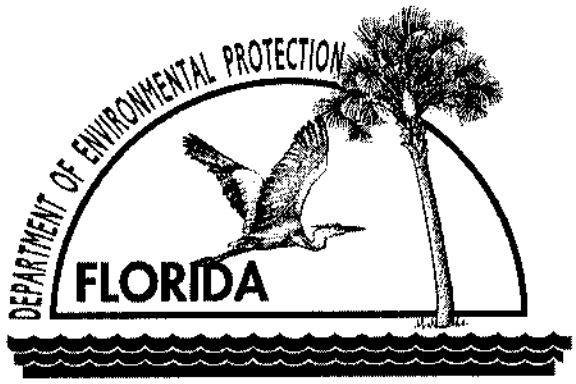


Biological Assessment of

City of Winter Haven
Wastewater Treatment Plant # 3

Polk County

NPDES #FL0036048

Sampled September 1996

February 1997

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 Winter Haven WWTP #3
County: Polk
NPDES Number: FL0036048
State Permit Expiration Date: 26 June 1997

Toxics Sampling Inspection (XSI)

Date Sampled: 16 September 1996

Results: Metals and organic compounds found in the effluent complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 16 September 1996

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 16 September 1996

Results: Quantitative (Hester-Dendy) measures of macroinvertebrate health indicated that the unnamed tributary which receives the effluent was not adversely affecting the biota of the Peace Creek Canal. In fact, invertebrate parameters at the test site were either the same as, or better than, those of the reference site. The dipnet results demonstrated the biota of the test site to be healthier than the reference site. The Stream Condition Index (SCI) indicated the Peace Creek Canal reference site, with 17 points, was in the "poor" category, while the test site, with 29 points, was in the "excellent" category. The improvements seen in the macroinvertebrate populations at the test site coincided with improvements in habitat there. This suggests that habitat in the Peace Creek Canal, and not water quality, was the factor most limiting the success of the biota at the reference site. The phytoplankton communities at both Peace Creek Canal sites were relatively sparse. Chlorophyll *a* was undetected at both sites and algal density was very low. Taxa richness increased from 12 taxa at the reference site to 16 taxa at the test site, while Shannon-Weaver diversity improved from 3.3 at the reference site to 3.6 at the test site. In summary, there was no evidence the facility was negatively affecting the phytoplankton.

Water Quality Inspection (WQI)

Date Sampled: 16 September 1996

Results: Effluent CBOD (3 mg/L), TSS (16 mg/L), fecal coliforms (260 organisms/100 mL), and total coliforms (480 organisms/100 mL) complied either with permit limits or Class III water quality standards. Nutrient concentrations at the Peace Creek Canal test site were relatively similar to those found at the reference site, and were fairly average for a Florida stream, despite elevated phosphorus in the effluent. This suggests that dilution in the Peace Creek Canal was sufficiently great to prevent nutrient enrichment from the facility. Algal Growth Potential (AGP) at the tributary site (7.9 mg dry wt/L) was lower than the AGP of the reference site (11.3 mg dry wt/L) or the test site (13.4 mg dry wt/L). The values at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for AGP (Raschke and Schultz 1987). The effluent AGP was 18.6 mg dry wt/L.

Introduction

The City of Winter Haven Wastewater Treatment Plant is located in Polk County, Florida (see maps in Appendix). Wastewater at this 5.0 MGD facility is treated to secondary standards via extended aeration. Treated wastewater is routed to a holding pond. Effluent from this pond is either sprayed on citrus or hay fields or is routed to an overland flow system for further treatment which is then discharged to a cement-lined ditch which flows to an unnamed tributary of the Peace Creek Canal. The outfall 001 is located at the weir along this ditch (see maps in Appendix). The discharge from this ditch varies, depending on seasonal rainfall. For example, an average of 2.94 MGD was discharged during the three months prior to June, 1996. During September, 1995, the flow averaged 4.5 MGD.

State permit limits are seasonal due to the variable or intermittent nature of the effluent. The permit limits for the month of September are as follows: carbonaceous BOD and ammonia (10 mg/L as an monthly average, 12 mg/L as a weekly average), total suspended solids (20 mg/L as an annual average, 30 mg/L as a monthly average, 45 mg/L as a weekly average), unionized ammonia (0.02 mg/L maximum), dissolved oxygen (5.0 mg/L minimum).

This facility typically operates in a satisfactory manner. Only a single abnormal event is on record. In July, 1996, the effluent dissolved oxygen fell below the 5.0 mg/L minimum limit (to 3.6 mg/L), due to low flow through the system.

Major characteristics of community structure of reference and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	20	32
Florida Index	5	15
SCI	17	29
EPT Index	3	4
% Contribution of Dominant Taxon	43.1	39.6
% Oligochaeta	13.8	6.0
% Diptera	4.1	12.8
% Ephemeroptera	17.1	40.9
% Trichoptera	3.3	20.1
% Odonata	1.6	0.7
% Coleoptera	0	3.4
% Amphipoda	43.1	8.7
% Pelecypoda	5.7	3.4
% Other	11.3	4.0
% Predators	9.8	5.7
% Above Surface Deposit Feeders	35	30.2
% Below Surface Deposit Feeders	13.8	5.4
% Suspension Feeders	5.7	27.9
% Scrapers	5.3	23.5
% Shredders	21.5	6.4
% Plant piercer	0.8	0.3
Macroinvertebrate Hester-Dendy		
Number of Taxa	19	19
Florida Index	5	6
Shannon-Weaver Diversity	2.06	2.85
EPT Index	3	3
% Oligochaeta	0	0
% Diptera	19.3	34.5
% Ephemeroptera	7.8	20.5
% Trichoptera	0	2.3
% Odonata	1.6	0
% Coleoptera	0.5	.59
% Amphipoda	67.2	39.2
% Other	3.6	2.9
% Predators	8.5	14.1
% Above Surface Deposit Feeders	47	46.1
% Below Surface Deposit Feeders	0	0
% Suspension Feeders	.26	3.2
% Scrapers	4.43	11.4
% Shredders	38.0	23.7
% Scavengers	1.0	0.3
Phytoplankton Algae		
Number of Taxa	12	16
Shannon-Weaver Diversity	3.3	3.6
Algal Density (#/mL)	385.3	645.9
Chlorophyll a (µg/L)	1.12 U	1.00 U
% Blue-green	8	9.8
% Green	32	31.7
% Diatoms	28	22
% Other	32	36.6
Algal Growth Potential (mg dry wt/l)	11.3	13.4

Methods

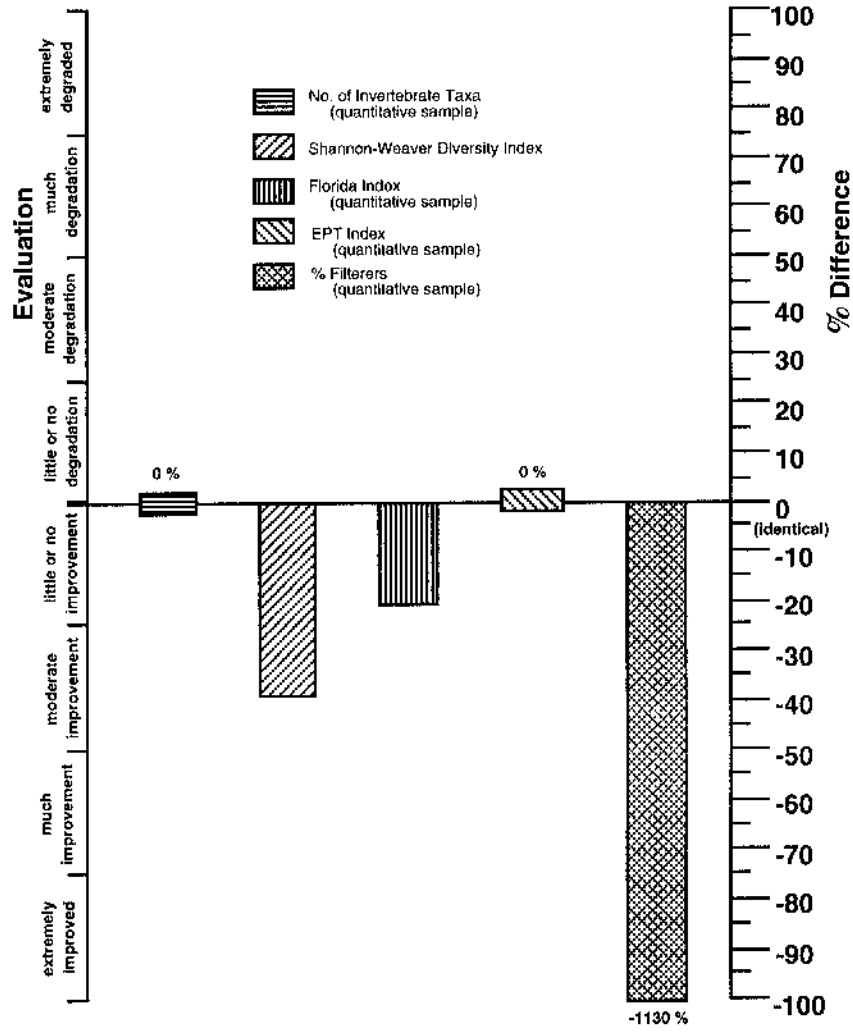
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in the Peace Creek Canal, upstream of the unnamed tributary which receives the effluent) and a test site (located in the Peace Creek Canal downstream of this unnamed tributary) (see maps in Appendix). Note that the test site was located approximately 2 miles downstream of the Winter Garden #3 outfall weir. An additional water chemistry site was established in the unnamed tributary prior to its confluence with the Peace Creek Canal. 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 the reference site, test site, and tributary site. 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. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Phytoplankton was sampled at both reference and test sites by 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.

Habitat Assessment: Seven attributes known to have potential effects on the stream biota were evaluated and scored, with 20 points possible for each factor.



Effect of discharge on the benthic macroinvertebrate community.

Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points).

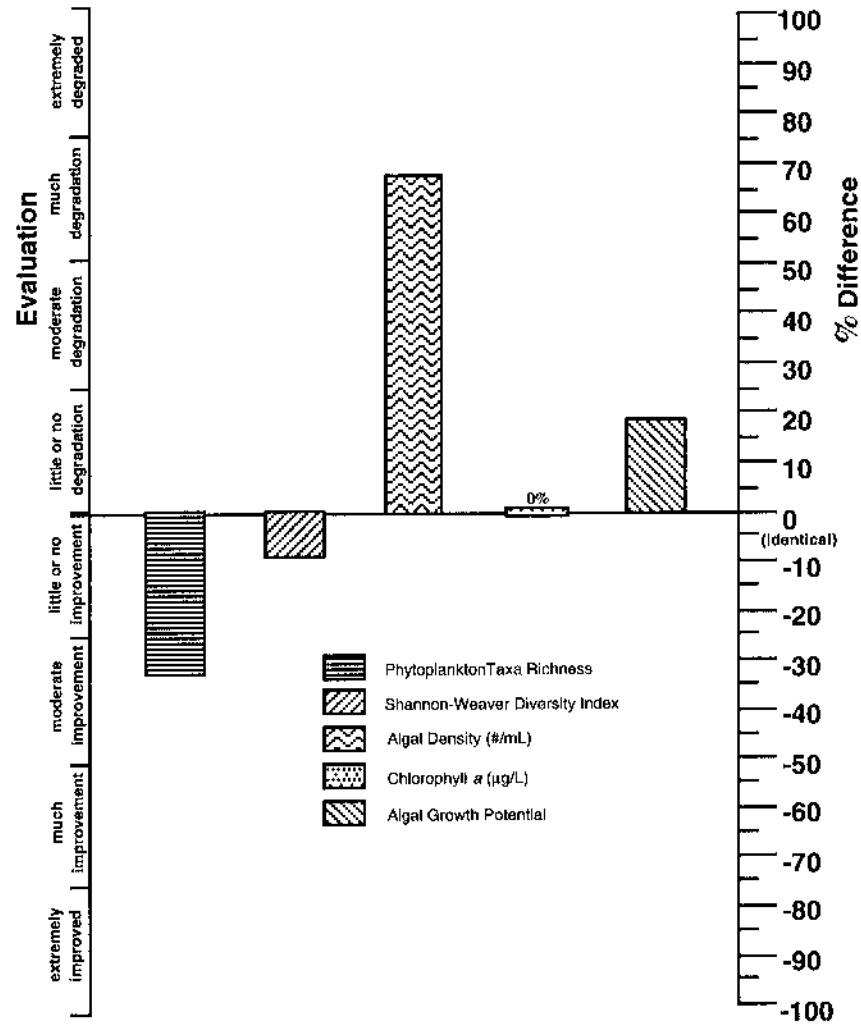
Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be correlated with increased algal taxa richness.

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 Hudson *et al.* (1990), Lenat (1993), and Chang *et al.* (1992) 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.



Effect of discharge on the algal 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 (Barbour *et al.* 1996). 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, the diatom to blue-green algae ratio, and the % filter-feeders are measured as the reference site minus test site divided by the refer-

ence 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: Brent Johnson and Diane McCominns (DEP Southwest) and Lyn Burton, Jennifer Eichelberger, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Kathleen Lurding, Elizabeth Miller, Urania Quintana, Bart Richard, Landon Ross, Lisa Tamburello, David Whiting, Vicki Whiting, 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.

Results and Discussion

Habitat quality at the reference site (with 62 points) was classified as "marginal", improving to the "suboptimal" category at the test site (with 80 points). The reference site especially lost points in the categories of riparian zone buffer width and quality (see Habitat Assessment forms in Appendix).

Dissolved oxygen concentrations at the reference site (4.0 mg/L) and at the test site (2.7 mg/L) were both lower than the Class III water quality standard (minimum of 5.0 mg/L). The tributary site, with a dissolved oxygen of 5.7 mg/L, complied with Class III water quality standards. The conductivity was basically unchanged between the reference site (121 µmhos/cm) and the test site (118 µmhos/cm), while the tributary site was slightly higher (201 µmhos/cm). The pH (ranging from 6.1 SU to 7.0 SU) and temperature measurements (between 29.8° C and 26.8° C) were similar at the Peace Creek Canal reference, test, and tributary sites. The pH was moderately higher at the tributary site (7.0 SU), while temperature was somewhat lower (26.6° C).

The effluent was not acutely toxic to the water flea, *Ceriodaphnia dubia*, or to the fish, *Cyprinella leedsi*. No mortality occurred during the two 48 hour acute toxicity tests (Appendix).

A very low concentration (below the criterion for detection) of atrazine (0.027 µg/L) was found in the effluent sample. No other organic pollutants were detected in the effluent. Metals detected in the effluent included aluminum (148 µg/L), iron (246 µg/L), and zinc (28 µg/L). At an effluent hardness of 100.6 mg $CaCO_3$ /L, all these metals met Class III water quality standards.

With the exception of total phosphorus, nutrients at the tributary site were low for a typical Florida stream (see Chemistry Summary Table in Appendix). Total phosphorus (0.76 mg/L) at the tributary site was higher than the values found in approximately 90% of other Florida streams (see Typical Water Quality Values in Appendix). The Winter Haven #3 discharge, with a total phosphorus concentration of 1.4 mg/L, contributed to the elevated total phosphorus at the tributary site. Nutrient concentrations at the Peace Creek Canal test site, however, were similar to those found at the reference site, and were average for a Florida stream. This suggests that dilution in the Peace Creek Canal was sufficiently great to prevent phosphorus enrichment from the facility.

Algal Growth Potential (AGP) at the tributary site (7.9 mg dry wt/L) was lower than the AGP of the reference site (11.3 mg dry wt/L) or the test site (13.4 mg dry wt/L). The values at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for AGP (Raschke and Schultz 1987). The effluent AGP was 18.6 mg dry wt/L.

Effluent CBOD (3 mg/L), TSS (16 mg/L), fecal coliforms (260 organisms/100 mL), and total coliforms (480 organisms/100 mL) complied either with permit limits or Class III water quality standards.

Quantitative measures of macroinvertebrate health indicated the unnamed tributary which receives the effluent was not adversely affecting the biota of the Peace Creek Canal. In fact, invertebrate parameters at the test site were either the same as, or better than, those of the reference site. 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 the test site is better than the reference site.

In the Hester-Dendy samples, taxa richness (19 taxa) and the EPT Index (3) were the same at the reference and test sites. Improvements in the Shannon-Weaver diversity index (from 2.1 at the reference site to 2.9 at the test site), and the Florida Index

(5 at the reference site, 6 at the test site) were observed between the upstream and downstream stations. Filter-feeders were more abundant at the test site.

The dipnet results, which generally demonstrated the biota of the test site to be healthier than the reference site, were consistent with the Hester-Dendy data. The Stream Condition Index (SCI) indicated the reference site, with 17 points, was in the "poor" category, while the test site, with 29 points, was in the "excellent" category. The improvements seen in the macroinvertebrate populations at the test site coincided with improvements in habitat there. This suggests that habitat in the Peace Creek Canal, and not water quality, was the factor most limiting the success of the biota at the reference site.

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. The phytoplankton communities at both Peace Creek Canal sites were relatively sparse. Chlorophyll *a* was undetected at both sites and algal density, ranging from 385 cells/mL to 646 cells/mL, was very low. Taxa richness increased from 12 taxa at the reference site to 16 taxa at the test site, while Shannon-Weaver diversity improved from 3.3 at the reference site to 3.6 at the test site. The green alga, *Scenedesmus* sp. was the most abundant organism at the reference and test sites alike, accounting for 24% of the populations at both stations. In summary, there was no evidence the facility was negatively affecting the phytoplankton.

Conclusions

Dissolved oxygen concentrations at the Peace Creek Canal reference and test sites were below Class III water quality standards.

The effluent was not acutely toxic to the water flea, *Ceriodaphnia dubia,* or to the fish, *Cyprinella leedsi.*

Metals and organic compounds found in the effluent complied with Class III water quality standards.

Nutrient concentrations at the Peace Creek Canal test site were relatively similar to those found at the reference site, and were fairly average for a Florida stream, despite elevated phosphorus in the effluent. This suggests that dilution in the Peace Creek Canal was sufficiently great to prevent nutrient enrichment from the facility.

Algal Growth Potential (AGP) at the tributary site (7.9 mg dry wt/L) was lower than the AGP of the reference site (11.3 mg dry wt/L) or the test site (13.4 mg dry wt/L). The values at all three sites exceeded the 5.0 mg dry wt/L "problem threshold" for AGP (Raschke and Schultz 1987). The effluent AGP was 18.6 mg dry wt/L.

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The phytoplankton communities at both Peace Creek Canal sites were relatively sparse. Chlorophyll *a* was undetected at both sites and algal density was very low. Taxa richness increased from 12 taxa at the reference site to 16 taxa at the test site, while Shannon-Weaver diversity improved from 3.3 at the reference site to 3.6 at the test site. In summary, there was no evidence that the facility was negatively affecting the phytoplankton.

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Chemistry Summary Table for Winter Haven WWTP, collected 16 September 1996.	Effluent	Tributary Site	Reference Site	Test Site
Organic Constituents (ug/L)				
Atrazine	0.027 T			
Metals (ug/L)				
Aluminum	148 A			
Arsenic	20 U			
Calcium	30.7 A			
Copper	5 U			
Chromium	5 U			
Iron	246 A			
Lead	10 U			
Magnesium	5.82 A			
Mercury	0.10 U			
Nickel	4 U			
Selenium	30 U			
Silver	0.04 U			
Zinc	28 A			
Nutrients (mg/L)				
Ortho-phosphate	0.91	No data	0.013	.091
Total phosphorus	1.4	0.76	0.13	0.16
Ammonia	0.057	0.046	0.059	0.086
Nitrate+Nitrite	0.67	0.084	0.09	0.10 A
TKN	1.2	1.1	1.7	1.7
General Phys-Chem Parameters				
Habitat Assessment			62	80
D. O. (mg/L)	8.3	5.7	4.0	2.7
pH (SU)	7.3	7.0	6.3	6.1
Specific Conductance (µmhos/cm)	418	201	121	118
Temperature (°C)		26.6	29.8	27.3
Hardness (mg CaCO3)	100.62			
TSS (mg/L)	16			
CBOD (mg/L)	3			
Total Coliform Bacteria (organisms/100mL)	480			
Fecal Coliform Bacteria (organisms/100mL)	260			
Algal Growth Potential (mg dry wt/L)	18.6	7.9	11.3	13.4
Toxicity				
Bioassay Fish-Dechlorinated	Not toxic			
Bioassay Invertebrate-Dechlorinated	Not toxic			

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

O - Sampled, but analysis lost or not performed

T - Value reported is less than the criterion of detection

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

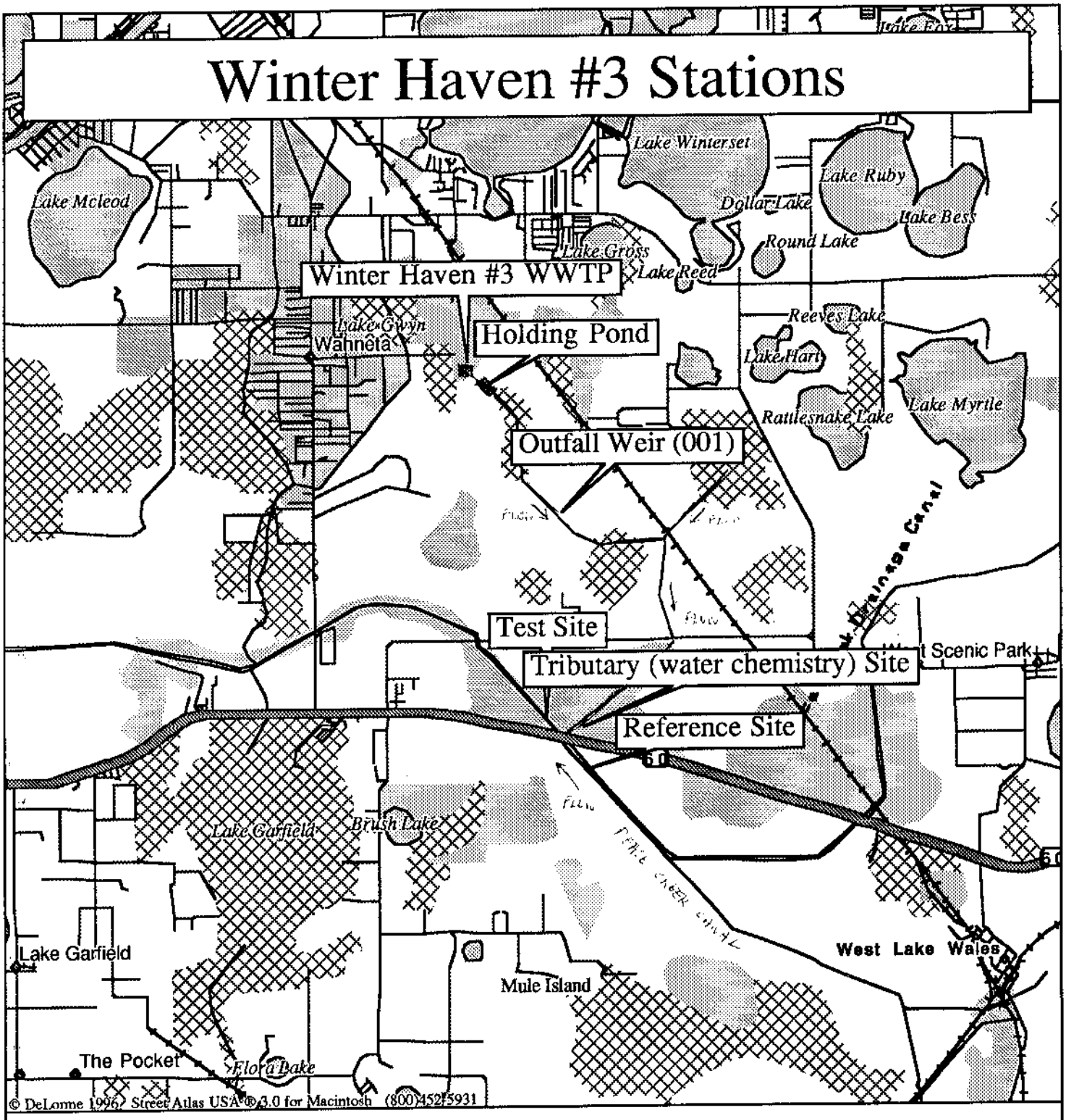
Typical Values for Selected Parameters in Florida Waters

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 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

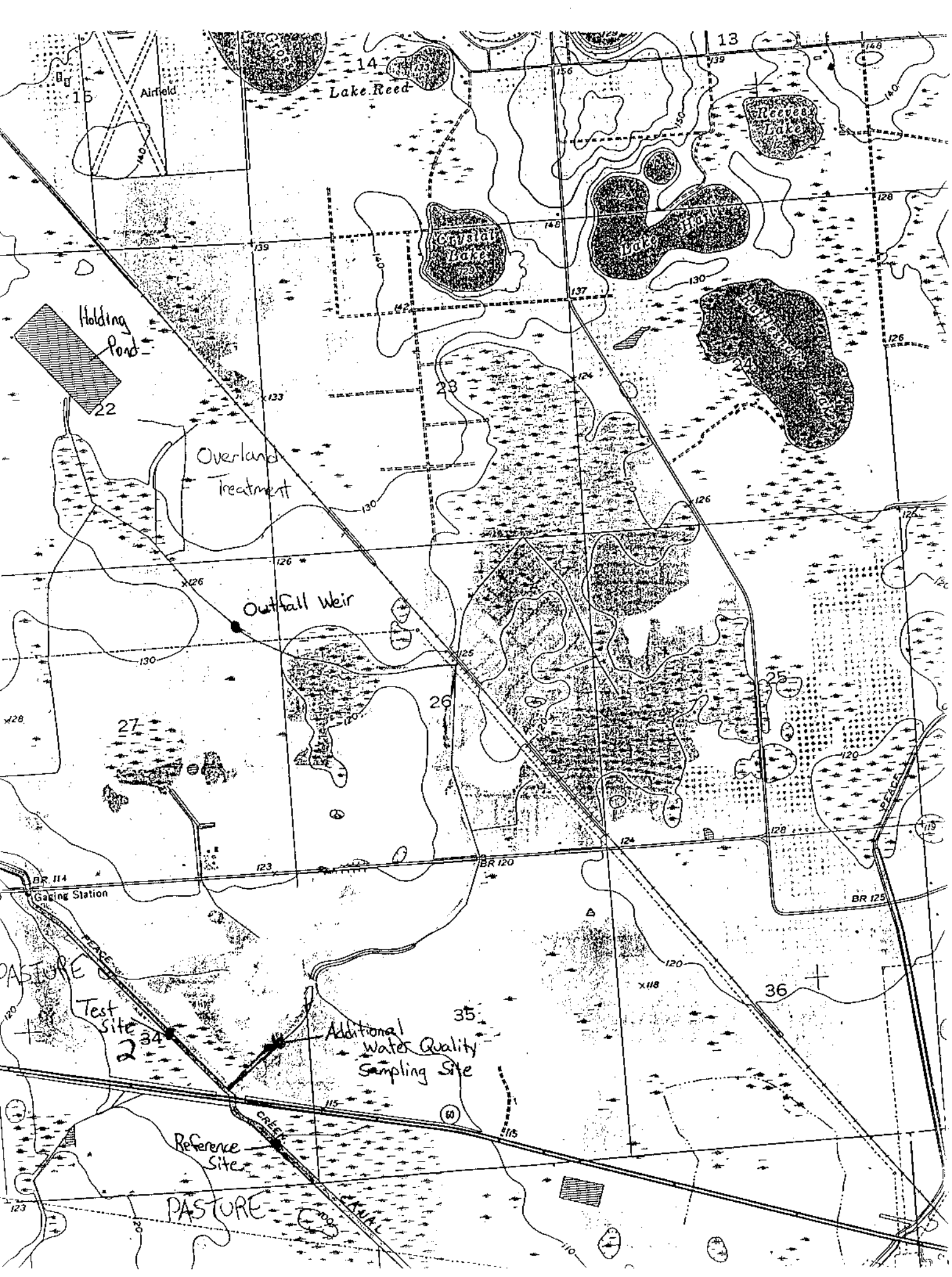
Units:
Phytoplankton Chlorophyll *a* (ug/L), Periphyton Chlorophyll *a* (mg/m^2), Nutrients (mg/L), Turbidity (NTU), Taxa richness and diversity values are for macroinvertebrates

Winter Haven #3 Stations



Mag 13.00
Wed Nov 20 07:50 1996
Scale 1:62,500 (at center)
1 Miles
2 KM

- Secondary SR, Road, Hwy Ramp
- Major Connector
- State Route
- US Highway
- Primary State Route
- Railroad
- Town, Small City
- Locale
- Population Center
- Land
- Lake, Ocean
- Woodland
- Sand
- Wetland


Holding Pond
Overland Treatment
Outfall Weir
Additional Water Quality Sampling Site
Reference Site
Test Site 2
PASTURE
PASTURE
Gaging Station
Airfield
Lake Reed
Crystal Lake
Hat Lake
Rowland Lake
Reeves Lake
BR 114
BR 120
BR 125
PEACE
CREEK
CANAL

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: Winter Haven WWTP #3		**Date Summary Prepared :** 7/12/96
Location (attach detailed map): 4400 Pelham Rd. South of Winter Haven	**County** Polk	**District** Southwest
Federal Permit # FL0036048 **and expiration date:** 6/26/97	**State GMS # and** 4053NO1249 **State expiration date:**	**Facility Type:** Industrial (Municipal) Federal Agricultural **Other (list):**

Function of facility:
treatment of domestic wastewater

Description of treatment process:
This system is a 5.0 MGD extended aeration plant which treats wastewater to secondary standards. Effluent is stored on site and pumped to an overland flow system for further treatment and is pumped to a ground-water monitor site prior to discharge to a tributary to the Peace River.

Receiving waters: Peace River	**Classification:** I II (III)	
Design Flow: 5.0 MGD	**Mean Flow:** 2.94 MGD (Annual Avg. 3 month ADF)	**Flow during survey:**

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

therefore, the best time to sample is: Rainy Season

If facility has a mixing zone, give details (size, parameters affected, etc.):
NONE

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

Parameter	Limit (units)
CBOD5	10 mg/L monthly 12 mg/L weekly
Ammonia-N	10 mg/L monthly 12 mg/L weekly
D.O.	5 mg/L minimum
TSS	20, 30, 45 mg/L annually
Unionized Ammonia	0.02 mg/L max

Describe special permit conditions and permit modifications:
- Limits are seasonal. Limits at left are for September.
- Unionized ammonia calculated from a grab sample for Ammonia-N, with temp & pH
- plant must meet secondary standards prior to discharge to pond to overland flow system.

Winter Nixon #2
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

Effluent is collected in a concrete lined ditch from the vertical flow system. Outfall 001 is considered the weir at the end of this ditch.

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

Jul-96 - DO below 5.0 to 3.6 - Apparent due to low flow through system

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

FAC-1, no prior enforcement.
Discharge is from a WQBEL.

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

No data available

Additional information:

Staff contributing to this review (signature):

Brent Johnson	(Biologist)
Joseph Spirito	(Inspector)
	(Engineer)
	( )
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: SW District Dep	STORET STATION NUMBER: 25020156	DATE (M/D/Y): 9/16/96	TIME 1500	RECEIVING BODY OF WATER: Peace Creek Canal

REMARKS:	COUNTY: Polk	LOCATION: Reference Site	FIELD ID/NAME: Winter Haven #3 WWTP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
80%		70%	5%	5%			

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

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

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

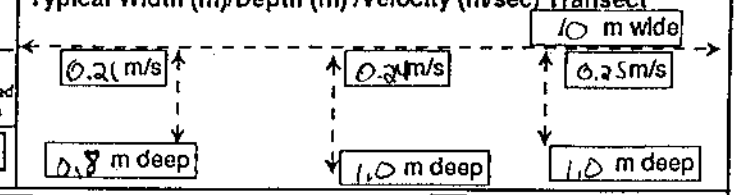
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: 1 (m above present water level) + 1 (present depth in m) = 2 (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



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	70	2	
Leaf Packs or Mats				Mud/Muck/Silt	10	3	
Aquatic Vegetation	20	15	Dip Net	Other:			
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):			Secchi (m):
Top	0.1	29.8	6.27	3.98	121			
Mid-depth								
Bottom								

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

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: Cloudy windy (N...) Rain imminent

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Brent Johnson	Brent Johnson	

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: SW District	STORET STATION NUMBER: 25020156	DATE (M/D/Y): 9/16/96	RECEIVING BODY OF WATER: Peace Creek Canal

REMARKS:	LOCATION: Reference Site - South of S.R. 60 at bridge	FIELD ID/NAME: Winter Haven #3 WWTP

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [9]	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 [14]	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 [5]	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 [17]	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 [8]	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 [4]	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants 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 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: No riparian zone. Area surrounded by pasture.

67 [60] **TOTAL SCORE**

ANALYSIS DATE: 9/16/96	ANALYST: Brent Johnson	SIGNATURE: Brent Johnson

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: SWI District	STORET STATION NUMBER: 25020158	DATE (M/D/Y): 9/16/96	TIME 1045	RECEIVING BODY OF WATER: Peace Creek Water

REMARKS:	COUNTY: Polk	LOCATION: Test Site	FIELD ID/NAME: Winter Haven #3 WWTP

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20%		70%	5%	5%			

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

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

Width of riparian vegetation (m) on least buffered side: 13

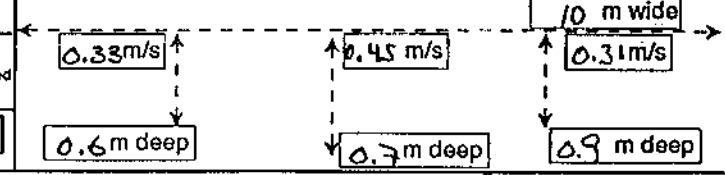
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: 1.2 (m above present water level) + 0.7 (present depth in m) = 1.9 (m above bed)

Typical Width (m)/Depth (m) /Velocity (m/sec) Transect



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)	5	5	Dip Net	Sand -	70	2	Dip Net
Leaf Packs or Mats				Mud/Muck/Silt -	10	3	Dip Net
Aquatic Vegetation	10	5	Dip Net	Other:			
Rock or Shell Rubble				Other:			
Undercut banks/Roots	5	5	Dip Net	*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	0.2	27.30	6.07	2.70	118			
Mid-depth	0.2		6.07	2.70				
Bottom								

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

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:
Partly Cloudy
Southerly breeze
85-90° Hot

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Brent Johnson / Dave McDonnas	Brent Johnson	

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME: SWI District	STORET STATION NUMBER: 25020158	DATE (M/DD/Y): 9/16/96	RECEIVING BODY OF WATER: Peace Creek Canal

REMARKS:	LOCATION: Test Site North of S.R. 60 at bridge	FIELD ID/NAME: Winter Haven #3 WWTP

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [7]	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 [4]	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 [17]	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 [12]	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 [12]	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 [11]	Over 80% of streambank surfaces consist of native plants, including trees understory shrubs, or non-woody macrophytes. Plants growing naturally. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants 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 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.

[8580] **TOTAL SCORE**

Comments: Riparian zone - Florida slash pine, live oak, sour orange, buttonbush, beautyberry

ANALYSIS DATE: 9/16/96	ANALYST: Brent Johnson	SIGNATURE: Brent Johnson

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Winter Haven
County: Polk
Contact / District: Brent Johnson / Southwest
NPDES Permit #: FL0036048
LIMS Sample #: 152320 LIMS Job #: 96-Sep-17-37
sample log 9-24-96 MF
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 1 of 2
Remarks:

Sample Collection: Date 9-16-96 Time 1310
Test Beginning: Date 9-17-96 Time 1500
Test Ending: Date 9-17-96 Time 1500
Organism Batch #: 39 Diluent Batch #: 40
Organism Age: <24hours
Test Organism: Ceriodaphnia dubia

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	25.4 @ 25.4	8.2 @ 25 °C	101.4 @ 101.3 1410 @ 1409 @ 24.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.2 @ 24.3	5.4 @ 24.2 °C	107 @ 101.3 1398 @ 1409 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.6 @ 23.6	5.4 @ 23.4 °C	106.6 @ 101.3 1389 @ 1409 @ 24.0 °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) 0 hr	UNCORRECTED Cond. (µmhos/cm) 24 h	UNCORRECTED Cond. (µmhos/cm) 48 h
Ctc	A	5	5	5	8.0		8.0	23.3		24.0	8.0		7.8	170		155
Ctc	B	5	5	5			8.1			23.8			7.8			150
Ctc	C	5	5	5			8.2			23.8			8.0			150
Ctc	D	5	5	5			8.2			23.8			8.0			155
100%	A	5	5	5	7.6		8.5	23.8		23.5	8.0		8.2	450		450
100%	B	5	5	5			8.5			23.3			8.0			450
100%	C	5	5	5			8.5			23.2			8.3			450
100%	D	5	5	5			8.5			23.8			8.3			455
Measured/Loaded by:		MF	MF	ND	DW		DW	DW		DW	DW		DW	DW		DW
Recorded by:		MF	MF	DW	ND		DB	ND		DB	ND		DB	N.D		DB

Investigators' Signatures

Marshall Fairchild

reviewer

form updated 4/01/96

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			not measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.05	0.05	DR100	DW
Alkalinity (mg/L as $CaCO_3$):	120	69	113	Hach	ND
Hardness (mg/L as $CaCO_3$):	129	86	105	Hach	ND
Total ammonia (mg/L as N):	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -58.1 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Winter Haven WWTP #3
County: POLK
Contact / District: Brent Johnson / Southwest
NPDES Permit #: FL0036048
LIMS Sample #: 152820 **LIMS Job #:** 96-Sep-17-37
sample log 9-24-96 MF
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 2 of 2
Remarks:

Sample Collection: Date 9-16-96 Time 1310
Test Beginning: Date 9-17-96 Time 1500
Test Ending: Date 9-19-96 Time 1500
Organism Batch #: 70 and 71 **Diluent Batch #:** well
Organism Age: 8 and 9 days
Test Organism: Cyprinella leedsi

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	25.4 @ 25.4	8.2 @ 25 °C	101.4 @ 101.3 1410 @ 1409 @ 24.6 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.2 @ 24.3	8.4 @ 24.2 °C	107 @ 101.3 1398 @ 1409 @ 24.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.6 @ 23.6	8.4 @ 23.4 °C	106.6 @ 101.3 1384 @ 1409 @ 24.0 °C 9700 @ 9997

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Ctr A	B1	5	5	4*	7.8	8.4	8.3	24.8	23.3	23.9	8.0	8.6	8.1	255	250	255
Ctr B	B2	5	5	5	7.8	8.4	8.4	24.8	23.2	23.5	8.0	8.6	8.2	250	250	250
Ctr C	B3	5	5	4*	7.9	8.4	8.4	24.8	23.2	23.5	8.0	8.6	8.3	250	245	250
Ctr D	B4	5	5	5	7.9	8.3	8.4	24.7	23.5	23.9	8.0	8.6	8.3	250	250	255
100% A	B5	5	5	5	7.5	8.1	8.3	24.9	23.3	23.5	7.8	8.3	8.2	470	460	465
100% B	B6	5	5	5	7.5	8.1	8.3	24.9	23.2	23.4	7.8	8.3	8.0	470	460	465
100% C	B7	5	5	5	7.5	8.1	8.3	24.9	23.2	23.4	7.9	8.4	8.5	470	460	465
100% D	B8	5	5	5	7.5	8.1	8.3	25.0	23.5	23.9	7.9	8.5	8.2	470	465	465
Measured/Loaded by:		DW	ND	ND	DW	DN	DW	DW	DN	DW	DW	DN		DW	MF	DW
Recorded by:		MF	ND	DW	ND	ND	DB	ND	ND	DB	ND	ND		ND	ND	DB

Investigators' Signatures

* water in water space

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not Measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	0.05	DR100 Hach	DW
Alkalinity (mg/L as $CaCO_3$) :	120	69	107	115*	ND
Hardness (mg/L as $CaCO_3$) :	129	86	117	Hach 105*	ND
Total ammonia (mg/L as N) :	<0.017	<0.017	<0.017	Orion	MF

reference

Summer Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	20	≥ 31	30-16	<16		≥ 26	25-14	<14	3	≥ 22	21-12	<12	
EPT Index	3	≥ 7	6-4	<4		≥ 4	3-2	<2	3	-	≥2	<2	
# Chironomid Taxa	3	≥9	8-5	<5		≥7	6-4	<4	1	≥7	6-4	<4	
% Contribution of Dominant Taxon	43.1	≤22	23-61	>61		≤29	30-64	>64	3	≤31	32-66	>66	
% Diptera	4.1	-	≤50	>50		-	≤37	>37	3	-	≤47	> 47	
Florida Index	5	≥ 16	15-8	<8		≥7	6-4	<4	3	≥ 8	7-4	<5	
% Suspension feeders/Filterers	5.7	≥ 12	11-6	<6		-	≥7	<7	1	-	≥7	<7	
Total Score		Panhandle				Peninsula			17	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			26-31	Excellent			25-29
		Good			21-26	Good			20-25	Good			19-24
		Poor			14-20	Poor			13-19	Poor			13-18
		Severely Degraded			7-13	Severely Degraded			7-12	Severely Degraded			7-12

test

Summer Index Period: Stream Condition Index for Florida (SCI) (April 1996)													
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	Value	Panhandle				Peninsula				Northeast			
		5	3	1	Score	5	3	1	Score	5	3	1	Score
Total Number of Taxa	32	≥ 31	30-16	<16		≥ 26	25-14	<14	5	≥ 22	21-12	<12	
EPT Index	4	≥ 7	6-4	<4		≥ 4	3-2	<2	5	-	≥2	<2	
# Chironomid Taxa	7	≥9	8-5	<5		≥7	6-4	<4	5	≥7	6-4	<4	
% Contribution of Dominant Taxon	39.6	≤22	23-61	>61		≤29	30-64	>64	3	≤31	32-66	>66	
% Diptera	12.8	-	≤50	>50		-	≤37	>37	3	-	≤47	> 47	
Florida Index	15	≥ 16	15-8	<8		≥7	6-4	<4	5	≥ 8	7-4	<5	
% Suspension feeders/Filterers	27.9	≥ 12	11-6	<6		-	≥7	<7	3	-	≥7	<7	
Total Score		Panhandle				Peninsula			29	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			26-31	Excellent			25-29
		Good			21-26	Good			20-25	Good			19-24
		Poor			14-20	Poor			13-19	Poor			13-18
		Severely Degraded			7-13	Severely Degraded			7-12	Severely Degraded			7-12

Benthic macroinvertebrate taxa list for Winter Haven #3 WWTP, collected via Hester-Dendy artificial substrates in the Peace Creek Canal, on September 16, 1996. Densities, in number/m^2, represent the mean of four replicates.

	Reference Site	Test Site
Gastropoda		
Amnicola dalli johnsoni	2	2
Ancylidae	–	2
Micromenetus dilatatus	2	2
Amphipoda		
Hyalella azteca	256	133
Decapoda		
Palaemonetes paludosus	2	–
Procambarus sp.	6	–
Ephemeroptera		
Stenacron sp.	2	2
Stenacron interpunctatum	4	18
Baetis sp.	2	–
Caenis sp.	22	50
Odonata		
Pachydiplax longipennis	6	–
Ischnura sp.	–	2
Enallagma sp.	2	–
Enallagma pollutum	–	2
Coleoptera		
Dytiscidae	2	–
Dineutus sp.	–	2
Trichoptera		
Cyrnellus fraternus	–	8
Diptera		
Chironomidae	12	4
Ablabesmyia rhamphe grp.	6	60
Labrundinia sp.	–	2
Labrundinia neopilosella	2	–
Labrundinia pilosella	–	6
Corynoneura taris	–	4
Asheum beckae	2	–
Glyptotendipes sp.	–	4
Glyptotendipes sp. B Epler	4	6
Goeldichironomus sp.	2	–
Goeldichironomus holoprasinus	–	2
Parachironomus sp.	–	2
Parachironomus carinatus	14	4
Polypedilum scalaenum grp.	30	18
Tanytarsus sp.	2	–
Tanytarsus sp. L Epler	–	4
Tanytarsus sp. A Epler	–	2

Benthic macroinvertebrate taxa list for Winter Haven WWTP #3, collected via 20 dipnet sweeps in the Peace Creek Canal on September 16, 1996.

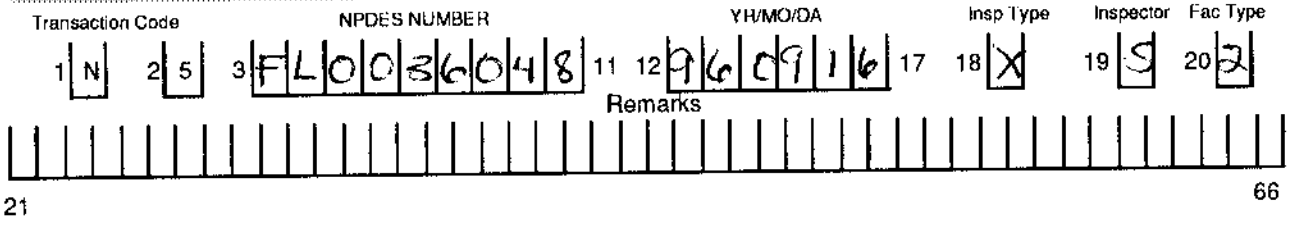
	Reference Site	Test Site
Oligochaeta		
Limnodrilus hoffmeisteri	4	1
Aulodrilus pigueti	9	1
Pristina aequiseta	–	1
Dero trifida	3	4
Dero pectinata	1	–
Dero lodeni	–	1
Hirudinea		
Gloiobdella elongata	–	1
Gastropoda		
Amnicola dalli johnsoni	3	–
Ancylidae	–	1
Hebetancylus excentricus	–	1
Pelecypoda		
Corbicula fluminea	5	–
Pisidiidae	2	5
Amphipoda		
Hyalella azteca	53	13
Decapoda		
Palaemonetes paludosus	7	1
Ephemeroptera		
Baetis propinquus	–	2
Callibaetis floridanus	8	–
Caenis sp.	13	59
Odonata		
Gomphidae	1	–
Brachymesia sp.	1	–
Macromia taeniolata	–	1
Ischnura sp.	–	2
Enallagma sp.	1	–
Hemiptera		
Corixidae	2	1
Belostoma sp.	1	–
Coleoptera		
Stenelmis sp.	–	3
Dubiraphia sp.	–	1
Microcylloepus pusillus	–	1
Trichoptera		
Trichoptera	–	3
Cheumatopsyche sp.	–	25
Oxyethira sp.	4	2
Diptera		
Simulium sp.	–	6

Clinotanypus sp.	–	1
Labrundinia pilosella	3	–
Monopelopia boliekae	1	–
Pentaneura inconspicua	–	2
Cryptochironomus sp.	1	–
Polypedilum sp.	–	1
Polypedilum illinoense grp.	–	2
Polypedilum halterale grp.	–	1
Polypedilum convictum grp.	–	2
Rheotanytarsus exiguus grp.	–	2
Tanytarsus sp. C Epler	–	1
Odontomyia sp.	–	1

Phytoplankton taxa list, and densities (#/mL) for Winter Haven #3 WWTP, collected via subserface grab in the Peace Creek Canal, on September 16, 1996.

	Reference Site	Test Site
Cyanophyceae		
Dactylococcopsis sp.	31	32
Lyngbya contorta	–	16
Oscillatoria sp.	–	16
Chrysophyceae		
Synura sp.	46	32
Bacillariophyceae		
Melosira sp.	–	32
Rhizosolenia sp.	15	–
Achnanthes sp.	15	16
Navicula sp.	31	32
Gomphonema sp.	15	–
Nitzschia sp.	31	63
Chlorophyceae		
Chlamydomonas sp.	–	16
Chlorogonium sp.	15	–
Tetraedron sp.	–	16
Pediastrum sp.	–	16
Scenedesmus sp.	92	158
Tetrastrum sp.	15	–
Spermatozoopsis sp.	62	63
Euglenophyceae		
Euglena sp.	15	16
Phacus sp.	–	47
Cryptophyceae		
Cryptomonas sp.	–	79

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



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

