

Biological Assessment of

City of Sanford Wastewater Treatment Facility

Seminole County

NPDES #FL0020141

Sampled November 1995

March 1996

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: City of Sanford WWTP
County: Seminole
NPDES Number: FL0020141
NPDES Permit Expiration Date: 30 September 1996

Toxics Sampling Inspection (XSI)

Date Sampled: 13 November 1995

Results: No organic pollutants were detected in the effluent, and no metals were detected in the effluent above Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 13 November 1995

Results: The facility was not discharging at the time of sampling, and the "effluent" sample had to be taken prior to dechlorination and oxygenation. The effluent sample, which was dechlorinated in the lab prior to analysis (to be consistent with the facility's normal process), was not toxic to *Ceriodaphnia dubia* or *Cyprinella leedsi*.

Impact Bioassessment Inspection (IBI)

Date Sampled: 13 November 1995

Results: Qualitative measures of benthic macroinvertebrate community health indicated no adverse effects associated with the discharge. Invertebrate populations at both receiving water sites were characteristic of a lentic, macrophyte dominated system. The low Florida Index, EPT, and SCI scores probably reflect the sluggish water velocity/lake-type conditions present rather than some anthropogenic disturbance. Measures of phytoplankton community health were very similar between the two study sites, and suggested no algal related problems.

Water Quality Inspection (WQI)

Date Sampled: 13 November 1995

Results: Since the facility was not discharging during this survey, it was having no near-field effect upon receiving water nutrient concentrations. Nutrients at the reference and test sites were virtually identical, and with the exception of TKN, were present at levels less than those found in 50% of other Florida streams. The relatively high TKN (2.5 mg/L) at both sites is not of concern, and is indicative only of swamp water inputs. Effluent nitrate-nitrite (8.6 mg/L) was elevated, but within permit limits. Algal growth potential (AGP) was 7.4 mg dry wt/L at the reference site and 10.8 mg dry wt/L at the test site. Both values somewhat exceeded the 5 mg dry wt/L "problem threshold".

These fifth year inspections provide the necessary information to evaluate the facility's impact on its receiving waters and to provide the basis for specific condition recommendations for permit renewal.

Introduction

The City of Sanford Wastewater Treatment Plant is located on the south shore of Lake Monroe in Seminole County, Florida (see maps in Appendix). Treatment at this 7.3 MGD facility consists of flow equalization, complete-mix activated sludge processing, chemical addition for nutrient reduction, tertiary filtration, high level disinfection, re-aeration, and dechlorination. The majority of this effluent is used for irrigation (*e.g.*, edible crops, golf courses) or is delivered to the Site 10 sprayfield (located on State Road 46, west of Sanford). There is a permitted "wet weather" discharge from the post-aeration structure to the St. Johns River. As of August, surface water discharge to the St. Johns River had occurred on only 44 days in 1995. The facility was not discharging to the St. Johns River at the time of sampling, although approximately 5.2 MGD of effluent was being delivered to the reuse areas.

Permit limits for the discharge, based upon a WQBEL, are as follows: CBOD and TSS (20.0 mg/L as an annual average), total nitrogen (12.0 mg/L as an annual average), ammonia (7.0 mg/L as a daily maximum), total phosphorus (4.0 mg/L annual average), total residual chlorine (0.01 mg/L maximum at discharge), and dissolved oxygen (5.0 mg/L minimum). Whole effluent toxicity testing is also required. State and Federal permits for this facility were consolidated on June 1, 1995, due to the delegation of the NPDES program to the State of Florida.

Past permit violations include acute toxicity (to *Ceriodaphnia dubia)* on three occasions, and exceeding the ammonia limit twice. Facility upsets include two sewage spills from the collection system to Lake Monroe, and two instances when turbidity and TSS were too high for the reuse system. Previous Consent Orders, one to address the TSS violations to the public reuse system and one to eliminate the surface water discharge (via construction of the Site 10 sprayfield), have been resolved.

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	20	22
Florida Index	2	2
SCI	13	15
EPT Index	2	2
% Contribution of Dominant Taxon	69.3	70.5
% Oligochaeta	6.3	11.5
% Diptera	0	8.7
% Ephemeroptera	0.5	1.1
% Trichoptera	0.5	0
% Amphipoda	73.4	70.5
% Gastropoda	11.5	0.6
% Other	7.8	7.6
% Predators	2.6	2.7
% Above Surface Deposit Feeders	34.9	38.5
% Below Surface Deposit Feeders	4.2	8.2
% Suspension Feeders	1.0	1.1
% Scrapers	11.7	1.1
% Shredders	38.3	38.5
% Scavengers	2.6	2.2
% Browser-grazers	2.6	2.2
% Parasites	1.6	0
% Unknown	0.5	4.4
Phytoplankton Algae		
Number of Taxa	24	28
Shannon-Weaver Diversity	3.96	4.3
Algal Density (#/mL)	795.6	953.1
Chlorophyll a (µg/L)	0.50 U	0.61 U
% Blue-green	34.7	44.6
% Green	28.7	32.2
% Diatoms	34.7	22.3
% Other	2.0	0.8
Algal Growth Potential (mg dry wt/l)	7.4	10.8

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 upstream of the discharge in the St. Johns River)

and a test site (the area down gradient of the discharge). 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 reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Phytoplankton samples for community composition analysis were collected via subsurface grabs. Chlorophyll *a* was also determined for phytoplankton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, 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.

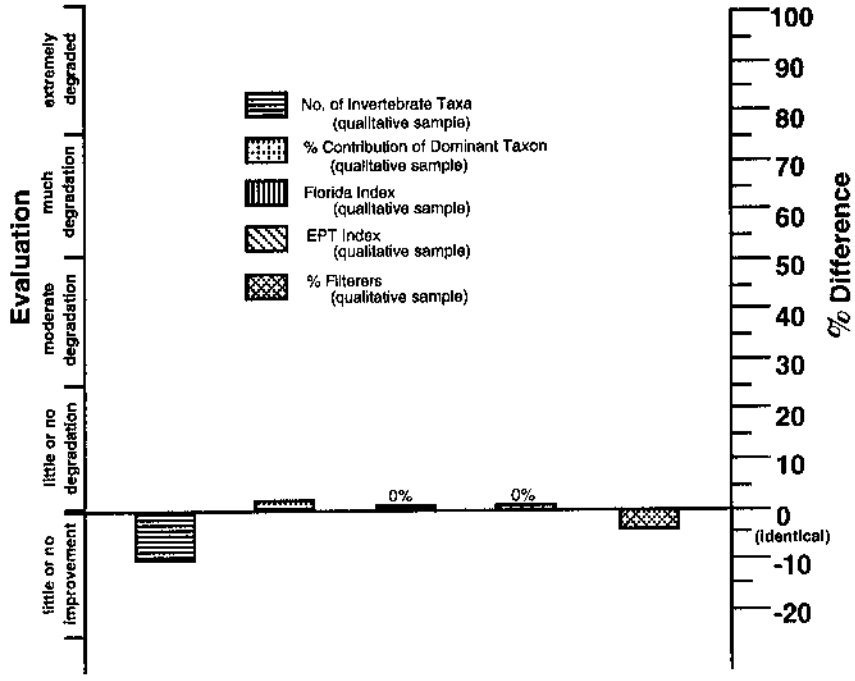
Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

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 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).



Effect of discharge on the benthic macroinvertebrate community.

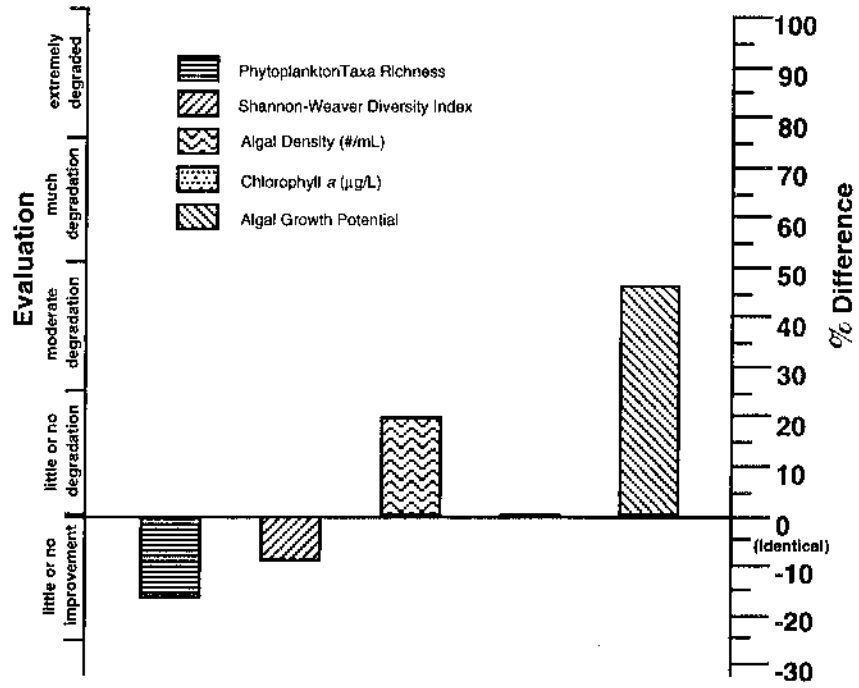
Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress. A decreased diatom to blue-green algae ratio (calculated by dividing the number of individuals in the Bacillariophyta by the number of individuals in the Bacillariophyta + Cyanophyta) is often indicative of 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 for Florida (SCI) is a composite macroinvertebrate 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 Florida Index, the EPT Index, and the % filter-feeders are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving 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: Phil Kane, Steve Kent and Karen Gottwald (DEP Central District) and Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Tina Mikulski, Elizabeth Miller, Urania Quintana, Lisa Tamburello, David Whiting, and Vicki Whiting (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.

Results and Discussion

The study area was situated in the St. Johns River, just downstream of Lake Monroe. The river is approximately 100 m wide, 4 m deep, with clear, tannic stained water and abundant aquatic macrophyte coverage along the shore. The reference and test sites, which received identical habitat assessment scores (116 points), were also similar with respect to many physical/chemical parameters. For example, conductivity ranged from 405 µmhos/cm to 401 µmhos/cm, dissolved oxygen ranged from 8.0 mg/L to 7.4 mg/L, pH was 7.3 SU at the reference site and 7.4 SU at the test site, and water temperature was 20.3 °C and 19.2 °C at the reference and test sites, respectively. Available habitat at both sites consisted predominantly of aquatic vegetation with some mud/muck.

The facility was not discharging at the time of sampling, and the "effluent" sample was taken prior to dechlorination and oxygenation. Not surprisingly, this chlorinated effluent was acutely toxic to both *Ceriodaphnia dubia* and *Cyprinella leedsi*. Both tests were terminated at 24 hours due to 100% mortality. However, the facility does dechlorinate and oxygenate prior to final discharge. The effluent sample which was dechlorinated in the lab prior to analysis was not acutely toxic to either organism (Appendix).

Zinc (20 µg/L) and iron (53 µg/L) were found in the effluent at concentrations above the practical quan-

titation limit. At a hardness of 132.5 mg/L as $CaCO_3$, neither of these values exceed Class III standards. No organic pollutants were detected in the effluent sample.

Since the effluent was not discharging during this survey, it was having no near-field effect upon receiving water nutrient concentrations. Nutrients at the reference and test sites were virtually identical, and with the exception of TKN, were present at levels less than those found in 50% of other Florida streams (see Appendix). The relatively high TKN (2.5 mg/L) at both sites is not of concern, and is indicative only of swamp water inputs. Effluent nitrate-nitrite (8.6 mg/L) was elevated, but within permit limits.

Algal growth potential (AGP) was 7.4 mg dry wt/L at the reference site and 10.8 mg dry wt/L at the test site. Both values somewhat exceeded the 5 mg dry wt/L "problem threshold" of Raschke and Schultz (1987).

Qualitative measures of benthic macroinvertebrate community health indicated no adverse effects associated with the discharge. 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.

Invertebrate populations at both receiving water sites were characteristic of a lentic, macrophyte dominated system. Taxa richness (from 20 to 22 taxa), Florida Index (2 points at each site), and EPT index (2 points at each site) were very similar or identical at both sites. The low Florida Index and EPT scores probably reflect the sluggish water velocity/lake-type conditions present rather than some anthropogenic disturbance. Both sites were solidly dominated by the amphipod, *Hyalella azteca* (69.3% and 70.5% at the reference and test sites, respectively). This organism, and others found during this survey (*e.g.*, the shrimp, *Palaemonetes paludosus*, the mayfly, *Caenis* sp., and the gastropod, *Littoridinops monroensis*) are typical of lentic systems with aquatic vegetation. Due to the physical and habitat characteristics of this area, the Stream Condition Index (SCI) was not considered to be a useful tool in assessing potential human impacts. SCI scores were low at both sites.

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. Measures of algal community health were very similar between the two study sites. Taxa richness varied from 24 to 28 taxa, Shannon-Weaver diversity ranged from 4.0 to 4.3, and algal density was between 796 organisms/mL and 953 organisms/mL. Chlorophyll *a* was below the detection limit at both sites, indicating very low algal biomass.

Conclusions

The facility was not discharging at the time of sampling, and the "effluent" sample had to be taken prior to dechlorination and oxygenation. The effluent sample, which was dechlorinated in the lab prior to analysis (to be consistent with the facility's normal process), was not acutely toxic to either test organism.

Zinc (20 µg/L) and iron (53 µg/L), were found in the effluent at concentrations which complied with Class III standards. No organic pollutants were detected in the effluent sample.

Since the effluent was not discharging during this survey, it was having no near-field effect upon receiving water nutrient concentrations. Nutrients at the reference and test sites were virtually identical, and with the exception of TKN, were present at levels less than those found in 50% of other Florida streams. The relatively high TKN (2.5 mg/L) at both sites is not of concern, and is indicative only of swamp water inputs. Effluent nitrate-nitrite (8.6 mg/L) was elevated, but within permit limits.

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Measures of phytoplankton community health were very similar between the two study sites, and suggested no algal related problems.

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Chemistry summary table for

City of Sanford WWTP	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None detected			
Metals (ug/L)			
Aluminum	100 U		
Arsenic	10 U		
Cadmium	0.080 U		
Chromium	10 U		
Copper	7 I		
Iron	53		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.050 U		
Zinc	20		
Nutrients (mg/L)			
Ortho-phosphate	0.68	0.056	0.038 I
Total phosphorus	0.66	0.056	0.059
Ammonia	0.031 I	0.045	0.045 A
Nitrate+Nitrite	8.6	0.052 I	0.058 I
TKN	1.1	2.5	2.5
General Phys-Chem Parameters			
Habitat Assessment		116	116
D.O. (mg/L)	4.4	8.0	7.4
pH (SU)	6.7	7.3	7.4
Conductivity (µmhos/cm)	612	405	401
Hardness (mg/L CaCO3)	132.5		
CBOD5 (mg/L)	1.0 I	1.0 I	1.0 U
TSS (mg/L)	1.2 I	0.7 I	1.2
Temperature (°C)	25.6	20.3	19.2
Algal Growth Potential (mg dry wt/L)	78.3	7.4	10.8
Toxicity			
Bioassay Fish-Chlorinated	LC50 < 100%		
Bioassay Invertebrate-Chlorinated	LC50 < 100%		
Bioassay Fish-Dechlorinated	No mortality		
Bioassay Invertebrate-Dechlorinated	No mortality		

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

I - Valuc reported is less than the minimum quantitation limit, and greater than or cqual to the minimum detection limit

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

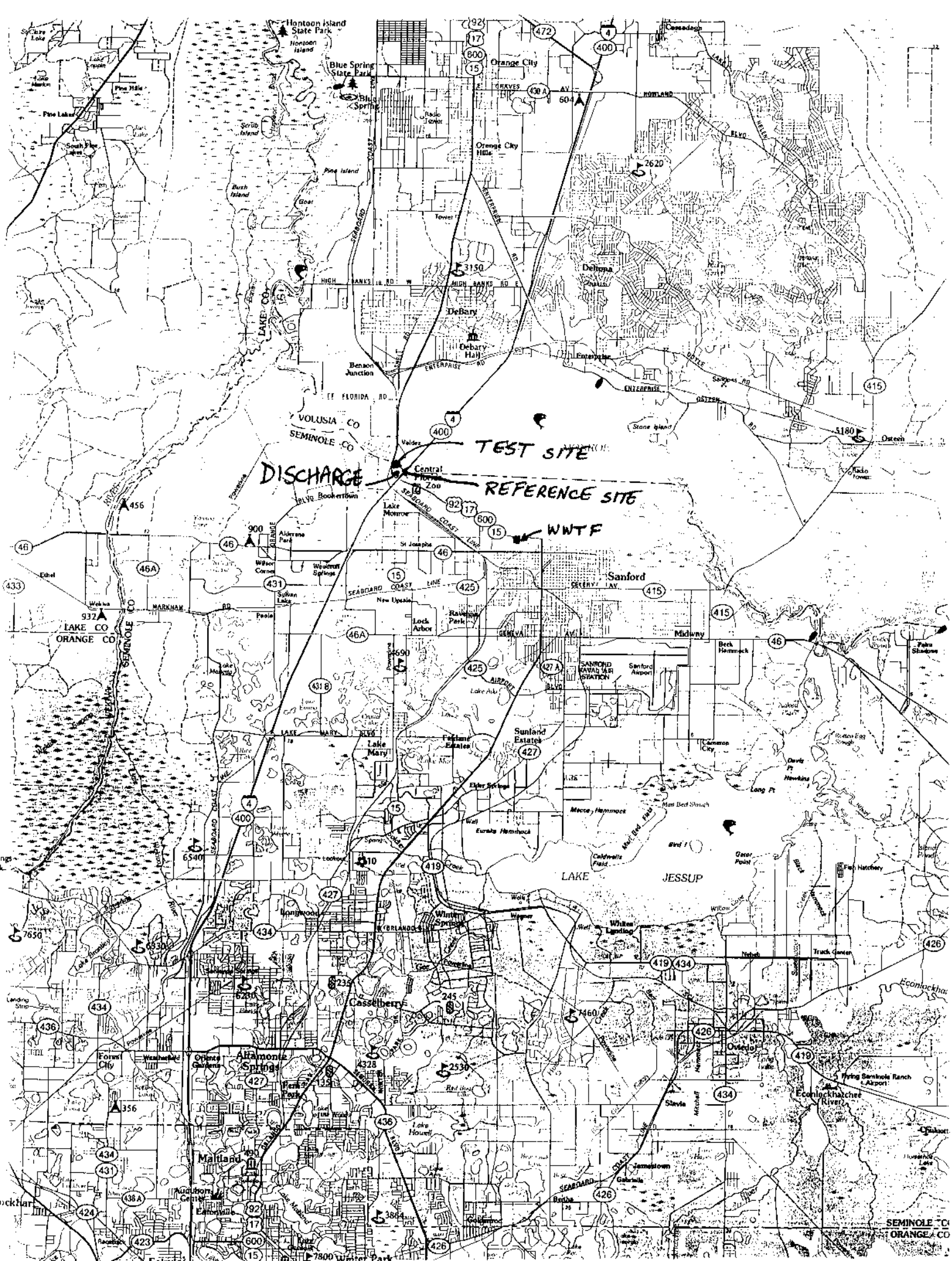
Typical Values for Selected Parameters in Florida Waters

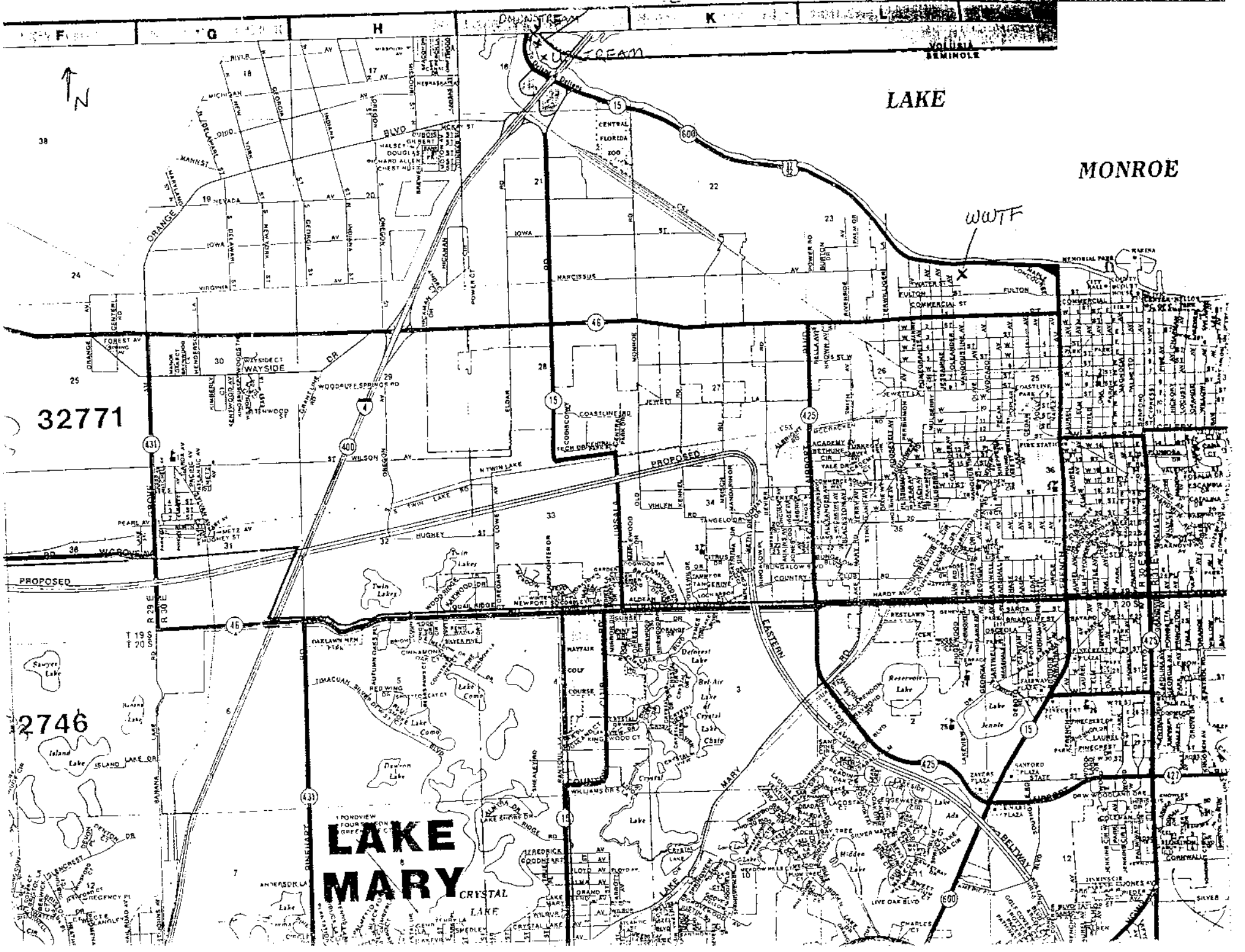
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

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 Phosphate	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-Phosphate	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-Phosphate	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


TEST SITE
DISCHARGE
REFERENCE SITE
WWTF
Hontoon Island State Park
Blue Spring State Park
Orange City
DeBary
Deltona
Enterprise
Osteen
Sanford
Midway
Lake Monroe
Lake Mary
Sanford Airport
LAKE JESSUP
Winter Springs
Casselberry
Altamonte Springs
Maitland
Oviedo
Econlockhatchee River
Central Florida Zoo
Benson Junction
Debary Hall
Lake Harney
Lake Howell
Lake Jesup
VOLUSIA CO
SEMINOLE CO
LAKE CO
ORANGE CO
SEABOARD COAST LINE
ENTERPRISE RD
HIGH BANKS RD W
HIGH BANKS RD E
LAKE MARY BLVD
MARKHAM RD
GENEVA AV
SANFORD AV
ORLANDO
Econlockhatchee River
SEMINOLE CO
ORANGE CO


LAKE
MONROE
WWTF
32771
2746
LAKE
MARY
PROPOSED
PROPOSED
EASTERN
BELTWAY
ORANGE
WAYSIDE
Twin Lakes
Lake Como
Island Lake
Sawyer Lake
Dewson Lake
Deforest Lake
Bel-Air Lake
Crystal Lake
Reservoir Lake
Jennie Lake
Ada Lake
Hidden Lake
CRYSTAL LAKE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: City of Sanford WRF		Date Summary Prepared: 10/12/95
Location (attach detailed map): See attached map	County: Seminole	District: Central
Federal Permit # FL0020141 and expiration date: 9/30/96	State GMS # and 3059M01119 State expiration date: 0059-246220 7/11/99	Facility Type: Industrial (Municipal), Federal Agricultural Other (list):

Function of facility:
Domestic Wastewater Treatment Plant serving the City of Sanford

Description of treatment process:
7.3 MGD AADF design capacity complete-mix activated sludge wastewater treatment facility with flow equalization, chemical feed facilities, tertiary filtration, high level disinfection, reaeration, dechlorination, dual reclaimed water holding tanks, sludge thickening and dewatering with belt filter presses. Reclaimed water is discharged to public access irrigation of edible crops, golf courses, etc., restricted access irrigation at Site 1 and a wet weather discharge to the St. Johns River (1.0 mi

Receiving waters: St. Johns River	Classification: I II (III)	
Design Flow: 7.3 MGD	Mean Flow: ~5.2 MGD	Flow during survey: 5.15 MGD AADF To Be Determined

Discharge is: Continuous (Intermittent) Seasonal Rainfall dependent
Other (describe) Flow dependent, operations dependent
therefore, the best time to sample is: Variable daily

If facility has a mixing zone, give details (size, parameters affected, etc.):
N/A

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

Parameter	Limit (units)
See attached sheets for state and federal effluent limits. State & federal permits were consolidated on June 1, 1995 due to the delegation of the NPDES program to the State of FL.	

Describe special permit conditions and permit modifications:
NPDES permit was modified 4/28/95 to include Whole Effluent Toxicity testing requirement. Also, all sample types were changed from 24-hour composite to grab and sample frequency was changed from daily/5 per week to daily/discharge. BOD5 was changed to CBOD5 for consistency with State permit requirements

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

City of Sanford
(Facility)

Description of permitted outfall(s):
Wet weather discharge from postaeration structure to St. Johns River via 760 ft 30" D.I. Flex-Lok Beltan Ball joint pipe to two steel plume structures with concrete chamfer all around. Elevation of discharge invert -5.5 & -7.5 MSL. Location: 70 ft east of old US 17-92 Bridge.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year:
① NH_3 limit = 7.0 daily max. Nov. '94 - NH_3 = 10.14 mg/L, Jan '95 - NH_3 = 12.9 mg/L.
② This plant has experienced numerous toxicity violations. November 1994 - failed Ceriodaphnia dubia test. February 1995 - failed Ceriodaphnia dubia test. (2 of 3 definitives failed.) March 1995 - passed. C. dubia & Dec. 1994 - failed C. dubia. (2 of 3 definitives failed.)
③ Plant upsets - 8/31/95 - overflowing manholes along lakefront due to rain. 2/9/95, 1/5/95, 1/6/95 - turbidity and TSS too high for reuse system discharged to River. ~~12/5/94 - 1000 gallons raw sewage overflow to Lake Monroe,~~ 11/6/94 - old discharge to Lake Monroe ~~discontinued~~, new discharge to river started and due to rain.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
First impact bioassessment to be conducted by FDEP on 11/13/95.
Consent Order 94-1431 issued to address TSS violations in reuse system. Case resolved 5/24/94.
Consent Order 91-0302 issued 3/27/91 for elimination of surface water discharge. Site 10 constructed. Wet-weather discharge continues in use (44 days as of 8/31/95)
WQBELs - as shown in Specific Condition 2B (attached)

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
Past turbidity violations have ceased. TSS results continue to improve. Consistency in reporting parameter results has improved. Fewer lab accidents have occurred which result in loss of data.

Additional information:
Plant continues to experience high flows and collection system overflows during periods of heavy rainfall due to I&I problems. An extremely wet year in 1994 (Tropical Storm Gordon, etc.) contributed to this facility's difficulty in meeting authorized wet weather flow limitations that year.

Staff contributing to this review (signature):

Philip N. Kane, Ed.D	(Biologist)
Karen Gottwald	(Inspector)
Al Carter	(Engineer)
	( )
	( )
	( )

State Monitoring Requirements

Permittee:
City of Sanford

Attention: Paul R. Moore, P.E.
Utilities Director

I. D. Number: 3059M01119
Permit Number: DO59-246220
Date Of Issue:
Expiration Date: 7/11/99

SPECIFIC CONDITIONS:

1. A. The required effluent sampling for discharge to the St. Johns River at a point after final treatment shall be as follows:

Parameter	Recording or sampling Frequency (a)
Flow	continuous
Total Chlorine Residual	continuous
Total Chlorine Residual (after dechlorination)	daily
pH	continuous
TSS	daily
$CBOD_5$	daily
Fecal Coliform	daily
Dissolved Oxygen	daily
Total Nitrogen as N	daily
Ammonia Nitrogen as N (NH_3-N)	daily
Total Phosphorus as P	daily

(a) daily grab sample during discharge

B. The required sampling of the reclaimed water used for public access irrigation (including edible and non-edible crops and Site 10) shall be as follows:

Parameter	Location	Recording or Sampling Frequency
Flow	A^	continuous
Chlorine residual	A	continuous
pH	A	continuous
Turbidity	B	continuous
$CBOD_5$*	A	daily, 4 days per week***
TSS*	B	daily, 4 days per week**
Fecal coliform	A	daily, 4 days per week**

* Influent and effluent
** Grab samples required during peak flow period.
*** Flow proportioned 24-hour composite sample required

A After disinfection
B After filtration, prior to disinfection
^ Per Specific Condition #25

The sampling and analysis required above shall be in accordance with Chapter 17-601, F.A.C. and approved standard methods. Properly executed reports shall be submitted monthly to this office by the 28th day of the following month.

In accordance with Rule 17-601.400(3), F.A.C., any laboratory test required by this permit shall be performed by a laboratory that has been certified by DHRS in accordance with Rule 10D-41.100 - .113, F.A.C., to perform the test. On-site tests for dissolved oxygen, pH, and total chlorine residual shall be performed by a laboratory certified to test for dissolved oxygen, pH, and total chlorine residual or under the direction of an operator certified in accordance with Chapter 61E12-41, F.A.C.

State Effluent Limits

Permittee:
City of Sanford

Attention: Paul R. Moore, P.E.
Utilities Director

I. D. Number: 3059M01119
Permit Number: DO59-246220
Date Of Issue:
Expiration Date: 7/11/99

SPECIFIC CONDITIONS:

In accordance with Rule 17-160.300(6), F.A.C., sample collection shall be performed by following the protocols outlined in "DER Standard Operating Procedures for Laboratory Operations and Sample Collection Activities" (DER-QA-001/92). Alternatively, sample collection may be performed by an organization who has an approved Comprehensive Quality Assurance Plan (CompQap) on file with DEP. This CompQap shall be approved for collection of samples from the required matrices and for the required tests.

2. A. The following information shall also be reported to the Department monthly (Rule 17-610.860(5), F.A.C.) for those months in which surface water discharge occurs:

a) A list of days when the discharge occurs.
b) The volume and duration of the discharge each day.
c) An explanation of the factors contributing to the wet weather discharge.
d) The stream stage at the highway 17-92 bridge gaging station in the receiving body for each day of the discharge.
e) In stream sampling for the following parameters is required on those days in which a discharge occurs at a point approximately 500 feet upstream and downstream from the point of discharge:

Parameter	Recording and Sampling Frequency
$CBOD_5$	daily grab
TN	daily grab
NH_3-N	daily grab
TP	daily grab
DO	daily grab

B. The following water quality based effluent limits (WQBEL) shall apply for the wet weather discharge to the St. Johns River:

Parameter		Effluent Limitation Concentration (mg/l)
Total Suspended Solids	(TSS)	20.0 annual average
5-day Carbonaceous BOD	($CBOD_5$)	20.0 annual average
Total Nitrogen as N	(TN)	12.0 annual average
Ammonia Nitrogen as N	(NH_3-N)	7.0 daily maximum
Total Phosphorus as P	(TP)	4.0 annual average
Dissolved Oxygen	(DO)	5.0 minimum at all times
Total Residual Chlorine	(TRC)	0.01 maximum at all times

State Toxicity Requirements

permittee:
City of Sanford

Attention: Paul R. Moore, P.E.
Utilities Director

I. D. Number: 3059M01119
Permit Number: DO59-246220
Date Of Issue:
Expiration Date: 7/11/99

SPECIFIC CONDITIONS:

No discharge will be permitted when river stage, as observed by City operator on staff gage near point of discharge, is below 1.2 feet above MSL unless there has been total rainfall of three (3) inches or more within the preceding four (4) days. (Rainfall may be measured either at the Sanford Wastewater Treatment Plant or Sanford Airport).

Under special conditions, discharge may be made for up to five (5) days where neither of the above conditions are met. Any additional discharge beyond five (5) days will only be permitted upon specific approval of DEP on a case by case basis.

2. C. Toxicity testing requirements for surface water discharge:

The permittee shall initiate the series of tests described below to evaluate wastewater toxicity. The permittee shall conduct 96 hour static renewal screening acute toxicity tests on the test species, Ceriodaphnia dubia and Cyprinella leedsi, once annually during the period of discharge on samples of 100% whole effluent. Such static renewal tests will be conducted on two separate grab samples of 100% final effluent collected uniformally during the period of wet weather discharge and used in two separate tests in order to account for daily variations in effluent quality. A standard reference toxicant quality assurance test shall be conducted concurrently with each species used in the toxicity tests.

If control mortality exceeds 10% of either species in any test, the test(s) for the species (including the control) shall be repeated. A test will be considered valid only if control mortality does not exceed 10% for either species. If, in any separate grab sample test, 100% mortality occurs prior to the end of the test, and control mortality is less than 10% at that time, that test (including the control) shall be terminated with the conclusion that the sample demonstrates unacceptable acute toxicity.

If any such screening test indicates that unacceptable toxicity (less than 80% survival of test organisms in 100% effluent) is found in any sample of effluent, additional (definitive) acute static renewal toxicity testing involving the determination of 96-hour LC50 values with 95% confidence limits will be required. A minimum of three (3) such 96-hour additional tests are required to be conducted within 30 days from the date that any screening test indicates the presence of toxicity. Preferably, the first of these additional tests shall be initiated within seven (7) days of a failed screening test. The second test shall be initiated at least seven (7) days after completion of the first additional test. Such tests shall be conducted using that test species which exhibited the most toxicity in the screening tests above, and shall be taken at the same time of day and day of the week during which the greatest toxicity was exhibited.

permittee:
City of Sanford

Attention: Paul R. Moore, P.E.
Utilities Director

I. D. Number: 3059M01119
Permit Number: DO59-246220
Date Of Issue:
Expiration Date: 7/11/99

SPECIFIC CONDITIONS:

The results of each toxicity test shall be submitted to the Department concurrently with monthly discharge monitoring reports.

All test procedures, and quality assurance criteria used shall be in accordance with Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, 4th Edition, EPA-600/4-90/027. If the test organisms specified in Sub-Part a are not available, appropriate substitutes from the list of recommended test organisms in the above referenced bioassay manuals may be used. This, and any other deviation from the standard bioassay procedures, shall be submitted to the Department for review and approval prior to use.

3. Groundwater monitoring shall be performed in accordance with the attached Ground Water Monitoring Plan Implementation Schedule.

4. Domestic residuals (sludge) disposal shall be in accordance with Rule 17-640, F.A.C. Residuals shall be analyzed quarterly and the results submitted with each Agricultural Use Plan (AUP) update. AUP's shall be resubmitted annually for approval, on appropriate Department Forms, beginning one (1) year from the date of permit issuance.

   The current AUPs, dedicating 175.8 acres of the Skinner site, 178.5 acres of the Cowart Site, both located on Highway 11 north of Bunnell, Flagler County and 12 acres of the Lee Sod II site located on Pell Road four (4) miles north of Maytown, Volusia County are approved for application of residuals. All other previously approved AUP's are Null and Void.

5. The reclaimed water facilities discharging to ground waters shall be operated and maintained at all times so as to prevent overflow or seepage of water to adjacent ground surfaces or runoff to surface waters.

6. The boundary of the zone of discharge shall be 100 feet from the site (wetted disposal area) boundary or to the installation's property line, whichever is less. The zone of discharge shall be the volume underlying the surface within this boundary to the base of the unconfined aquifer.

7. Operation of the treatment plant shall be under the control of Certified Operators, in accordance with Rule 17-699.310, F.A.C., who shall perform the duties required by Chapter 61E12-41, F.A.C.

8. Operational difficulties, including any collection/transmission system overflows, which may cause or result in non-compliance with the requirements of the permit, shall be reported within twenty-four (24) hours to the Department.

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL

1. During the period beginning on the effective date and lasting through the expiration of the permit permittee is authorized to discharge from outfall(s) 001, sanitary wastewater, whenever there is a wet weather discharge to surface waters of the U. S..

Such discharges shall be limited and monitored by the permittee as specified below:

PARAMETER	DISCHARGE LIMITATIONS			MONITORING REQUIREMENT		
	Annual Average	Monthly Average	Weekly Average	Measurement Frequency*	Sample Type	Sample Point
Flow, MGD	Report	Report	Report	Daily/During Discharge	Recording flowmeter & totalizer	Effluent
Carbonaceous Biochemical Oxygen Demand (5 Day), mg/l	20.0	30.0	45.0	Daily/During Discharge	Grab	Effluent
Carbonaceous Biochemical Oxygen Demand (5 Day), mg/l	--	Report	--	Daily/During Discharge	24 Hour Composite	Influent
Total Suspended Solids, mg/l	20.0	30.0	45.0	Daily/During Discharge	Grab	Effluent
Total Suspended Solids, mg/l	--	Report	--	Daily/During Discharge	24 Hour Composite	Influent
Total Nitrogen as N, mg/l	12.0	15.0	18.0	Daily/During Discharge	Grab	Effluent
Ammonia Nitrogen as N, mg/l	--	4.0	5.0	Daily/During Discharge	Grab	Effluent
Total Phosphorus as P, mg/l	4.0	5.0	6.0	Daily/During Discharge	Grab	Effluent
Fecal Coliform Bacteria, N/100 ml	See Item 8 on Page I-3.			Daily/During Discharge	Grab	Effluent

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS - FINAL - CONTINUATION

PARAMETER	DISCHARGE LIMITATIONS			MONITORING REQUIREMENT		
	Annual Average	Monthly Average	Weekly Average	Measurement Frequency*	Sample Type	Sample Point
Total Residual Chlorine, mg/l	Daily maximum of 0.01.			Daily/During Discharge	Grab	Effluent
Dissolved Oxygen shall not be less than 5.0 mg/l				Daily/During Discharge	Grab	Effluent
pH, standard units	See Item 6 on Page I-3.			Daily/During Discharge	Grab	Effluent
Acute Whole Effluent Toxicity	See Item 10 on Page I-3.			During Discharge	Grab	Effluent

2. The effluent shall not cause a visible sheen on the receiving water. Also, there shall be no discharge of floating solids or visible foam in other than trace amounts.

3. Samples taken in compliance with the monitoring requirements specified in this permit shall be taken at the nearest accessible point after final treatment but prior to the actual discharge or mixing with the receiving waters.

4. Testing for total residual chlorine (TRC) shall be conducted according to either the low-level amperometric titration method or the DPD colorimetric method as specified in Section 4500-Cl E. or 4500-Cl G., respectively, Standard Methods for the Examination of Water and Wastewater, 17th Edition. If chlorine is not detected using one of these methods, the permittee shall report on the discharge monitoring report form, the analytical results for chlorine as being measured at less than the detection level for the test method selected; the test method shall also be reported. The permittee shall then be considered to be in compliance with the above daily maximum concentration limit for TRC.

*If the discharge exceeds five consecutive days, then five samples shall be taken per week.

UPSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/3/95	TIME 1055	RECEIVING BODY OF WATER: ST JOHNS RIVER

REMARKS:	LOCATION: CITY OF SANFORD STP 1201 W SEMINOLE BLVD SANFORD, FL	FIELD ID/NAME: CSANSTP
UPSTREAM		

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)
25					10	10	55 PARKS

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: 0m

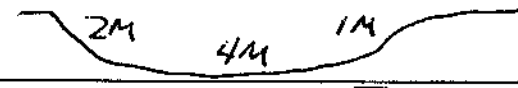
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 4.0M

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



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)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt	25	5	NET
Aquatic Vegetation	75	15	NET	Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)				***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):			Secchi (m):
Top	0.3	20.26	7.28	7.96	405			0.7M
Mid-depth	0.0	19.35	7.28	8.04	405			
Bottom	1.7	18.92	7.24	7.91	404			

System Type : Stream: ☐ (1st - 2nd order, 3rd - 4th order, 5th - 6th order, 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ 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: ☐ TANNIN

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

Weather Conditions/Notes: PARTLY CLOUDY/SUN COOL

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

SAMPLING TEAM:	SIGNATURE:	DATE:
KANE, KENT	Phil Kane	11/3/95

UPSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (v2)

SUBMITTING AGENCY CODE: 3C SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/13/95	RECEIVING BODY OF WATER: ST JOHNS RIVER

REMARKS: UPSTREAM	LOCATION: CITY OF SANFORD STP 1201 W SEMINOLE BLVD SANFORD, FL.	FIELD ID/NAME: CSANSTP

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 15	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity 17	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization 18	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition 19	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability 19	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width 5	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality 18	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

5 Add **5 points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

116 **TOTAL SCORE**

Comments

ANALYSIS DATE: 11/13/95	ANALYST: KANE	SIGNATURE: Phil Kane

DOWNSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 31 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/3/95	TIME 0945	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS: DOWNSTREAM	LOCATION: CITY OF SANFORD STP 1201 W SEMINOLE BLVD. SANFORD, FL	FIELD ID/NAME: CSANSTP

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)
10%					20	40	30 PARKS

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

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

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

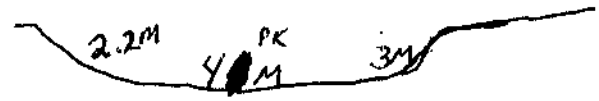
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 4.0M

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



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)				Sand			
Leaf Packs or Mats				Mud/Muck/Silt	25	5	NET
Aquatic Vegetation	25	15	NET	Other:			
Rock or Shell Rubble				Other:			
Shorezone (Roots/Veg.)				*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):			Secchi (m):
Top	0.3	19.2	7.40	7.37	401			0.7M
Mid-depth	1.1	19.04	7.36	7.41	401			
Bottom	1.9	18.95	7.34	7.34	405			

System Type : Stream: ☐ PK (1st - 2nd order 3rd - 4th order 5th - 6th order 7th order or greater) Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☑ 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: ☐ TANNIN

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

Weather Conditions/Notes:

PARTLY CLOUDY/SUN
COOL

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

SAMPLING TEAM: KANE, KENT	SIGNATURE: Phil Kane	DATE: 11/13/95

DOWNSTREAM

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (v2)

SUBMITTING AGENCY CODE: 30 / SUBMITTING AGENCY NAME: FDEP CENTRAL DISTRICT	STORET STATION NUMBER:	DATE (M/D/Y): 11/13/95	RECEIVING BODY OF WATER: ST. JOHNS RIVER

REMARKS: DOWNSTREAM	LOCATION: 120 W. SEMINOLE BLVD SANFORD, FL. CITY OF SANFORD STP	FIELD ID/NAME: CSANSTP

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 15	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity 17	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization 18	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition 19	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 16	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability 19	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width 5	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities 5 4 3 2 1
Riparian Zone Vegetation Quality 18	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

5 Add 5 points if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.

Comments

116 **TOTAL SCORE**

ANALYSIS DATE: 11/13/95	ANALYST: KANE	SIGNATURE: Phil Kane

Sample Source: City of Sanford STP
County: Seminole
Contact / District: Phil Kane / Central
NPDES Permit #: FL00 20141
LIMS Sample #: 122519 LIMS Job #: 95-NOV-14-38
sample log 11-14-95

Sample Collection: Date 11-13-95 Time 1200
Test Beginning: Date 11-14-95 Time 1500
Test Ending: Date 11-16-95 Time 1500
Organism Batch #: 63 Diluent Batch #: well
Organism Age: 12 days old
Test Organism: Cyprinella leedsi

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

Test Number: 2 of 4

Remarks: Sample dechlorinated with 1.67 mL of 0.025 N Sodium thiosulfate per liter of sample
dcc

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	22.1 @ 22.0	8.7 @ 22.2 °C	109.0 @ 102.3 975 @ 1013 @ 22.4 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.5 @ 23.2 °C	140.3 @ 141.3 955 @ 1013 @ 21.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.3 @ 21.3	8.6 @ 22.3 °C	137.1 @ 141.3 948 @ 1013 @ 22.0 °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	UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~ 24 h	UNCORRECTED Cond. (mmhos/cm) ~~Cond. (µmhos/cm)~~ 48 h
Control A	602	5	5	5	7.8	8.1	8.3	22.4	22.4	22.6	8.3	8.2	8.1	240	240	240
Control B	62	5	5	5	7.8	8.1	8.3	22.4	22.2	22.5	8.3	8.1	8.0	240	240	240
Control C	30	5	5	5	7.8	8.1	8.3	22.4	22.1	22.4	8.3	8.1	8.2	240	240	240
Control D	136	5	5	5	7.8	8.1	8.4	22.4	22.0	22.5	8.3	8.1	8.2	240	240	240
100 % A	183	5	5	5	7.3	7.8	8.0	23.1	22.3	22.5	7.9	8.0	8.2	600	590	600
100 % B	88	5	5	5	7.3	7.8	8.0	23.2	22.2	22.5	7.9	7.9	8.1	605	590	600
100 % C	607	5	5	5	7.3	7.8	8.0	23.2	22.0	22.4	7.9	7.9	8.1	605	590	600
100 % D	630	5	5	5	7.3	7.8	7.8	23.2	22.0	22.5	7.8	7.9	8.2	605	595	605
Measured/Loaded by:		DW	MF	MF	MF	TR	JN	MF	TR	JN	MF	TR	JN	MF	TR	JN
Recorded by:		MF	TR	MF	DW	DR	DR	DW	DR	DR	DW	DR	DR	DW	DR	DR

Investigators' Signatures

reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water: Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):	<0.03	—	1.22	DR/100	JN
Alkalinity (mg/L as $CaCO_3$):	125	—	90	Hach	JN
Hardness (mg/L as $CaCO_3$):	125	—	145	Hach	JN
Total ammonia (mg/L as N):	<0.017	—	<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Sanford STP
County: Seminole
Contact / District: Phil Kane / Central
NPDES Permit #: FL0020141
LIMS Sample #: 122519 **LIMS Job #:** 95-NOV-14-38
sampled 11-13-95

Sample Collection: Date 11-13-95 Time
Test Beginning: Date 11-14-95 Time
Test Ending: Date 11-16-95 Time
Organism Batch #: 53 **Diluent Batch #:**
Organism Age: <24 Hrs
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 4

Remarks: Sample dechlorinated with 1.67 mL of 0.025 N Sodium thiosulfate per Liter of sample

decL

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	22.1 @ 22.2	8.7 @ 22.2 °C	109.0 @ 1002 975 @ 1013
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.5 @ 23.2 °C	140.3 @ 1411 955 @ 1013
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.3 @ 21.3	8.6 @ 22.3 °C	137.1 @ 1413 948 @ 1013

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. (µmhos/cm) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h
Control A	A	5	5	5	8.1		8.3	22.4		23.1	8.3		7.9	125	
Control B	B	5	5	5			8.2			23.1			7.8		
Control C	C	5	5	5			8.3			23.2			7.8		
Control D	D	5	5	5			8.3			23.2			7.8		
100% A	A	5	5	5	7.4		8.2	23.3		23.2	8.0		7.8	570	
100% B	B	5	5	5			8.3			23.2			7.8		
100% C	C	5	5	5			8.3			23.1			7.8		
100% D	D	5	5	5			8.3			23.1			8.0		
Measured/Loaded by:		MF	MF	MF	MF		JN	MF		JN	MF		JN	MF DW	
Recorded by:		MF	TR	MF	DW		DR	DW		DR	DW		DR	DW	

Investigators' Signatures
Marshall Faircloth
Debra Nolte
Jennifer Moore
Robin G. Rader
David R. Ross

reviewer

form updated 5/05/95

Water Quality Parameters

	Salt Water / Well Water	20% Min Water	Sample	Method
Field Total Residual Cl2 (mg/L):			—	—
Lab Total Residual Cl2 (mg/L):	—	<0.03	1.22	DR100
Alkalinity (mg/L as $CaCO_3$):	—	75	90	Hach
Hardness (mg/L as $CaCO_3$):	—	90	145	Hach
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion

Ammonia Meter #98136 Ammonia Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Sanford STP
County: Seminole
Contact / District: Phil Kane / Central
NPDES Permit #: FL0020141
LIMS Sample #: 122519 (LIMS 11-29-95) **LIMS Job #:** 95-NOV-14-38

Sample Collection: Date 11-13-95 Time 1200
Test Beginning: Date 11-14-95 Time 1300
Test Ending: Date 11-15-95 Time 1500
Organism Batch #: 53 **Diluent Batch #:** 45
Organism Age: <24 hours
Test Organism: Ceriodaphnia dubia

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

Test Number: 3 of 4

Remarks: Cl- sample
Test terminated at 24 hours. All test organisms dead in 100% sample test.

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	22.1 @ 22.2	8.1 @ 22.2 °C	109.0 @ 102.3 925 @ 1013 @ 22.4 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.5 @ 23.2 °C	140.3 @ 141.3 955 @ 1013 @ 21.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.3 @ 21.3	8.6 @ 22.3 °C	157.1 @ 141.3 948 @ 1013 @ 22.0 °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	A	5	5		8.1	8.1		22.3	22.5		8.1	8.1		180	190	
Control B	B	5	5			8.1			22.7			8.0			195	
Control C	C	5	5			8.1			22.9			7.7			195	
Control D	D	5	5			8.1			22.9			7.7			190	
100% A	A	5	0		7.4	8.1		22.4	22.5		7.7	7.9		555	595	
100% B	B	5	0			8.3			22.5			7.9			620	
100% C	C	5	0			8.3			22.5			7.9			620	
100% D	D	5	0			8.3			22.5			7.9			620	
					100% A 48 hr	8.3 *	WRONG #									
Measured/Loaded by:		MF	MF		ME	TR		ME	TR		ME	TR		ME	TR	
Recorded by:		MF	TR		DW	DR		DW	DR		DW	DR		DW	DR	

Investigators' Signatures
Marbel Faircloth
Joseph Mills
Tobin C. Rader
Dana L. Ross

Water Quality Parameters	Salt Water: Well Water	Salt Water: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):					
Lab Total Residual Cl2 (mg/L):		<0.03	1.22	DR/00	JN
Alkalinity (mg/L as CaCO3):		75	90	Hach	JN
Hardness (mg/L as CaCO3):		90	145	Hach	JN
Total ammonia (mg/L as N):		<0.017	<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

reviewer

form updated 5/05/95

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Sanford STP
County: Seminole
Contact / District: Phil Kane / Central
NPDES Permit #: FL0020141
LIMS Sample #: 122519 (Time 11-29-95) LIMS Job #: 95-NOV-14-38

Sample Collection: Date 11-13-95 Time 1200
Test Beginning: Date 11-14-95 Time 1500
Test Ending: Date 11-15-95 Time 1500
Organism Batch #: 63 Diluent Batch #: well
Organism Age: 12 days
Test Organism: Cyprinella leedsi

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

Test Number: 4 of 4

Remarks: Acute
Test terminated at 24 hours. All test organisms dead in 100% sample test

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	22.1 @ 22.2	8.7 @ 22.2°C	109.0 @ 102.3 975 @ 1013 @ 22.4 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	21.2 @ 21.3	8.5 @ 23.2°C	140.3 @ 141.3 955 @ 1013 @ 21.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	21.3 @ 21.3	8.6 @ 22.3°C	137.1 @ 141.3 948 @ 1013 @ 22.0 °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	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Control A	A21	5	5	5	7.9	8.2		23.1	22.2		7.9	8.0		240	240	
Control B	6333	5	5	5	7.9	8.2		23.1	~~8.0~~ 22.1		7.7	7.9		240	240	
Control C	C210	5	5	5	7.9	8.2		23.1	7.9 ~~7.9~~		8.0	7.9		245	235	
Control D	T20	5	5	5	7.9	8.2		23.2	22.1		8.0	8.1		245	235	
100% A	79	5	0		7.2	7.8		22.4	22.1		7.2	8.1		580	580	
100% B	44	5	0		7.2	7.8		22.4	22.0		7.2	8.1		585	580	
100% C	606	5	0		7.1	7.7		23.0	21.9		6.9	8.1		590	580	
100% D	48	5	0		7.1	7.7		23.1	21.9		6.9	8.1		590	580	
							CTRL	B	22.1 DR							
								C	21.9 DR		WROTE DATA IN WRONG BOX DR					
								D								
Measured/Loaded by:		DW	MF		MF	TR		MF	TR		MF	TR		MF	TR	
Recorded by:		MF	TR		DW	DR		DW	DR		DW	DR		DW	DR	

Investigators' Signatures

Marshall Faircloth
D. Dantzler
Jennifer Smith
Cindy Roden
Dennis Ross

reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			—	—	—
Lab Total Residual Cl2 (mg/L):	<0.03	—	1.22	DR100	JN
Alkalinity (mg/L as $CaCO_3$):	125	—	90	Hach	JN
Hardness (mg/L as $CaCO_3$):	125	—	145	Hach	JN
Total ammonia (mg/L as N):	<0.017		<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -57.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

REFERENCE SITE

Winter Index Period: Stream Condition Index for Florida (SCI) (1996) Version 3													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	**Panhandle (65, 75a)**				**Peninsula (75b, c, d)**				**Northeast (75e & f)**			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	20	≥26	25-13	<13		≥ 27	26-14	<14	3	≥18	17-9	<9	
EPT Index	2	≥6	5-3	<3		≥ 4	3-2	<2	3	-	≥3	<3	
# Chironomid Taxa	0	≥9	8-5	<5		≥9	8-5	<5	1	≥5	4-3	<3	
% Contribution of Dominant Taxon	69.3	≤25	26-62	>62		≤30	31-65	>65	1	≤44	45-72	>72	
% Diptera	0	-	≤60	>60		-	≤52	>52	3	-	≤67	>67	
Florida Index	2	≥ 13	12-7	<7		≥10	9-5	<5	1	≥ 6	5-3	<3	
% Suspension feeders/Filterers	1.0	≥ 13	12-7	<7		≥15	14-8	<8	1	≥ 32	31-16	<16	
Total Score		**Panhandle**				**Peninsula**			13	**Northeast**			
Interpretation of Score		**Excellent**			27-33	**Excellent**			27-33	**Excellent**			26-31
		Good			21-26	**Good**			21-26	**Good**			20-25
		Poor			14-20	**Poor**			14-20	**Poor**			14-19
		Severely Degraded			7-13	**Severely Degraded**			(7-13)	**Severely Degraded**			7-13

TEST SITE

Winter Index Period: Stream Condition Index for Florida (SCI) (1996) Version 3													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	**Panhandle (65, 75a)**				**Peninsula (75b, c, d)**				**Northeast (75e & f)**			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	22	≥26	25-13	<13		≥ 27	26-14	<14	3	≥18	17-9	<9	
EPT Index	2	≥6	5-3	<3		≥ 4	3-2	<2	3	-	≥3	<3	
# Chironomid Taxa	6	≥9	8-5	<5		≥9	8-5	<5	3	≥5	4-3	<3	
% Contribution of Dominant Taxon	70.5	≤25	26-62	>62		≤30	31-65	>65	1	≤44	45-72	>72	
% Diptera	8.7	-	≤60	>60		-	≤52	>52	3	-	≤67	>67	
Florida Index	2	≥ 13	12-7	<7		≥10	9-5	<5	1	≥ 6	5-3	<3	
% Suspension feeders/Filterers	1.1	≥ 13	12-7	<7		≥15	14-8	<8	1	≥ 32	31-16	<16	
Total Score		**Panhandle**				**Peninsula**			15	**Northeast**			
Interpretation of Score		**Excellent**			27-33	**Excellent**			27-33	**Excellent**			26-31
		Good			21-26	**Good**			21-26	**Good**			20-25
		Poor			14-20	**Poor**			(14-20)	**Poor**			14-19
		Severely Degraded			7-13	**Severely Degraded**			7-13	**Severely Degraded**			7-13

Benthic macroinvertebrate taxa list for the City of Sanford WWTP, collected via 20 discrete dip net sweeps in the St. Johns River, on 13 November, 1995.

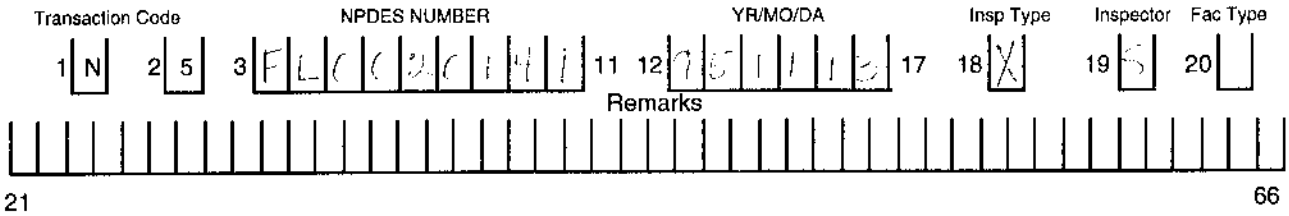
	Reference Site	Test Site
Turbellaria		
Dugesia sp.	180	–
Oligochaeta		
Aulodrilus pigueti	–	503
Bratislavia unidentata	72	–
Dero lodeni	36	–
Dero trifida	72	71
Eclipidrilus sp.	36	–
Haber speciosus	–	287
Haemonais waldvogeli	36	–
Limnodrilus hoffmeisteri	–	143
Pristina aequiseta	–	359
Spirosperma ferox	36	–
Stephensoniana sp.	36	–
Hirudinea		
Helobdella sp.	108	–
Helobdella stagnalis	–	143
Gastropoda		
Hyalopyrgus aequicostatus	–	71
Littoridinops monroensis	613	–
Micromenetus dilatatus	72	–
Ancylidae	108	–
Pelecypoda		
Pisidiidae	36	71
Trombidiformes		
Arrenurus sp.	–	71
Arrenurus problecornis	–	71
Unionicola sp.	–	71
Isopoda		
Cassidinidea ovalis	180	–
Amphipoda		
Gammarus sp.	288	–
Hyalella azteca	4801	9280
Decapoda		
Palaemonetes sp.	–	143
Palaemonetes paludosus	72	359
Decapoda	–	71
Ephemeroptera		
Baetis intercalaris	–	71
Caenis sp.	36	71
Trichoptera		
Cyrnellus fraternus	36	–
Lepidoptera		

Noctuidae	–	143
Lepidoptera	72	–
Diptera		
Chaoborus punctipennis	–	143
Chironomus sp.	–	431
Polypedilum convictum grp.	–	71
Polypedilum halterale grp.	–	71
Tanytarsus sp. F (Epler)	–	71
Tanytarsus sp. G (Epler)	–	71
Chironomidae	–	287

Phytoplankton taxa list and densities (#/mL) for the City of Sanford WWTP, collected via subsurface grabs in the St. Johns River, on 13 November, 1995.

	Reference Site	Test Site
Cyanophyceae		
Anabaena sp.	–	16
Aphanocapsa sp.	39	32
Aphanothece sp.	–	8
Chroococcus sp.	–	47
Dactylococcopsis sp.	55	47
Lyngbya sp.	24	39
Lyngbya contorta	16	63
Marssoniella sp.	16	8
Merismopedia sp.	32	39
Microcystis sp.	24	39
Oscillatoria sp.	39	47
Rhabdoderma sp.	24	16
Romeria sp.	8	24
Chrysophyceae		
Peroniella sp.	–	8
Bacillariophyceae		
Achnanthes sp.	32	–
Cocconeis sp.	8	–
Cyclotella sp.	47	24
Eunotia sp.	–	8
Fragilaria sp.	134	55
Melosira sp.	–	39
Navicula sp.	–	8
Nitzschia sp.	–	16
Pinnularia sp.	8	–
Pennales	47	63
Chlorophyceae		
Ankistrodesmus sp.	16	–
Chlamydomonas sp.	95	87
Cylindrocystis sp.	–	8
Dictyosphaerium sp.	8	32
Elakatothrix sp.	8	–
Golenkinia sp.	–	16
Micractinium sp.	–	8
Phacotus sp.	–	8
Scenedesmus sp.	63	126
Schroederia sp.	–	8
Tetraedron sp.	16	16
Tetrastrum sp.	8	–
Ulothrix sp.	16	–
Euglenophyceae		
Euglena sp.	8	–
Dinophyeae		
Peridinium sp.	8	–

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



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