 July 1995

Results: The sample of effluent was not acutely toxic to the fish, *Cyprinella leedsi*, or to the invertebrate, *Ceriodaphnia dubia*.

Impact Bioassessment Inspection (**IBI**)

Date Sampled: 24 July 1995

Results: Quantitative measures of benthic macroinvertebrate community health indicated that the facility was having no adverse effects on the receiving water biota. Pollution sensitive taxa were represented at both test sites. Taxa richness was slightly higher at the test sites, compared with the reference site. Adequate numbers of polychaete taxa and pelecypods were present at the test sites. While Shannon-Weaver diversity was identical at the reference site and test site 1, there was a decrease in diversity between the reference site and test site 2. This was due to the dominance of the pollution sensitive amphipod, *Corophium* sp. at test site 2. With the exception of an increase in algal density at the test sites, the discharge did not appear to be having any negative effect on algal communities.

Water Quality Inspection (**WQI**)

Date Sampled: 24 July 1995

Results: Fecal coliform levels complied with Class III water quality standards in all samples, ranging from 8 organisms/100 mL at the reference site to 660 organisms/100 mL at test site 2. Total coliforms complied with Class III standards in the effluent sample (900 organisms/100 mL) and at the reference site (15 organisms/100 mL), but exceeded water quality standards at both test site 1 (3000 organisms/100 mL) and test site 2 (2600 organisms/100 mL). While nitrogenous compounds at the test sites were low to normal for an estuary, total phosphorus concentrations at the test sites (0.25 mg/L) were almost double those found at the reference site (0.13 mg/L), and were higher than those found in 80% of other Florida estuaries. Total phosphorus of the Royal Lakes discharge was 2.5 mg/L. Algal growth potential at all three sites was above the 5 mg dry wt/L "problem threshold", ranging from 6.9 mg dry wt/L at the reference site to 12.6 mg dry wt/L at test site 1. The effluent AGP was 51.6 mg dry wt/L.

Introduction

The Royal Lakes Wastewater Treatment Plant is located in Duval County, on Western Way (see maps in Appendix). This 3.25 MGD domestic wastewater treatment facility is equipped with a vortex grit removal system, two Sanitaire® units which operate in parallel, two clarifiers, a chlorine contact chamber (for disinfection), and a dechlorination unit. An average of 2.647 MGD of treated wastewater is discharged into the Class III St. Johns River.

State permit limits are as follows: flow (3.25 MGD), CBOD and TSS (10 mg/L as an annual average, 12.5 mg/L as a monthly average, 15 mg/L as a weekly average, 20 mg/L maximum), pH (6.0 to 8.5 SU), fecal coliforms (200 organisms/100 mL as a monthly average, 800 organisms/100 mL maximum), and total residual chlorine (0.5 mg/L minimum at the exit of the chlorine contact chamber and 0.01 mg/L maximum when discharged). The facility is also required to perform monthly monitoring for organic nitrogen, TKN, ammonia, total nitrogen, total phosphorus, and orthophosphate.

This facility is currently under Administrative Order due to seven toxicity violations since 1992. Monthly Operating Report data show no permit violations in the last year. During a facility inspection conducted in December, 1994, the facility was operating satisfactorily.

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site 1	Test Site 2
Macroinvertebrate Ponar			
Number of Taxa	20	23	23
Shannon-Weaver Diversity	2.5	2.5	1.6
# Polychaete taxa	5	5	4
% Polychaeta	21.0	18.5	6.3
% Diptera	2.5	6.2	0.2
% Gastropoda	2.5	0.8	3.0
% Amphipoda	2.7	2.0	73.4
% Thoracica	16.3	42.3	1.9
% Isopoda	0	0.5	0.3
% Decapoda	0.3	1.6	0.2
% Malacostraca	0.3	1.6	0.2
% Pelecypoda	53.7	27.3	13.4
% Predator/Carnivores	2.1	4.4	0.2
% Above-Surface Deposit Feeders	11.0	10.5	3.2
% Below Surface Deposit Feeders	1.2	0.8	0
% Scavengers	1.3	0.8	0.6
% Suspension Feeders	80.1	79.4	91.4
% Browser/Grazers	1.3	0.8	0.6
Phytoplankton Algae			
Number of Taxa	36	37	34
Shannon-Weaver Diversity	4.3	3.9	4.1
Algal Density (#/mL)	11,475	24,583	22,749
% Blue-green	44.0	50.8	44.8
% Green	29.9	31.0	31.6
% Diatoms	25.1	13.1	17.7
Algal Growth Potential (mg dry wt/l)	6.9	12.6	7.9

Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located north of the discharge near Christopher Point) and two test sites bracketing the discharge (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

Benthic macroinvertebrate communities were evaluated at ref-

erence and test sites. Invertebrates were collected via three Ponar grabs per site (Ross 1990). Phytoplankton was sampled at reference and test sites by subsurface grabs. Chlorophyll *a* was also collected for phytoplankton communities, but the samples were lost due to a lab accident. Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum*, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed to determine the effects of a discharge. These are briefly discussed here.

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. For example, the Florida Index assigns points to stream-dwelling macroinvertebrates based on their sensitivity to pollution (see Ross 1990). A site with a high Florida Index score is considered healthy. Species sensitivity data from other sources, such as Hulbert (1990), Hudson *et al.* (1990), Lenat (1993), Farrell (1992), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

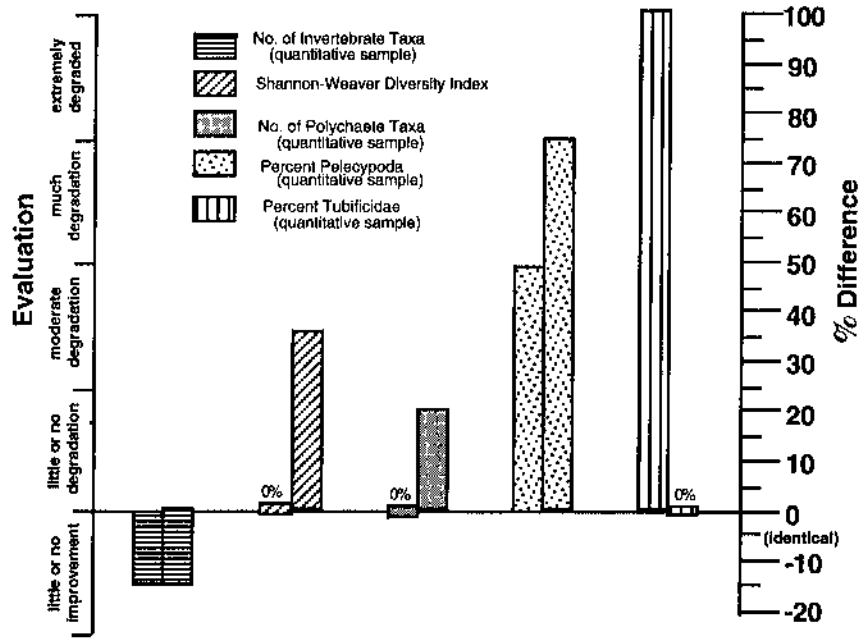
Ephemeroptera/Plecoptera/Trichoptera Index: This index is the sum of the number of EPT taxa present. Higher EPT values are associated with healthier systems.

Community structure: Substantial shifts in the proportions of major groups of organisms, compared to reference conditions, may indicate degradation. In marine systems, an increase in the % tubificid oligochaetes, a decrease in the % pelecypods, and a decrease in the number of polychaete taxa are all considered indicators of disturbance (Engel *et al.* 1994).

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of nutrient enriched conditions in flowing streams.

Trophic composition/feeding guilds: Disturbance can shift the feeding strategies of invertebrates. In Florida for example, pollution may be responsible for reducing the numbers of filter-feeders (FDEP 1994) and shredders (EA Engineering 1994).

The Stream Condition Index (SCI) is a composite macroinverte-



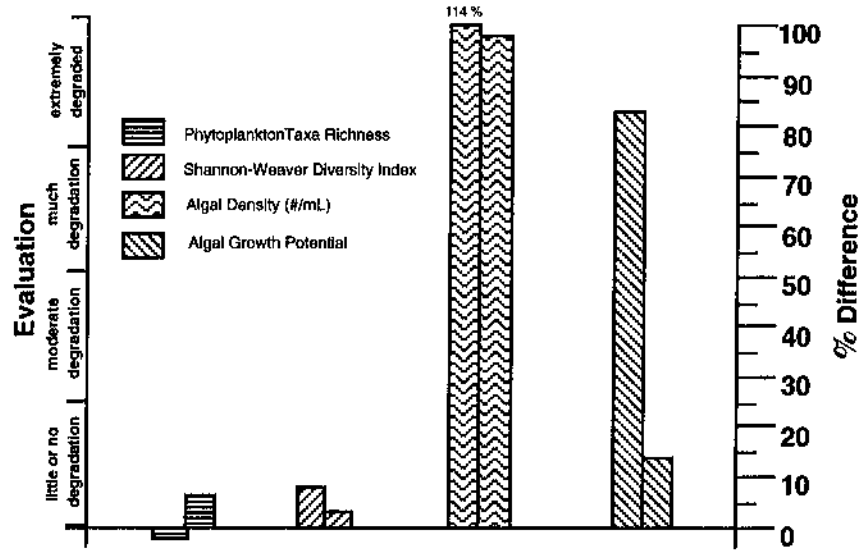
Effect of discharge on the benthic macroinvertebrate community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

brate metric (EA Engineering 1994). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition (see SCI calculation table in Appendix).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the % filter-feeders, the number of polychaete taxa, and the % pelecypods are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the % tubificids, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Tim McKelvey and Ruth Bouman (DEP Northeast District) and Lyn Burton, Melva Campos, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Elizabeth Miller, Joe North, Urania Quintana, Tobin Rader, Landon Ross, Jennifer Sparapani, and Greg Wynn (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Jan Mandrup-Poulsen, and Michael Tanski, as well as District representatives.



Effect of discharge on the algal community.

The left bar for each parameter shows differences between the reference site and test site 1. The right bar shows differences between the reference site and test site 2.

Results and Discussion

The study area was situated in a low salinity portion of the St. Johns River. Numerous pollution sources are present in this area, which is subject to tidally induced flow reversals. Habitat quality was better at the reference site (with 70 points) than at either test site (both sites scored 55 points). Land use near both test sites and the reference site was predominantly residential. The study sites were similar with respect to many physical/chemical parameters, such as conductivity (between 1496 µmhos and 2196 µmhos), temperature (between 31.7 °C and 32.0 °C), and pH (between 7.6 and 7.9 SU). Dissolved oxygen was unusually high at all three sites (between 13.5 mg/L and 14.0 mg/L). Water clarity was similar at each site, with Secchi depth measurements of between 0.6 m and 0.9 m. Substrate at the test sites was composed of a mixture of shell rubble, mud, and sand (Appendix).

No organic priority pollutants were detected in the effluent sample. Metals found in the discharge above quantitation limits included iron (42 µg/L) silver (0.17 µg/L), and zinc (34 µg/L). The concentration of silver represents a violation of Class III fresh water quality standards (Rule 62-302.530(60) FAC).

The sample of 100% effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi* (Appendix).

While nitrogenous compounds at the test sites were low to normal for an estuary, total phosphorus concentrations at the test sites (0.25 mg/L) were almost double those found at the reference site (0.13 mg/L), and were higher than those found in 80% of other Florida estuaries (see Table of Typical Water Quality Values in Appendix). Total phosphorus of the Royal Lakes discharge was 2.5 mg/L.

Algal growth potential (AGP) at all three sites was slightly above the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987), ranging from 6.9 mg dry wt/L at the reference site to 12.6 mg dry wt/L at test site 1. The effluent AGP was 51.6 mg dry wt/L.

Although the fecal and total coliform samples were held beyond the legally required 6 hour holding time, the tests were performed within 24 hours. This 24 hour time limit is considered to be acceptable for scientific information purposes. Fecal coliform levels complied with Class III water quality standards in all samples, ranging from 8 organisms/100 mL at the reference site to 660 organisms/100 mL at test site 2. Total coliforms complied with Class III standards in the effluent sample (900 organisms/100 mL) and at the reference site (15 organisms/100 mL), but exceeded water quality standards at both test site 1 (3000 organisms/100 mL) and test site 2 (2600 organisms/100 mL).

Quantitative measures of benthic macroinvertebrate community health indicated that the facility was having no adverse effects on the receiving water biota. The Figure on p. 2 indicates the degree of difference between the invertebrate populations of the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference site.

The community composition varied among the three receiving water stations, although several of the most abundant taxa were collected at all three sites. The pelecypod, *Mytilopsis leucophaeta*, was the most abundant organism at the reference site, followed by the barnacle, *Balanus* sp., and the polychaete, *Streblospio benedicti*. Test site 1 was dominated by *Balanus* sp., with *Mytilopsis leucophaeta*, and *Streblospio benedicti* also abundant. Test site 2 was dominated by the amphipod, *Corophium* sp., followed by *Mytilopsis leucophaeta* and the polychaete, *Polydora socialis*. There was a mix of freshwater and marine taxa at all three stations, suggesting a constantly changing salinity regime. This produces conditions that may be unfavorable for the establishment of either a strictly freshwater or marine assemblage.

Macroinvertebrate taxa richness was slightly lower at the reference site (with 20 taxa) than at either test site (each with 23 taxa). The reference site and test site 1 had identical Shannon-Weaver diversity values (2.5), while diversity at test site 2 was 1.6. This 36% decrease in diversity between the reference site and test site 2 was largely due to the dominance of the amphipod, *Corophium* sp., which made up 73% of the total population at test site 2. *Corophium* sp. is considered to be a pollution sensitive organism by Farrell (1992), and is often abundant in oligohaline waters.

There were similar numbers of polychaete taxa at all three sites, from 4 to 5. Pelecypods, especially *Mytilopsis leucophaeta,* were well represented at all three stations, ranging from 27.3% and 13.4% of the population at test sites 1 and 2, respectively, to 53.7% at the reference site. Tubificid worms were absent at the reference site and at test site 2, while small numbers of tubificids (0.6% of the total population) were recovered at test site 1. Note that the absolute differences between the reference and test sites with respect to the % Pelecypoda and % Tubificidae parameters are not really as striking as they appear on the graph. Several pollution sensitive crustaceans, including *Cassidinidea ovalis*, *Edotea* sp., *Gitanopsis* sp., *Corophium* sp., and *Melita nitida* (Farrell 1992) were found at one or both test sites, suggesting no degradation. In summary, the discharge did not appear to have negative effects on the receiving water invertebrates.

The Figure on p. 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. All three study sites were similar with respect to many measures of algal community health, such as number of algal taxa (ranging from 34 to 37), diversity (ranging from 3.9 to 4.3), and community composition. Blue-green algae were most numerous at all three sites, followed by chlorophytes, and diatoms. Algal density at the test sites, however, was approximately double that of the reference site (which had 11,475 organisms/mL). This corresponded with the increase (roughly double) in total phosphorus at the test sites, compared with the reference site. Unfortunately, chlorophyll *a* data are not available to determine if there was a biomass increase at the test sites, or whether there was simply an abundance of small nanoplankters. With the exception of this increase in algal density, the discharge did not appear to be having any negative effect on algal communities.

Conclusions

No organic priority pollutants were detected in the effluent sample. Silver (0.17 µg/L) was found in the discharge at a concentration exceeding Class III fresh water quality standards (Rule 62-302.530(60) FAC).

The sample of 100% effluent was not acutely toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi.*

While nitrogenous compounds at the test sites were low to normal for an estuary, total phosphorus concentrations at the test sites (0.25 mg/L) were almost double those found at the reference site (0.13 mg/L), and were higher than those found in 80% of other Florida estuaries. Total phosphorus of the Royal Lakes discharge was 2.5 mg/L.

Algal growth potential at all three sites was above the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987), ranging from 6.9 mg dry wt/L at the reference site to 12.6 mg dry wt/L at test site 1. The effluent AGP was 51.6 mg dry wt/L.

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With the exception of an increase in algal density at the test sites, the discharge did not appear to be having any negative effect on algal communities.

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Chemistry Summary Table for

Royal Lakes WWTP	Effluent	Reference Site	Test Site 1	Test Site 2
Organic Constituents (ug/L)				
None detected				
Metals (ug/L)				
Aluminum	100 U			
Arsenic	10 U			
Cadmium	0.1 U			
Copper	7 I			
Chromium	10 U			
Iron	42			
Lead	10 U			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.17 A			
Zinc	34			
Nutrients (mg/L)				
Ortho-phosphate	2.2 A	0.10	0.18 A	0.14
Total phosphorus	2.5	0.13	0.25	0.25
Ammonia	0.069 A	0.018 I	0.015 I	0.034
Nitrate+Nitrite	4.0 A	0.020 U	0.050 I	0.020 U
TKN	1.4	1.1	1.1	1.3
General Phys-Chem Parameters				
Habitat Assessment		70	55	55
D. O. (mg/L)		13.9	13.5	14.0
pH (SU)	7.4	7.9	7.7	7.6
Specific Conductance (µmhos/cm)	1050	2196	1604	1496
Hardness (mg/L)	353.4			
Temperature (°C)		31.7	32.0	32.0
Total Suspended Solids (mg/L)		14	14	16
CBOD (mg/L CaCO3)	3	< 2	3	3
Algal Growth Potential (mg dry wt/L)	51.6	6.9	12.6	7.9
Toxicity				
Bioassay Fish	Not Toxic			
Bioassay Invertebrate	Not Toxic			
Microbiological Communities (org/100 mL)				
Fecal Coliform	600 Q	8 AQ	480 Q	660 Q
Total Coliform	900 Q	15AQ	3000 Q	2600 Q

A - Value reported is the mean of two or more determinations.

I - Value reported is less than the minimum quantitation limit, and greater than or equal to the minimum detection limit.

Q - Sample held beyond normal holding time.

U - Material analyzed for but not detected; value reported is the minimum detection limit.

Typical Values for Selected Parameters in Florida Waters

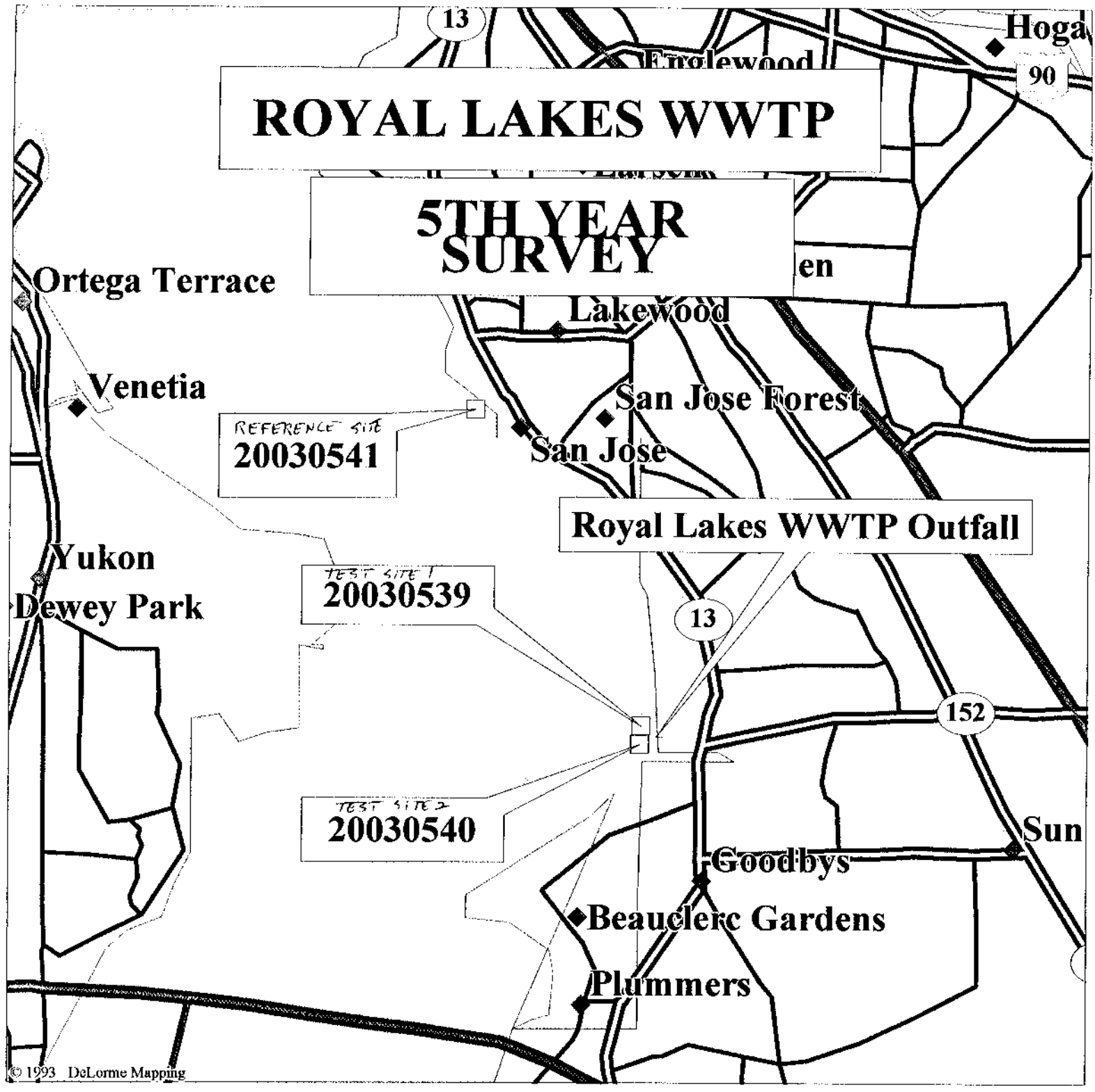
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

Percentile Distribution

Parameter	5%	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
STREAMS (1617 stations)											
Phytoplankton Chlorophyll *a*	0.22	0.52	0.94	1.60	3.02	4.63	6.72	9.87	14.68	27.35	48.70
Periphyton Chlorophyll *a*	0.31	0.43	0.77	1.04	2.16	2.94	6.45	10.51	17.00	39.51	60.85
H-D Diversity	0.84	2.12	2.48	2.74	2.88	3.09	3.25	3.40	3.52	3.76	3.90
Qualitative Taxa Richness	9.00	12.00	17.00	20.00	22.00	24.50	26.00	28.00	31.00	37.00	53.00
H-D Taxa Richness	6.00	6.50	9.00	11.50	13.00	15.00	17.00	21.50	26.00	29.00	32.00
TKN	0.30	0.39	0.56	0.73	0.87	1.00	1.11	1.26	1.49	1.93	2.80
Ammonia	0.02	0.02	0.04	0.05	0.06	0.08	0.11	0.14	0.20	0.34	0.60
NO2-NO3	0.01	0.01	0.03	0.05	0.07	0.10	0.14	0.20	0.32	0.64	1.05
Total Phosphorus	0.02	0.03	0.05	0.06	0.10	0.13	0.18	0.25	0.39	0.74	1.51
Ortho Phosphorus	0.01	0.01	0.03	0.04	0.05	0.08	0.11	0.17	0.27	0.59	1.37
Turbidity	0.60	0.90	1.20	1.45	2.10	2.80	3.60	4.50	6.65	10.45	16.30
LAKES (477 stations)											
Phytoplankton Chlorophyll *a*	0.80	1.71	2.88	4.28	10.06	13.40	20.00	30.10	47.20	65.44	113.90
Dredge Diversity	0.71	0.97	1.43	1.74	1.98	2.12	2.21	2.59	2.85	3.15	3.17
Dredge Taxa Richness	3.00	5.00	6.50	7.00	9.00	10.00	11.00	13.00	15.00	17.00	21.00
TKN	0.36	0.49	0.67	0.83	1.08	1.26	1.40	1.51	1.68	2.11	3.46
NH3+NH4	0.01	0.02	0.02	0.03	0.04	0.06	0.08	0.12	0.15	0.21	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.04	0.05	0.10	0.14	0.23
Total Phosphorus	0.01	0.02	0.02	0.03	0.05	0.07	0.09	0.11	0.14	0.23	0.42
Ortho-Phosphorus	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.21	0.32
Turbidity	1.00	1.25	1.55	2.05	2.75	4.50	6.45	9.60	14.10	26.00	40.00
ESTUARIES (690 stations)											
Phytoplankton Chlorophyll *a*	2.14	3.28	4.49	5.13	6.00	6.93	7.94	9.60	12.40	17.60	22.20
Dredge Diversity	1.34	1.53	1.91	2.28	2.56	2.90	3.15	3.59	4.01	4.53	4.98
Dredge Taxa Richness	4.00	6.00	9.00	11.00	15.00	18.50	25.00	35.00	41.00	62.00	90.00
TKN	0.26	0.34	0.42	0.50	0.59	0.69	0.76	0.82	0.95	1.30	1.49
NH3+NH4	0.01	0.02	0.03	0.04	0.05	0.06	0.08	0.09	0.13	0.22	0.28
NO2-NO3	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.05	0.08	0.17	0.23
Total Phosphorus	0.01	0.02	0.06	0.07	0.10	0.11	0.14	0.17	0.23	0.43	0.59
Ortho-Phosphorus	0.01	0.02	0.03	0.04	0.04	0.05	0.07	0.09	0.12	0.21	0.44
Turbidity	3.50	4.00	4.50	5.05	5.40	5.60	6.30	6.80	8.00	11.40	11.75

Units:

Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates



LEGEND

- State Route
- Town, Small City
- Interstate, Turnpike
- US Highway
- County Boundary
- Population Center
- Major Street/Road
- Interstate Highway
- State Route
- US Highway
- Land Mass
- Open Water

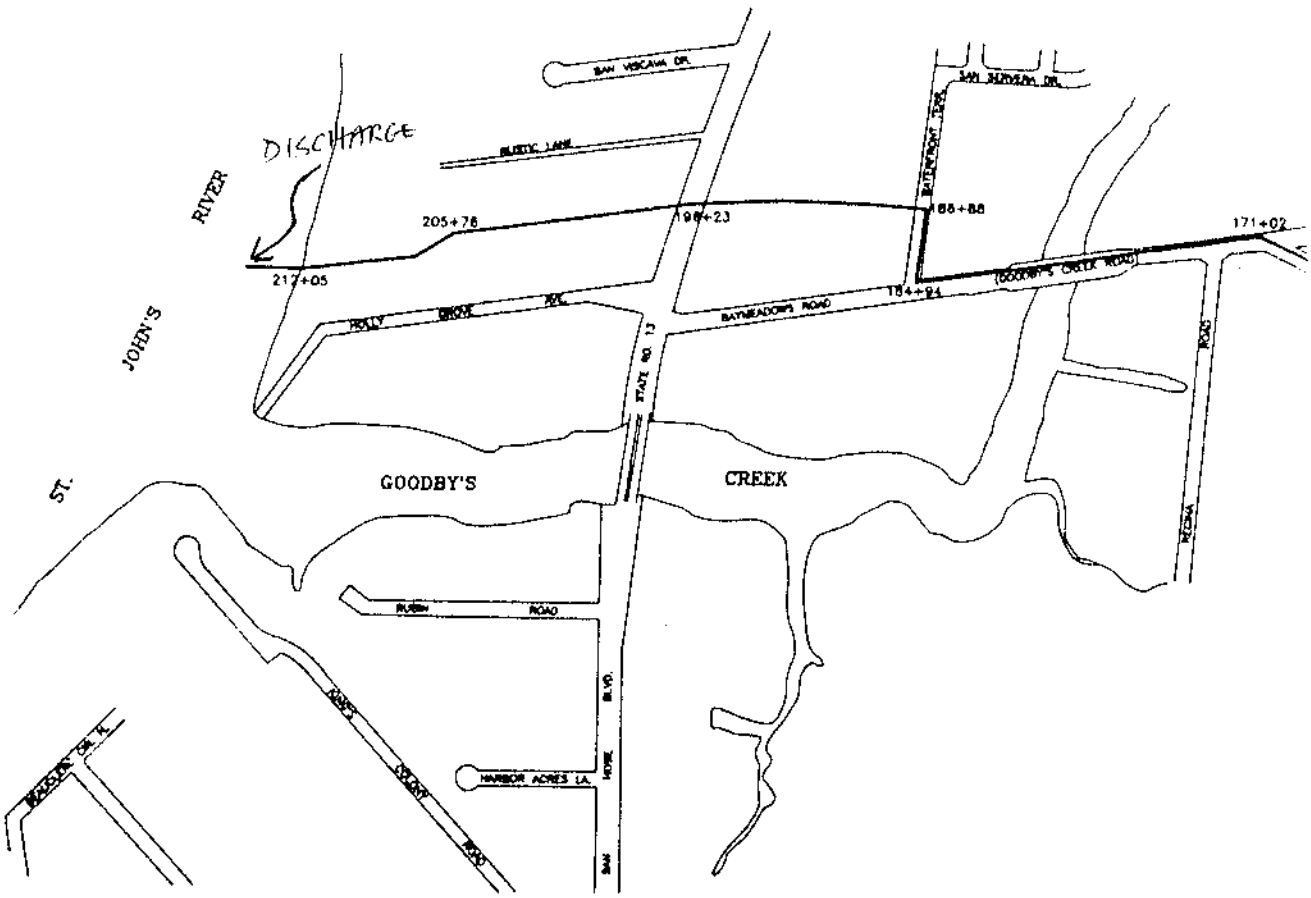
Scale 1:62,500 (at center)

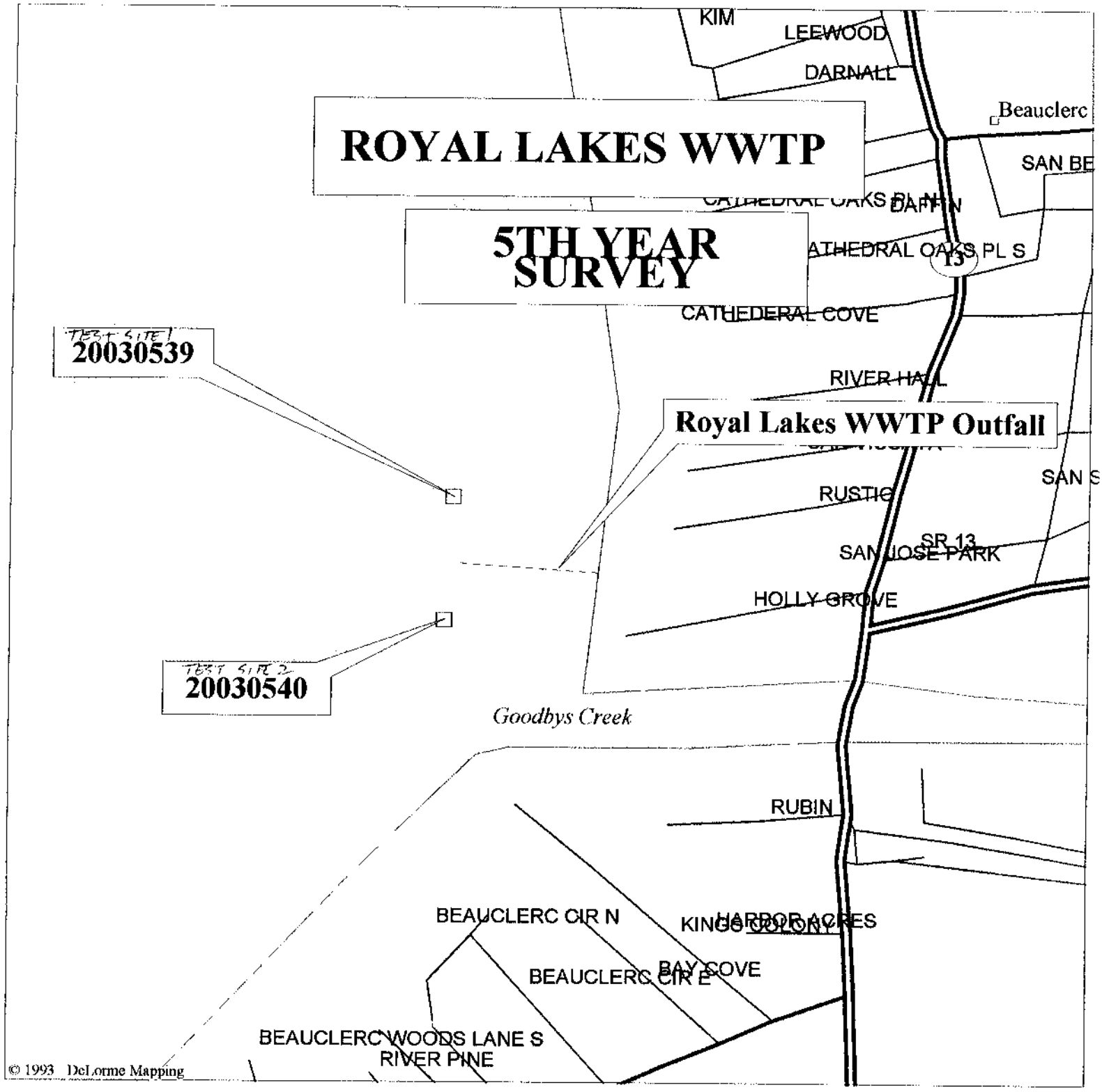
1 Miles

2 KM

Mag 12.00
Fri Jul 21 10:03:46 1995

Royal Lakes Outfall





LEGEND

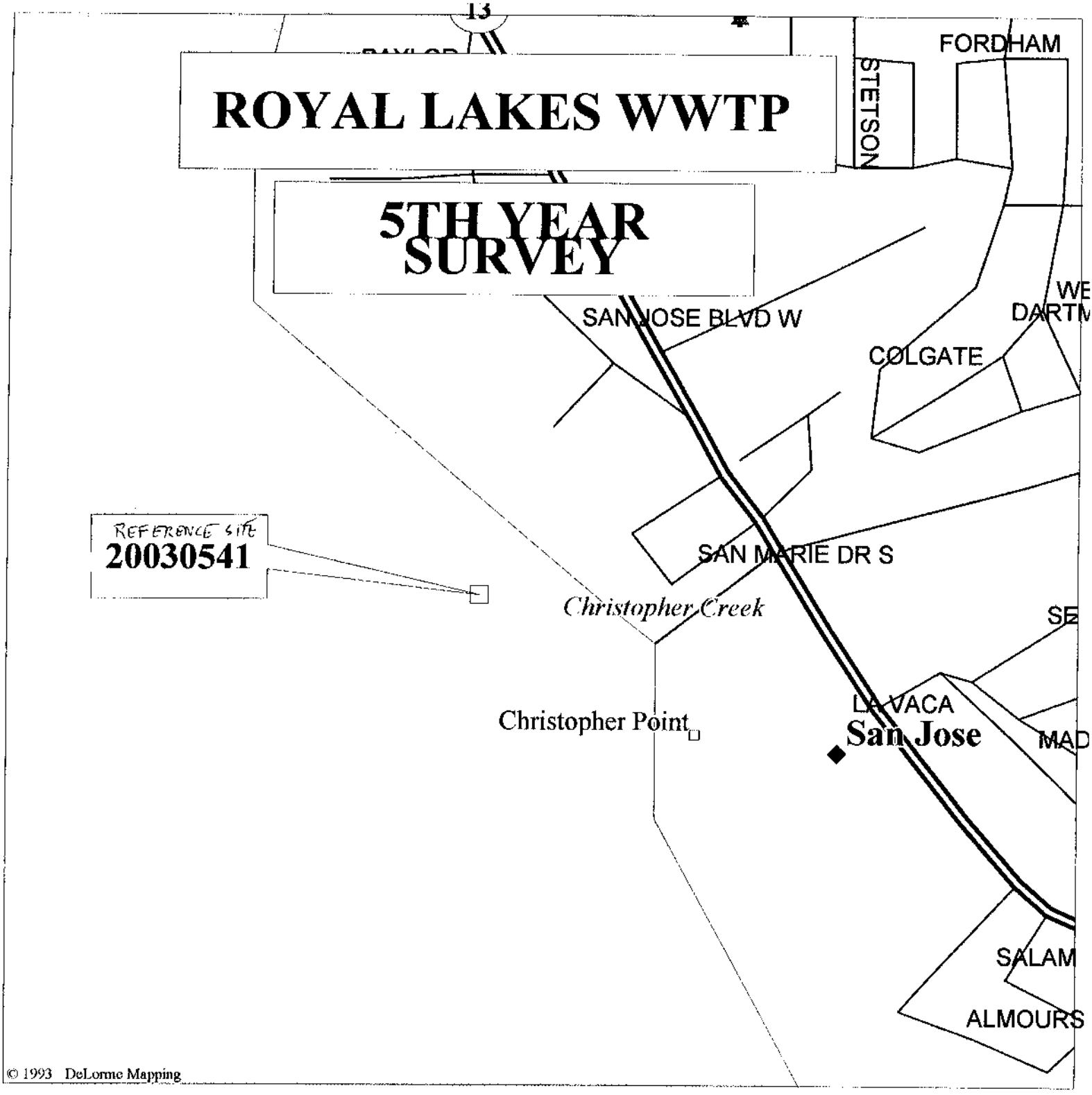
- State Route
- Geo Feature
- Population Center
- Street, Road
- Major Street/Road
- State Route
- River
- Land Mass
- Open Water

Scale 1:9,375 (at center)

1000 Feet

200 Meters

Mag 15.00
Fri Jul 21 09:51:09 1995



LEGEND

- State Route
- Geo Feature
- Town, Small City
- Park
- Population Center
- Street, Road
- Major Street/Road
- State Route
- River
- Land Mass
- Open Water

Scale 1:7,813 (at center)

500 Feet

200 Meters

Mag 15.00
Fri Jul 21 09:59:36 1995

Royal Lakes Subdivision

FY15

RQ-95-JUL-24-06
RQ-95-JUL-21-07

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name: Royal Lakes Subdivision		**Date Summary Prepared:** July 18, 1995
Location (attach detailed map): 8501 Western Way Jacksonville, FL	**County** Duval	**District** NE District
Federal Permit # FL0026751 **and expiration date:** 1-31-98	**State GMS # and** 3116PC03660 **State expiration date:** 4-15-98 DO16-335624 4/95	**Facility Type:** ID Industrial Municipal Federal Agricultural Other (list):

Function of facility:
Secondary treatment of domestic wastewater for basic disinfection.

Description of treatment process: This facility is permitted as 3.25 mgd conventional plug flow wastewater facility. Influent flows through a common vortex grit remover prior to being split between 2 Sanitaire Units operating in parallel, following separate clarification effluent flows into a common chlorination system, followed by dechlorination and discharge into the St. Johns River.

Receiving waters: St. Johns River	**Classification:** I II (III)	
Design Flow: 3.25 mgd	**Mean Flow:** for 4/95 = 2.647 mgd	**Flow during survey:**

Discharge is: Continuous Intermittent Seasonal Rainfall dependent
Other (describe)

therefore, the best time to sample is:

If facility has a mixing zone, give details (size, parameters affected, etc.):
Not applicable.

List effluent limits (if necessary, attach relevant paperwork):

Parameter	Limit (units)
Flow	3.25 mgd
CBOD5	10/12.5/15/20
TSS	10/12.5/15/20
pH	6.0 to 8.5
TRC	Min 0.5 mg/L Max 0.6 mg/L
Fecal Coliform	200/800

Describe special permit conditions and permit modifications:
Required to monitor/report monthly for the following parameters: (16 hr flow proportional)
Organic Nitrogen
TKN
Total Ammonia (NH_3-N, NH_4^+-N)
Total Nitrogen (NO_2-N, NO_3-N)
Total Phosphorus
Ortho Phosphorus

Royal Lakes Subdivision
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

St. Johns River

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:

Based on last inspection performed 12/94, the plant is operating in satisfactory conditions. The plant is meeting permit limitation except for the toxicity test (WET).

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:

Under Administrative order AO No. 95-005 for violation of the acute effluent toxicity limits conducted on Nov 3, 92; December 1, 92; September 9, 93; July 28, 94; Aug 11, 94 August 18, 94; August 25, 94. The effluent was found to be toxic to Ceriodaphnia dubia.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:

Based on the past year data (Reported value on MORs), the facility is meeting its effluent limits for TSS, CBOD5, fecals, pH, chlorine, and flow. The Reported values for these parameters have been consistent. There is no discernable increase/decrease in values reported.

Additional information:

Staff contributing to this review (signature):

Tim McKelvey	(Biologist)
Ha Nguyen	(Inspector)
Ha Nguyen	(Engineer)
Ruth Bowman	(Biologist)
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 20030541	DATE (M/D/Y): 7/24/95	TIME: 1415	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS: 1200 - 1500 ft. from shoreline	LOCATION: EAST BANK OF ST. JOHNS RIVER NORTH OF CHRISTOPHER CREEK	FIELD ID/NAME: REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
				100			

Local Watershed Erosion (check box): None [✓] Slight [ ] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [ ] Some potential sources [✓] Obvious sources [ ]

Width of riparian vegetation (m) on least buffered side: —0— *List & map dominant vegetation on back*

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

2 - 2½ miles width
depth. 5-6 ft.

Artificially Channelized [✓] no [ ] [ ] [ ]
Artificially Impounded [✓] yes recent, severe some recovery mostly recovered, more sinuous

High Water Mark (ft above bed): ft. Surface 1-2 ft.

Canopy Cover % : Open : [✓] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [✓] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposition: Sludge: [ ] Sand smothering: (none) slight moderate severe Silt smothering: none (slight) moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs or Mats				Sand			
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble				Other:			
Undercut Banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or ~~Salinity~~ (ppt):	Salinity		Secchi (m):
Top								
Mid-depth	2.5	↑	↑	↑	↑	↑		0.9
Bottom	5.0	31.73	7.88	13.91	.2196	1.11		

System Type : Stream: [ ] (1st - 2nd order / 3rd - 4th order / ~~5th - 6th order~~ / 7th order or greater) Lake: [ ] Wetland: [ ] Estuary: [✓] Other: [ ] SJR

Water Odors (check box): Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [✓] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [ ] Slightly turbid: [✓] Turbid: [ ] Opaque: [ ]

Color (check box): Tannic: [✓] Green (algae): [ ] Clear: [ ] Other: [ ]

Weather Conditions/Notes:

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[✓]	[ ]	[ ]	[ ]
Fish	[ ]	[ ]	[✓]	[ ]
Aquatic Macrophytes	[✓]	[ ]	[ ]	[ ]
Iron/sulfur Bacteria	[✓]	[ ]	[ ]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
Tim McKelvey / Ruth Bowman	Tim McKelvey	7-24-95

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 20030541	DATE (M/D/Y): 7-24-95	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	LOCATION: EAST BANK OF ST. JOHNS RIVER NORTH OF CHRISTOPHER CREEK	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 5	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points ✓	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 31	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points ✓	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 8	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 10	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 8-10 points ✓	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE: 76

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7-24-95	McKelvey / Bowman	Tom McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 20030539	DATE (M/D/Y): 7-24-95	TIME: 1310	RECEIVING BODY OF WATER: ST. JOHN'S RIVER

REMARKS:	LOCATION: EAST BANK OF ST. JOHNS RIVER	FIELD ID/NAME:
800–1000 ft from shoreline	200FT. NORTH OF ROYAL LAKES P.O.D.	TEST SITE #1

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
				100			

Local Watershed Erosion (check box): None ☑ Slight ☐ Moderate ☐ Heavy ☐

Local Watershed NPS Pollution (check box): No evidence ☐ Some potential sources ☑ Obvious sources ☐

Width of riparian vegetation (m) on least buffered side: —0— | *List & map dominant vegetation on back*

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

depth 4-5 ft.
tidal, no velocity
3 mites - width

Artificially Channelized ☑ no ☐ recent, severe ☐ some recovery ☐ mostly recovered, more sinuous

Artificially Impounded ☑ yes

High Water Mark (m above ~~bed~~ SURFACE): 1-2 ft.

Canopy Cover % : Open : ☑ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☑ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none (slight) moderate severe Silt smothering: none slight (moderate) severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles			
Leaf Packs or Mats				Sand	5	1	ECKMAN
Aquatic Vegetation				Mud/Muck/Silt	20	1	ECKMAN
Rock or Shell Rubble	75	1	ECKMAN	Other:			
Undercut Banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth ~~(m)~~ ft:	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Salinity		Secchi (m):
Top	0							0.7
Mid-depth	2.0	32.01	7.69	13.45	1604	0.80		
Bottom	4.0							

System Type : Stream: ☐ (1st - 2nd order / 3rd - 4th order / 5th - 6th order / 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ ST. JOHNS RIVER

Water Odors (check box): Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils (check box): None: ☑ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity (check box): Clear: ☐ Slightly turbid: ☐ Turbid: ☑ & Opaque: ☑

Color (check box): Tannic: ☐ Green (algae): ☐ Clear: ☐ Other: ☑ muddy brown

Weather Conditions/Notes:
HOT 90°F +, HUMID, PARTLY CLOUDY, WIND S.W @ 10 KNOTS, SLIGHT CHOP

Abundance:	Absent	Rare	Common	Abundant
Periphyton	☑	☐	☐	☐
Fish	☐	☐	☑	☐
Aquatic Macrophytes	☑	☐	☐	☐
Iron/sulfur Bacteria	☑	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
TIM McKELVEY / RUTH BOUMAN	Tim McKelvey	7/24/95

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP. NED JAX	STORET STATION NUMBER: 20030539	DATE (M/DY): 7-24-95	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS:	LOCATION: EAST BANK OF ST. JOHNS RIVER 200FT. NORTH OF ROYAL LAKES P.O.D.	FIELD ID/NAME: TEST SITE #1

Habitat Parameter / score	Excellent	Good	Fair	Poor
Littoral Alterations: 5	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points ✓	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed: 24	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation: 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points ✓	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations: 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points ✓	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action: 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 8-10 points ✓	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type: 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points ✓	Anaerobic mud. 0-3 points

TOTAL SCORE: 55

COMMENTS:

ANALYSIS DATE: 7-24-95	ANALYST: McKelvey / Bouman	SIGNATURE: McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 3031 / SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 20030540	DATE (M/D/Y): 7/24/95	TIME: 1245	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS:	LOCATION:	FIELD ID/NAME:
800 - 1000 ft from shoreline	EAST BANK OF ST. JOHNS RIVER 200 FT. SOUTH OF ROYAL LAKES P.O.D.	TEST SITE #2

RIPARIAN ZONE/INSTREAM FEATURES

Predominant Surrounding Land-Use (specify relative percent in each category):

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
				100			

Local Watershed Erosion (check box): None [✓] Slight [ ] Moderate [ ] Heavy [ ]

Local Watershed NPS Pollution (check box): No evidence [ ] Some potential sources [✓] Obvious sources [ ]

Width of riparian vegetation (m) on least buffered side: -0-

List & map dominant vegetation on back

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect (draw cross-section & provide at least 3 velocity & depth values)

2-4 ft depth, 3 miles-width, tidal, no velocity

Artificially Channelized [✓] no [ ] [ ] [ ]

Artificially Impounded [✓] yes — recent, severe | some recovery | mostly recovered, more sinuous

High Water Mark (m above ~~bed~~ surface): 1-2 ft.

Canopy Cover % : Open : [✓] Lightly Shaded (11-45%): [ ] Moderately Shaded (46-80%): [ ] Heavily Shaded: [ ]

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Anaerobic: [ ] Other: [ ]

Sediment Oils: Absent: [✓] Slight: [ ] Moderate: [ ] Profuse: [ ]

Sediment Deposition: Sludge: [ ] Sand smothering: none (slight) moderate severe Silt smothering: none slight (moderate) severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Riffles		1	
Leaf Packs or Mats				Sand	5	1	ECKMAN
Aquatic Vegetation				Mud/Muck/Silt	20	1	ECKMAN
Rock or Shell Rubble	75	1	ECKMAN	Other:			
Undercut Banks/Roots				*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or ~~Salinity (ppt)~~:	Salinity ppt		Secchi (m):
Top								
Mid-depth	1.0	31.55	7.5	14.06	1496	0.74		0.6
Bottom	2.0							

System Type : Stream: [ ] (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: [ ] Wetland: [ ] Estuary: [ ] Other: [ ] ST JOHNS RIVER

Water Odors (check box): Normal: [✓] Sewage: [ ] Petroleum: [ ] Chemical: [ ] Other: [ ]

Water Surface Oils (check box): None: [✓] Sheen: [ ] Globs: [ ] Slick: [ ]

Clarity (check box): Clear: [ ] Slightly turbid: [ ] Turbid: [✓] & Opaque: [✓]

Color (check box): Tannic: [ ] Green (algae): [ ] Clear: [ ] Other: [ ] muddy brown

Weather Conditions/Notes:

HOT 90°F+, HUMID, PARTLY CLOUDY
WIND S.W @ 10 KNOTS, SLIGHT CHOP

Abundance:	Absent	Rare	Common	Abundant
Periphyton	[✓]	[ ]	[ ]	[ ]
Fish	[ ]	[ ]	[✓]	[ ]
Aquatic Macrophytes	[✓]	[ ]	[ ]	[ ]
Iron/sulfur Bacteria	[✓]	[ ]	[ ]	[ ]

SAMPLING TEAM:	SIGNATURE:	DATE:
TIM MCKELVEY RUTH BOUMAN	Tim McKelvey	7/24/95

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
MARINE BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

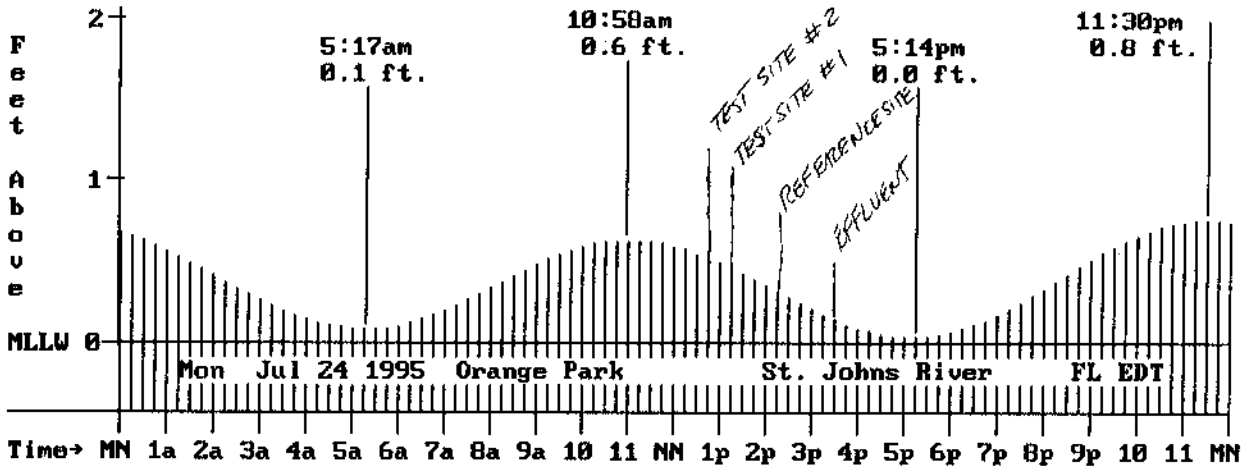
SUBMITTING AGENCY CODE: 803L SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 20030540	DATE (M/D/Y): 7-24-95	RECEIVING BODY OF WATER: ST. JOHN'S RIVER
REMARKS:	LOCATION: EAST BANK OF ST. JOHNS RIVER 200 FT. SOUTH OF ROYAL LAKES P.O.D.		FIELD ID/NAME: TEST SITE #2

Habitat Parameter score	Excellent	Good	Fair	Poor
Littoral Alterations 5	None—Unaltered shoreline. 9-10 points	Mostly natural shoreline, but with occasional riprap. 6-8 points	Shoreline consisting mostly of riprap and vertical seawalls. 3-5 points ✓	Shoreline consisting almost entirely of vertical seawalls. 0-2 points
Community Types Observed 26	At least four communities observed from the following list: mangrove swamp, marsh, oyster bar, grass bed, reef, saltern, natural beach, or tidal creek. 38-50 points	Two or three communities observed from those listed. 26-37 points	One community observed from those listed. 13-25 points	No communities observed from those listed. 0-12 points
Tidal Fluctuation 3	>0.75 m. 4-5 points	0.5 - 0.75 m. 3 points	0.25 - 0.5 m. 2 points	<0.25 m. 0-1 point
Freshwater Discharges/ Alterations 5	Only natural runoff.. 9-10 points	Mostly natural runoff, but with a few, small stormwater sources. 6-8 points	Considerable stormwater discharge from local roads, parking lots, etc. 3-5 points	Extensive manmade discharges, especially from canals draining large tracts of land. 0-2 points
Flow and Wave Action 9	Light to moderate wave action present except under the harshest weather conditions. Flow unrestricted by manmade structures. 9-10 points	—	—	Heavy wave action sometimes present even during average weather conditions, or flow restricted by manmade structures so that velocities are very high. 0-2 points
Sediment Type 7	Combination of sand, gravel, and shell. 12-15 points	Primarily sand, with small areas of mud. 8-11 points	Mixture of sand and mud, or well-aerated mud only. 4-7 points	Anaerobic mud. 0-3 points

TOTAL SCORE 55

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
7-24-95	McKelvey/Bowman	McKelvey



12:00MN	0.7ft.	5:00am	0.1ft.	10:00am	0.6ft.	3:00pm	0.2ft.	8:00pm	0.3ft.
1:00am	0.6ft.	6:00am	0.1ft.	11:00am	0.6ft.	4:00pm	0.1ft.	9:00pm	0.5ft.
2:00am	0.4ft.	7:00am	0.2ft.	12:00 N	0.6ft.	5:00pm	0.1ft.	10:00pm	0.7ft.
3:00am	0.3ft.	8:00am	0.3ft.	1:00pm	0.5ft.	6:00pm	0.1ft.	11:00pm	0.8ft.
4:00am	0.2ft.	9:00am	0.5ft.	2:00pm	0.4ft.	7:00pm	0.2ft.	12:00MN	0.8ft.

(C) 1986-1993 Coastal Computer Company - Press <P> to print graph
-Press <ESC> to return or use the <→> & <←> key to page other 16 days on record

tides & sampling times

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Royal Lakes WWTP
County: Duval
Contact / District: Ruth Bowman
NPDES Permit #: FL00
LIMS Sample #: 111847 (sample log 7/27/95) **LIMS Job #:** 95-Jul-25-15-01

Sample Collection: Date 7.24.95 Time 0950
Test Beginning: Date 7.25.95 Time 1300
Test Ending: Date 7.27.95 Time 1310
Organism Batch #: 36 **Diluent Batch #:** 30
Organism Age: <24 hrs
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	24.5 @ 24.6	8.3 @ 24.9 °C	102.3 @ 102.1
	9.0 @ 9.0			996 @ 1000 @ 24.9 °C
24 hr	___ @ 7.0	___ @ ___	___ @ ___ °C	___ @ ___
	___ @ ___			___ @ ___ @ ___ °C
48 hr	7.0 @ 7.0	24.5 @ 24.7	8.4 @ 24.1 °C	102.4 @ 102.1
	9.0 @ 9.0			1419 @ 1412 @ 23.9 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	5	5	8.0		8.2	24.2		25.1	8.6		7.7	170		190
Control	B	5	5	5			8.2			25.0			7.8			180
Control	C	5	4	4			8.2			25.0			7.7			180
Control	D	5	5	5			8.2			25.0			7.7			180
100%	A	5	5	5	7.4		8.4	23.9		25.2	8.1		7.8	1050		1060
100%	B	5	5	5			8.4			25.1			7.8			1040
100%	C	5	5	5			8.4			25.0			7.8			1130
100%	D	5	5	5			8.4			25.0			7.8			1140
Recorded by:		TR	MF	JRS	JN		JRS	JN		JRS	JN		JRS	JN		JRS
Measured/Loaded by:		TR	MF	JRS	JLS		MF	JLS		MF	JLS		MF	JLS		MF

(1145) Thanks to Jennifer called & OK

Investigators' Signatures

Reviewer

Water Quality Parameters

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Ø	—	Ruth Bowman
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR-100	JN
Alkalinity (mg/L as $CaCO_3$):	—	75	140	HACH	JLS
Hardness (mg/L as $CaCO_3$):	—	80	385	HACH	JLS
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: ~~58.8~~ * Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Royal Oaks WWTP
County: Duval
Contact / District: Ruth Bowman
NPDES Permit #: FL00[illegible]
LIMS Sample #: 111847 **LIMS Job #:** 95-Jul-25-15-01

Sample Collection: Date 7.24.95 Time 0950
Test Beginning: Date 7.25.95 Time 1300
Test Ending: Date 7.27.95 Time 1310
Organism Batch #: 29 **Diluent Batch #:** well
Organism Age: 11 days
Test Organism: Cyprinella leedsi

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.6	8.3 @ 24.9 °C	102.3 @ 102.1 996 @ 1000 @ 24.9 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.0	8.2 @ 25.1 °C	102.1 @ 102.1 1412 (JN 9-26-95) @ 1414 @ 24.6 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.5 @ 24.7	8.4 @ 24.1 °C	102.4 @ 102.1 1419 @ 1412 @ 23.9 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	D12	5	5	5	7.7	8.3	8.4	24.2	24.3	24.0	8.2	8.0	7.9	250	250	250
Control B	D5	5	5	5	7.7	8.3	8.4	24.2		24.0	8.2	8.0	7.9	250	250	250
Control C	D3	5	5	5	7.7	8.3	8.4	24.2		23.9	8.3	8.0	7.9	250	250	250
Control D	333	5	5	5	7.7	8.3	8.4	24.1		23.9	8.4	8.0	7.9	250	250	250
100% A	D14	5	5	5	7.3	8.0	8.1	24.4	24.2	23.9	8.3	7.8	7.8	1090	1085	1080
100% B	D3	5	5	5	7.3	8.0	8.1	24.4		23.8	8.3	7.8	7.8	1090	1085	1085
100% C	E22	5	5	5	7.3	8.0	8.1	24.4		23.8	8.4	7.7	7.8	1090	1085	1085
100% D	E11	5	5	5	7.3	8.0	8.1	24.4		23.8	8.2	7.7	7.8	1085	1090	1090
Recorded by:		TR	MF	JRS	JN	JLS	JLS	JN	JLS	JRS	JN	JLS	JLS	JN	JLS	JLS
Measured/Loaded by:		TR	MF	JRS	JLS	MF	MF	JLS	MF	MF	JLS	MF	MF	JLS	MF	MF

Investigators' Signatures

Jennifer Sprague
Robin C. Rader
Marshall Faircloth
Reviewer

Water Quality Parameters	Salt Water / (Well Water)	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Ø	—	Ruth Bowman
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR-100	TM
Alkalinity (mg/L as $CaCO_3$) :	130	—	140	HACH	JLS
Hardness (mg/L as $CaCO_3$) :	125	—	385	HACH	JLS
Total ammonia (mg/L as N) :	<0.017	—	<0.017	Orion	JN

Ammonia Ammonia Ammonia Control Sample

Benthic macroinvertebrate taxa list for Royal Lakes WWTP, collected via Ponar grab samples in the St. Johns River, on 24 July, 1995. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site 1	Test Site 2
Polychaeta			
Capitella capitata	14	-	-
Hobsonia florida	42	83	-
Nereis succinea	42	-	139
Polydora socialis	97	542	2569
Scolecolepides viridis	-	-	28
Spiophanes bombyx	-	14	-
Streblospio benedicti	1556	1542	1236
Spionidae	-	14	-
Oligochaeta			
Allonais inaequalis	-	-	83
Aulodrilus pigueti	-	14	-
Tubificoides heterochaetus	-	69	-
Enchytraeidae	-	14	-
Oligochaeta	-	-	347
Gastropoda			
Littoridinops sp.	208	97	1917
Pelecypoda			
Geukensia demissa	-	-	750
Mytilus sp.	292	28	111
Mytilopsis leucophaeata	3750	3139	7681
Rangia cuneata	444	69	-
Cirripedia			
Balanus sp.	1361	5028	1208
Isopoda			
Cassidinidea ovalis	-	14	-
Cyathura polita	-	42	181
Edotea sp.	-	-	28
Amphipoda			
Corophium sp.	14	97	46417
Gitanopsis sp.	69	42	-
Melita nitida	97	83	528
Oedicerotidae	42	14	-
Decapoda			
Penaeus sp.	14	-	-
Rhithropanopeus harrisii	14	194	125
Ephemeroptera			
Caenis sp.	-	-	28
Stenonema exiguum	-	-	14
Coleoptera			
Ancyronyx variegata	-	-	14
Diptera			
Coelotanypus sp.	97	500	-
Cryptochironomus sp.	56	28	42

Palpomyia / Bezzia grp.	-	-	14
Paratendipes subaequalis	-	14	-
Polypedilum scalaenum grp.	56	18	28
Stenochironomus sp.	-	-	14
Tanytarsus sp. G Epler	-	14	-
Chironomidae	-	-	56
Sipuncula			
Sipunculae	83	-	-

Phytoplankton taxa list and densities (#/mL), for Royal Lakes WWTP, collected via whole water grab samples in the St. Johns River, on 24 July, 1995.

	Reference Site	Test Site 1	Test Site 2
Cyanophyceae			
Aphanizomenon sp.	118	73	-
Aphanocapsa sp.	710	1101	881
Aphanothece sp.	907	7485	5357
Chroococcus sp.	907	1174	954
Dactylococcopsis sp.	118	1174	1835
Gloeocapsa sp.	39	73	73
Lyngbya sp.	394	147	147
Marssoniella sp.	-	73	147
Merismopedia sp.	591	587	440
Microcystis sp.	986	294	367
Oscillatoria sp.	79	73	-
Phormidium sp.	39	-	-
Rhabdoderma sp.	158	-	-
Spirulina sp.	-	220	-
Bacillariophyceae			
Achnanthes sp.	158	73	147
Bacillaria paradoxa	-	-	147
Cocconeis sp.	39	147	-
Coscinodiscus sp.	39	-	-
Cyclotella sp.	1104	2128	1835
Diatoma sp.	-	73	-
Diploneis sp.	-	-	220
Eunotia sp.	-	-	73
Melosira sp.	39	-	440
Navicula sp.	79	-	294
Nitzschia sp.	1144	807	881
Rhizosolenia sp.	39	-	-
Pennales	237	-	-
Chlorophyceae			
Chlamydomonas sp.	355	1394	587
Chlorella sp.	197	367	514
Chlorococcum sp.	237	881	1027
Chlorogonium sp.	39	-	294
Closterium sp.	79	147	-
Coelastrum sp.	39	73	-
Crucigenia sp.	-	-	367
Dictyosphaerium sp.	158	-	-
Elakatothrix sp.	-	73	-
Gloeocystis sp.	79	1470	-
Micractinium sp.	-	73	73
Oocystis sp.	237	-	147

Pediastrum sp.	39	-	-
Pteromonas sp.	-	73	73
Scenedesmus sp.	749	1248	954
Schroederia sp.	-	73	-
Spermatozoopsis sp.	79	73	73
Tetraedron sp.	-	660	147
Tetraedron trigonum	39	-	-
Tetrastrum sp.	39	73	147
Treubaria sp.	-	73	-
Ulothrix sp.	1025	2128	2862
Chlorophyceae	118	147	-
Euglenophyceae			
Euglena sp.	-	147	220
Lepocinclis sp.	-	660	440
Phacus sp.	-	-	220
Dinophyceae			
Peridinium sp.	-	73	-
Cryptophyceae			
Cryptomonas sp.	39	294	367

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

1 Transaction Code	2	3 NPDES NUMBER	11	12 YR/MO/DA	17	18 Insp Type	19 Inspector	20 Fac Type
N	5	FL0026751		950724		X	S	1

Remarks

21 66

Fill Out This Section For All Surface Water Discharger Inspections (CEI, CSI, CBI, PAI, XSI - RI Optional)

1 Transaction Code	2	3 NPDES NUMBER	11	12 YR/MO/DA	17	18 Insp Type	19 Inspector	20 Fac Type
N	5	FL0026751		950724		B	S	1

Remarks

21 66