

Biological Assessment of

Callahan Wastewater Treatment Plant

Nassau County

NPDES #FL0038407

Sampled July 1996

November 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: Callahan Wastewater Treatment Plant
County: Nassau
NPDES Number: FL0038407
State Permit Expiration Date: 31 December 1996

Toxics Sampling Inspection (XSI)

Date Sampled: 15 July 1996

Results: No organic pollutants were detected in the effluent. Metals found in the effluent complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 15 July 1996

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 15 July 1996

Results: Measures of macroinvertebrate health indicated there were no adverse effects attributable to the discharge. In the Hester-Dendy samples, improvements in taxa richness, the Shannon-Weaver diversity index, and the Florida Index were observed between the upstream and downstream stations. The Stream Condition Index (SCI) indicated that the reference and test sites, each with 29 points, were in the "excellent" category. The present study, compared with the 1990 sampling, demonstrates remarkable improvements in Alligator Creek's macroinvertebrate community, probably associated with the major enhancements in the Callahan WWTP. Most periphyton community parameters did not show any detrimental effects due to the Callahan effluent. However, the greater abundance of eutrophication-tolerant diatoms at the test site, such as *Cocconeis placentula, Nitzschia palea*, and *Gomphonema parvulum*, suggested moderate changes in community structure associated with the discharge.

Water Quality Inspection (WQI)

Date Sampled: 15 July 1996

Results: A turbidity violation (42.4 above background) at the test site (Rule 62-302.530(70) FAC) appeared to be caused by a source other than the Callahan discharge. Effluent concentrations of ammonia (0.83 mg/L), nitrate-nitrite (2.9 mg/L), and total phosphorus (0.87 mg/L) contributed to the enrichment of these compounds at the test site. The test site levels of ammonia, nitrate-nitrite, and total phosphorus were higher than those found in approximately 70%, 80%, and 79%, respectively, of other Florida streams. While the Algal Growth Potential increased from 13.1 mg dry wt/L at the reference site to 29.4 mg dry wt/L at the test site, both sites exceeded the 5.0 mg dry wt/L "problem threshold". The effluent AGP was 204.8 mg dry wt/L.

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 Callahan Wastewater Treatment Plant is located in Nassau County, Florida (see map in Appendix). Treatment at this 0.30 MGD design capacity facility includes rotating biological contactors, secondary clarification, chlorination for disinfection, and dechlorination. An average of 0.22 MGD of effluent is discharged into the Class III Alligator Creek, a tributary of the Nassau River.

State permit limits are as follows: carbonaceous biological oxygen demand (15.0 mg/L as an annual average), total suspended solids (20.0 mg/L as an annual average), ammonia (5.0 mg/L as an annual average), dissolved oxygen (6.0 mg/L minimum), pH (6 to 8.5 SU), total residual chlorine (0.5 mg/L minimum for disinfection, 0.01 mg/L maximum after dechlorination), and fecal coliform bacteria (200 organisms/100 mL). Additionally, the facility is required to monitor effluent nutrient parameters, as well as to perform water quality monitoring of the receiving waters.

A previous bioassessment attributed several violations (*e.g.*, the biological integrity criterion, the rule prohibiting imbalances of flora and fauna, and the rule prohibiting the dominance of nuisance species) to this facility's poor quality effluent (FDER 1991). The plant was issued a temporary operating permit to replace existing contactor units, install flow paced chlorinator/dechlorinator systems, and to renovate the clarifier and influent structures. The work has been completed, and the facility has returned to compliance with permit limits for fecal coliforms and ammonia.

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	40	33
Florida Index	12	15
SCI	29	29
EPT Index	6	2
% Contribution of Dominant Taxon	13.9	13.1
% Oligochaeta	8.4	8.0
% Diptera	34.9	35.8
% Ephemeroptera	20.5	7.3
% Amphipoda	4.8	0.7
% Isopoda	4.8	0.7
% Gastropoda	2.4	19.7
% Pelecypoda	4.2	13.1
% Coleoptera	13.9	4.4
% Other	6.1	3.1
% Predators	6.0	20.1
% Above Surface Deposit Feeders	29.2	23.0
% Below Surface Deposit Feeders	8.4	8.0
% Suspension Feeders	25.0	15.3
% Scrapers	19.6	25.6
% Shredders	6.0	7.3
Macroinvertebrate Hester-Dendy		
Number of Taxa	27	67
Florida Index	14	25
Shannon-Weaver Diversity	3.3	4.5
EPT Index	4	4
% Diptera	22.2	42.4
% Ephemeroptera	52.8	16.3
% Coleoptera	9.7	24.6
% Gastropoda	13.4	8.1
% Other	1.4	8.6
% Predators	5.8	11.8
% Above Surface Deposit Feeders	38.0	34.8
% Below Surface Deposit Feeders	0.5	7.1
% Suspension Feeders	8.1	10.4
% Scrapers	43.4	27.2
% Shredders	1.4	7.2
Periphyton Algae		
Number of Taxa	12	27
Shannon-Weaver Diversity	3.3	3.9
Algal Density (#/sq. mm)	1,800	20,332
Chlorophyll a (mg/sq. m)	3.3 U	3.3 U
Diatom/Diatom + B-G Abundance Ratio	0.6	0.9
% Blue-green	44.4	5.4
% Diatoms	55.6	93.6
Algal Growth Potential (mg dry wt/l)	13.1	29.4

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 300 m upstream of the bridge at US 1) and a test site (100 m downstream of the discharge) (see map in Appendix). A habitat assessment was performed *in situ* to establish comparability between sites. Supplemental physical/chemical data were also collected on the effluent and study sites. Acute screening toxicity bioassays, using *Ceriodaphnia dubia* and *Cyprinella leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on effluent, reference, and test sites. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

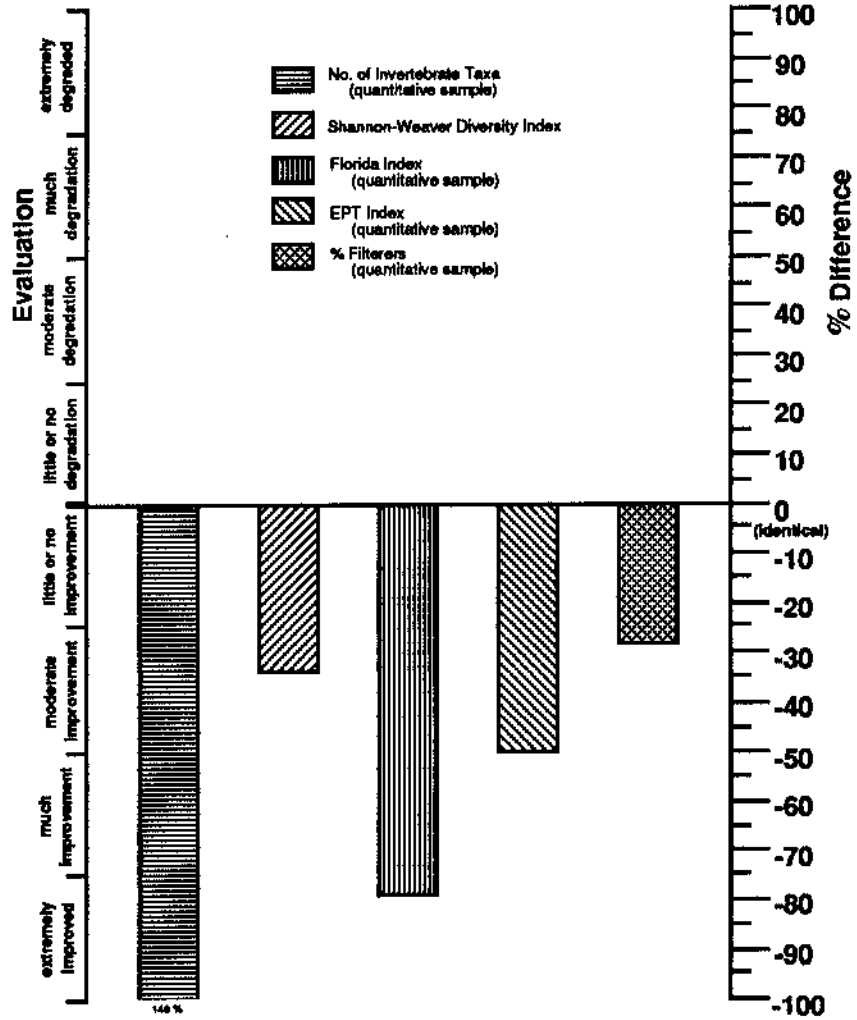
Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Periphyton was sampled at both reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton 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. 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 cor-



Effect of discharge on the benthic macroinvertebrate community.

related with increased algal taxa richness.

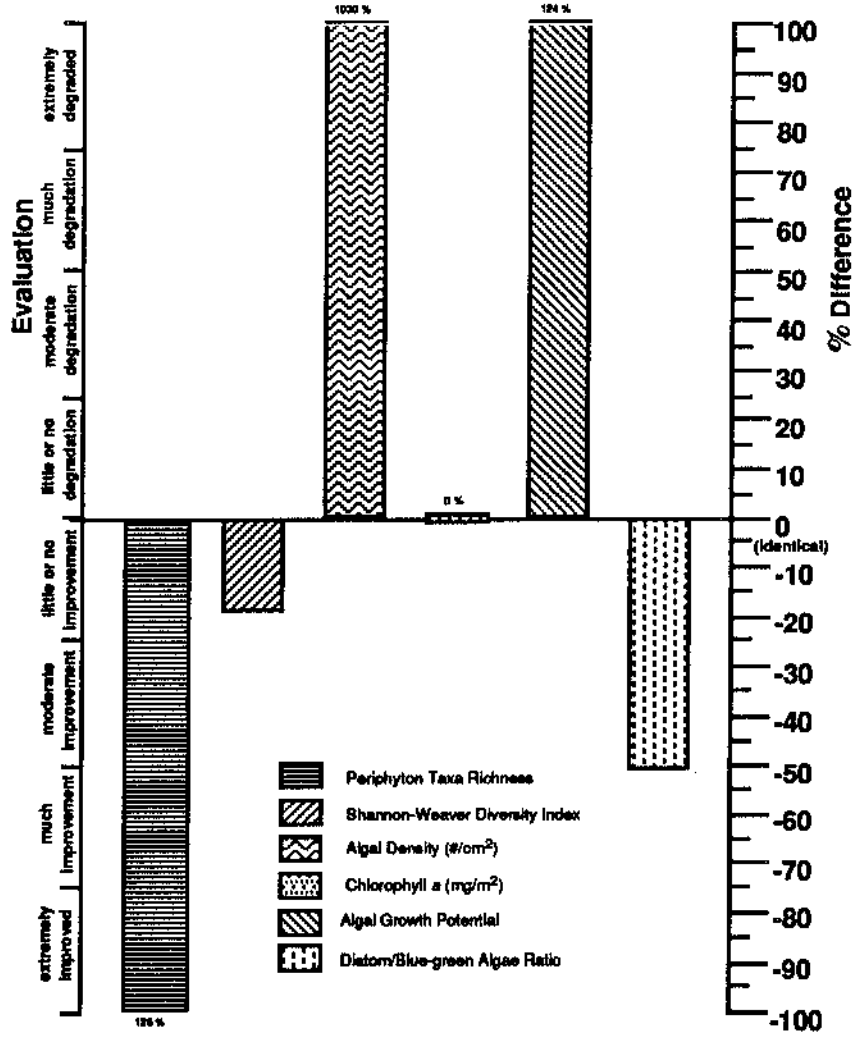
Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single 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.

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.



Effect of discharge on the algal community.

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 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: Tim

McKelvey and Mike O'Connor (DEP Northeast) and Lyn Burton, Jennifer Eichelberger, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Kathleen Lurding, Elizabeth Miller, Urania Quintana, Bart Richard, 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 127 points) was classified as "optimal", decreasing into the "suboptimal" category at the test site (with 83 points). The test site especially lost points in categories of substrate availability, water velocity, and artificial channelization (Appendix).

There were some differences in the physical/chemical measures between the two sites. While dissolved oxygen at the reference site (4.2 mg/L) was lower than the Class III water quality standard, the test site dissolved oxygen (5.7 mg/L) complied with Class III standards. The effluent, with a dissolved oxygen concentration of 6.5 mg/L, complied with the minimum permit limit of 6.0 mg/L. The conductivity increased from 101 µmhos/cm at the reference site to 208 µmhos/cm at the test site. Turbidity also increased between the reference site (5.7 NTU) and the test site (48.1 NTU), a violation of Rule 62-302.530(70) FAC. Since the effluent turbidity was 7.4 NTU, this indicates another source, probably nonpoint (such as silviculture, construction, or clearing), was responsible for the turbidity violation. The pH (ranging from 5.9 SU to 6.3 SU) and temperature (between 25.4 °C and 25.7°C) were similar at the two sites.

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 bioassays (Appendix).

No organic pollutants were detected in the effluent. Metals detected in the effluent included chromium (7 µg/L), zinc (8 µg/L) and iron (167 µg/L). At an effluent hardness of 213.6 mg $CaCO_3$ / L, all these metals met Class III water quality standards.

Effluent concentrations of ammonia (0.82 mg/L), nitrate-nitrite (2.9 mg/L), and total phosphorus (0.87 mg/L) contributed to the enrichment of these compounds at the test site. Ammonia increased from 0.08 mg/L at the reference site to 0.13 mg/L at the test site. Likewise, nitrate-nitrite increased from 0.08 mg/L to 0.32 mg/L, while total phosphorus rose from 0.28 mg/L to 0.38 mg/L. The test site levels of ammonia, nitrate-nitrite, and total phosphorus were higher than those found in approximately 70%, 80%, and 79 %, respectively, of other Florida streams (see Table of Typical Water Quality Values in Appendix).

Algal Growth Potential (AGP) results demonstrated that nutrient enrichment from the facility (effluent AGP = 204.8 mg dry wt/ L) exacerbated the already moderately elevated levels in Alligator Creek. AGP increased from 13.1 mg dry wt/L at the reference site to 29.4 mg dry wt/L at the test site. Water at both sites exceeded the 5.0 mg dry wt/L "problem threshold" for AGP (Raschke and Schultz 1987).

Most measures of macroinvertebrate health indicated that both sites in Alligator Creek were healthy, with no adverse effects attributable to the discharge. In fact, some invertebrate parameters were better at the test site, compared with 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 that the test site is better than the reference.

In the Hester-Dendy samples, improvements in taxa richness (27 taxa at the reference site, 67 at the test site), Shannon-Weaver diversity index (3.3 at the reference site, 4.5 at the test site), and the Florida Index (14 at the reference site, 25 at the test site) were observed between the upstream and downstream stations. The EPT Index was the same (4) at both stations.

The dipnet results, which showed the biota of both sites to be healthy, were consistent with the Hester-Dendy data. The Stream Condition Index (SCI) indicated that the reference and test sites, each with 29 points, were in the "excellent" category.

The present study, compared with the 1990 sampling, demon-

strates remarkable improvements in Alligator Creek's macroinvertebrate community, probably associated with the major enhancements in the Callahan WWTP. For example, in September, 1990 (using Hester-Dendys), only 7 taxa were found at the Alligator Creek test site, which had a very poor Shannon-Weaver diversity index (only 0.9). In July, 1996, the Hester-Dendy taxa richness at the test site was extremely good (with 67 taxa) and Shannon-Weaver diversity, at 4.5, was excellent.

The figure on p. 3 represents changes in the periphyton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. Most periphyton community parameters did not show any detrimental effects due to the discharge. For example, periphyton taxa richness increased from 12 taxa at the reference site to 27 taxa at the test site, while Shannon-Weaver diversity improved from 3.3 at the reference site to 3.9 at the test site. The diatom /Blue-Green algae ratio was also better at the test site (reference site = 0.6, test site = 0.9). Chlorophyll *a* was less than 3.3 mg/m² (the detection limit) at both sites. Algal density, however, was much higher at the test site (20,332 cells/ cm²) than at the reference site (1,800 cells/ cm²). This coincided with the greater abundance of eutrophication-tolerant diatoms (Whitmore 1989) there, such as *Cocconeis placentula, Nitzschia palea,* and *Gomphonema parvulum*, suggesting moderate changes in community structure associated with the discharge.

Conclusions

A turbidity violation at the test site (Rule 62-302.530(70) FAC) appeared to be caused by a source other than the Callahan discharge.

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

No organic pollutants were detected in the effluent. Metals found in the effluent complied with Class III water quality standards.

Effluent concentrations of ammonia (0.82 mg/L), nitrate-nitrite (2.9 mg/L), and total phosphorus (0.87 mg/L) contributed to the enrichment of these compounds at the test site. The test site levels of ammonia, nitrate-nitrite, and total phosphorus were higher than those found in approximately 70%, 80%, and 79%, respectively, of other Florida streams.

While the Algal Growth Potential increased from 13.1 mg dry wt/ L at the reference site to 29.4 mg dry wt/L at the test site, both sites exceeded the 5.0 mg dry wt/L "problem threshold". The effluent AGP was 204.8 mg dry wt/L.

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Most periphyton community parameters did not show any detrimental effects due to the Callahan effluent. However, the greater abundance of eutrophication-tolerant diatoms at the test site, such as *Cocconeis placentula, Nitzschia palea,* and *Gomphonema parvulum,* suggested moderate changes in community structure associated with the discharge.

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Chemistry summary table for Callahan WWTP.

	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None Detected	None Detected		
Metals (ug/L)			
Aluminum	100 U		
Arsenic	20 U		
Cadmium	0.05 U		
Copper	5 U		
Chromium	7 I		
Iron	167 A		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.04 U		
Zinc	8 I		
Nutrients (mg/L)			
Ortho-phosphate	0.75 A	0.24	0.29
Total phosphorus	0.87	0.28	0.38
Unionized Ammonia	0.002		
Ammonia	0.83 A	0.08	0.13
Nitrate+Nitrite	2.9 A	0.08	0.32 A
TKN	2.3	1.5	1.4
General Phys-Chem Parameters			
Habitat Assessment		127	83
D.O. (mg/L)	6.5	4.2	5.7
pH (SU)	6.5	5.9	6.3
Conductivity (µmhos/cm)	547	101	208
Temperature (°C)	27.3	25.7	25.4
Total Suspended Solids (mg/L)	5	3	4
Carbonaceous Biological Oxygen Demand, 5 day (mg/L)	5	<2	<2
Turbidity (NTU's)	7.4	5.7	48.1
Hardness (mg CaCO3)	213.6		
Algal Growth Potential (mg dry wt/L)	204.8	13.1	29.4
Toxicity			
Bioassay Fish-Dechlorinated	Not Toxic		
Bioassay Invertebrate-Dechlorinated	Not Toxic		

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

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

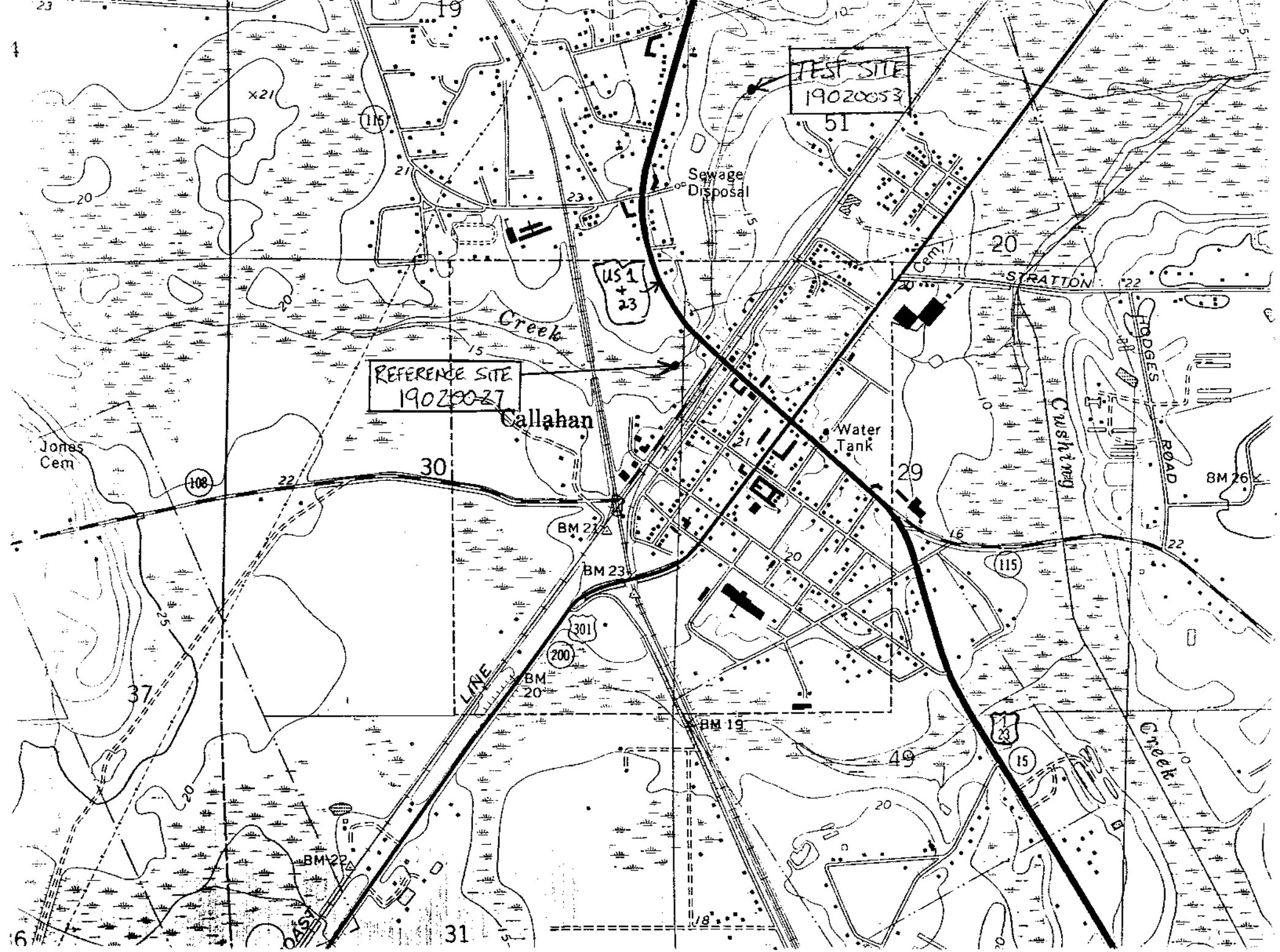
U - Material analyzed for but not detected; value reported is the minimum detection limit

Typical Values for Selected Parameters in Florida Waters

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

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

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


TEST SITE
19020053
REFERENCE SITE
19020027
Callahan
Sewage
Disposal
Water
Tank
Jones
Cem
Cem
STRATTON
HODGES
ROAD
Cushing
Creek
Creek
LINE
US 1
+
23
BM 21
BM 23
BM
20
BM 19
BM 22
BM 26
108
115
301
200
115
15
23
51
20
30
29
49
37
31

Callahan WWTP
FL15

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: CALLAHAN WWTP		**Date Summary Prepared :** 7-3-96
Location (attach detailed map): East Brandies Ave Callahan, FL 32011	**County** NASSAU	**District** NORTHEAST
Federal Permit # FL0038407 **and expiration date:** 12-31-96	**State GMS # and** 3145M01840 **State expiration date:** N/A	**Facility Type:** Industrial (Municipal) Federal Agricultural Other (list):

Function of facility:
Domestic Wastewater Treatment Plant

Description of treatment process:
A 0.30 MGD AADF rotating biological contactor type wastewater treatment plant with secondary clarification, chlorination disinfection, dechlorination and discharge to surface waters.

Receiving waters: Alligator Creek to Nassau River	**Classification:** I II (III)	
Design Flow: 0.3	**Mean Flow:** 0.218	**Flow during survey:**

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

therefore, the best time to sample is: N/A

If facility has a mixing zone, give details (size, parameters affected, etc.):
No Mixing Zone

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

Parameter	Limit (units) (Annual Avg.)
CBOD5	15.0 mg/L
TSS	20.0 "
NH3-N	5.0 "
DO	6.0 "
pH	6 to 8.5 Std units
Cl2 residual disinfection	0.5 mg/L
Cl2 res. dechlorination	0.01 "
Fecal Coliform	200 #/100 ml

Describe special permit conditions and permit modifications:
Required to perform stream monitoring and effluent nutrient monitoring.
Former State Permit was a TOP - issued to allow City to perform maintenance and construct improvements to meet water quality standards - work is complete, and certified and approved.

Callahan WWTP
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

Approximately 300' of 8" DIP to Alligator Creek - No diffuser.

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

None

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

Previous Bioassessment date is Feb. 1991

WQBEL's were required for $CBOD_5$ and NH_3-N.

The State issued a TOP to allow City to complete maintenance and construction to replace existing contactor units, install flow paced chlorination/dechlorination systems and clarifier and influent structure renovation.

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

Facility has returned to compliance with fecal coliform and NH_3-N effluent limits since completion of construction and maintenance improvements.

Additional information:

Staff contributing to this review (signature):

Tim McKelvey	(Biologist)
	(Inspector)
Dan Fabrikant	(Engineer)
Pat O'Connor	(Biologist)
	( )
	( )

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP NED JAX	STORET STATION NUMBER: 19020027	DATE (M/D/Y): 7-17-96	TIME: 1330	RECEIVING BODY OF WATER: ALLIGATOR CREEK

REMARKS:	COUNTY: NASSAU	LOCATION: 300 YDS UPSTREAM OF BRIDGE / UPSTREAM POD, of CALLAHAN WWTP	FIELD ID/NAME: REFERENCE SITE

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		10	10	50	10		

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: 15M

List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: 1 (m above present water level) + .5 (present depth in m) = 1.5 (m above bed)

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

3 m wide		
/ m/s	/ m/s	/ m/s
.1 m deep	.5 m deep	.1 m deep

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)	50	10	dipnet	Sand	20	2	dipnet
Leaf Packs or Mats	5	6	dipnet	Mud/Muck/Silt	—		
Aquatic Vegetation	—			Other:	—		
Rock or Shell Rubble	—			Other:	—		
Undercut banks/Roots	25	6	dipnet	*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):	TURB. NTU		Secchi (m):
Top								.5
Mid-depth	.5	25.71	5.9	4.2	101	5.7		
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: Hot, Humid, rain in p.m., approximately 300 yds upstream of bridge at US1/23.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
McKelvey / O'Connor	Tim McKelvey	

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 19020027	DATE (M/D/Y): 7-15-96	RECEIVING BODY OF WATER: ALLIGATOR CREEK

REMARKS: 300 yds upstream of bridge @ US1/23.	LOCATION: UPSTREAM P.O.D. of CALLAHAN WWTP	FIELD ID/NAME: REFERENCE SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 20	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 19	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 ~~20~~	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 15 ~~20~~	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 13 ~~15~~	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 15	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 20	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

127 TOTAL SCORE

ANALYSIS DATE: 7-15-96	ANALYST: McKelvey / O'Connor	SIGNATURE: Tim McKelvey

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED	STORET STATION NUMBER: 19020053	DATE (M/D/Y): 7-15-96	TIME: 1215	RECEIVING BODY OF WATER: Alligator Creek

REMARKS:	COUNTY: NASSAU	LOCATION: 100 YARDS DOWNSTREAM P.O.D. of Callahan WWTP	FIELD ID/NAME: TEST SITE

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)
30		50		10	10		

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

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

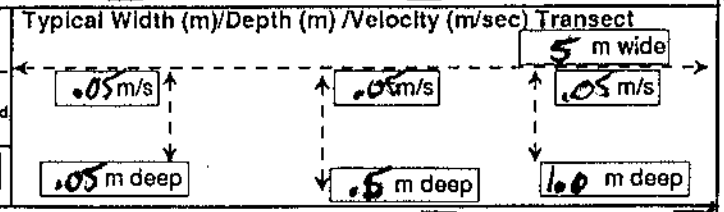
Width of riparian vegetation (m) on least buffered side: >18 — *List & map dominant vegetation on back*

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

Artificially Impounded ☐ yes

High Water Mark: 1+ (m above present water level) + .5 (present depth in m) = 1.5+ (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: ☑

Cattle, WWTP, runoff from stormwater.

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)	10	6	dipnet	Sand	40	1	dipnet
Leaf Packs or Mats	5	6	dipnet	Mud/Muck/Silt	40	1	dipnet
Aquatic Vegetation	0			Other:			
Rock or Shell Rubble	0			Other:			
Undercut banks/Roots	5	6	dipnet	*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):	TURBIDITY NTU		Secchi (m):
Top								
Mid-depth	.3	25.41	6.3	5.72	208	48.1		.5
Bottom								

System Type : Stream: ☑ (1st order ☑ 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: Hot Humid

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

SAMPLING TEAM:	SIGNATURE:	DATE:
McKelvey / O'Connor	Toni McKelvey	

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

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED JAX	STORET STATION NUMBER: 19020053	DATE (M/D/Y): 6-15-96	RECEIVING BODY OF WATER: ALLIGATOR CREEK

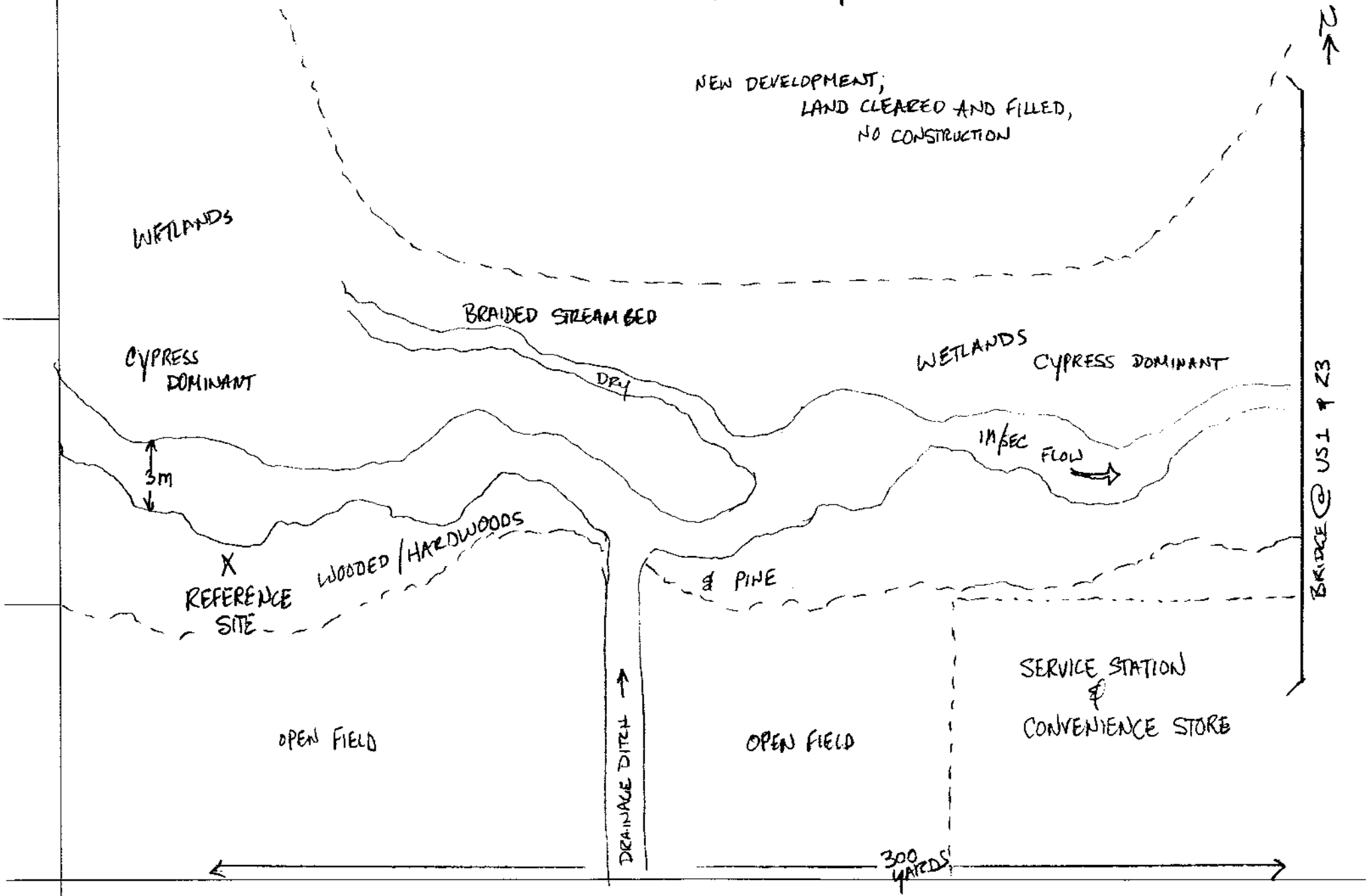
REMARKS:	LOCATION: 100yds. DOWNSTREAM CALLAHAN P.O.D.	FIELD ID/NAME: TEST SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 8	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 10	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 10	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 10	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 10	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 20	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 15	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
0	Add **5 points** if cross-sectional area of flow is estimated to be > one square meter during periods of normal flow.			
83	**TOTAL SCORE**			

Comments

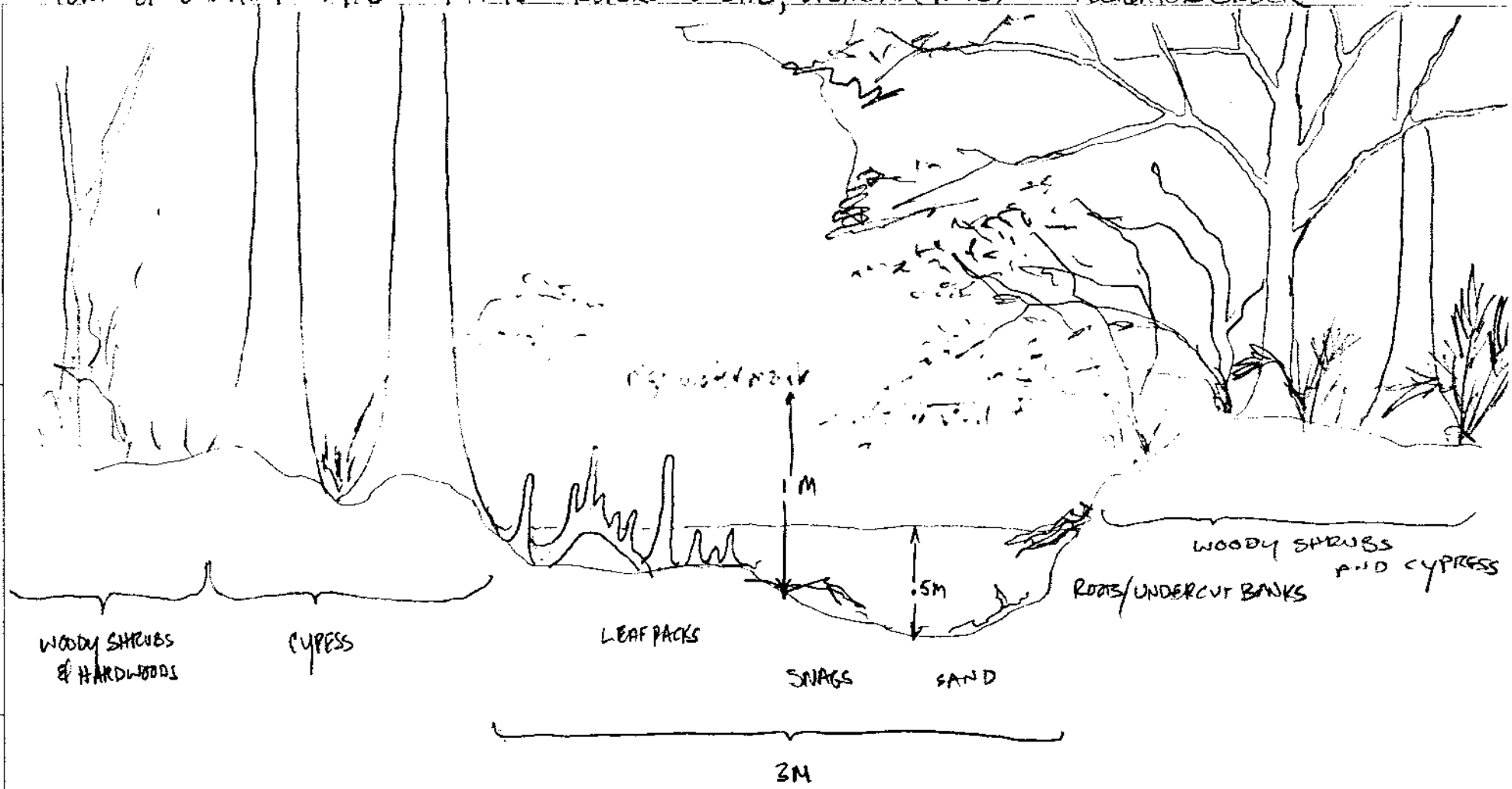
ANALYSIS DATE:	ANALYST:	SIGNATURE:
6-15-96	McKelvey/O'Connor	Tina McKelvey

TOWN OF CALLAHAN FYI'S 7-9-96 REFERENCE SITE, UPSTREAM of P.O.D. ALLIGATOR CREEK

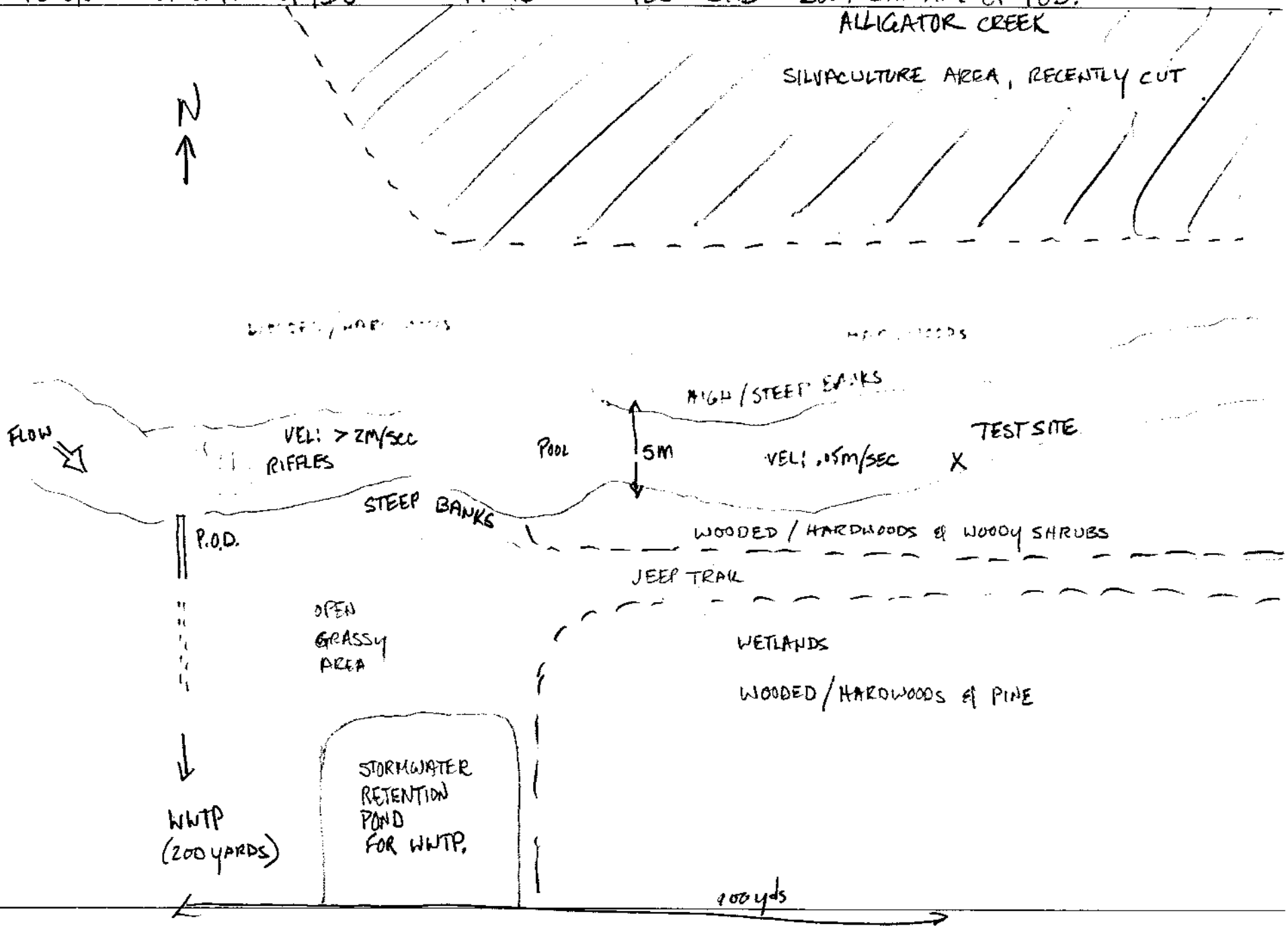


National Brand

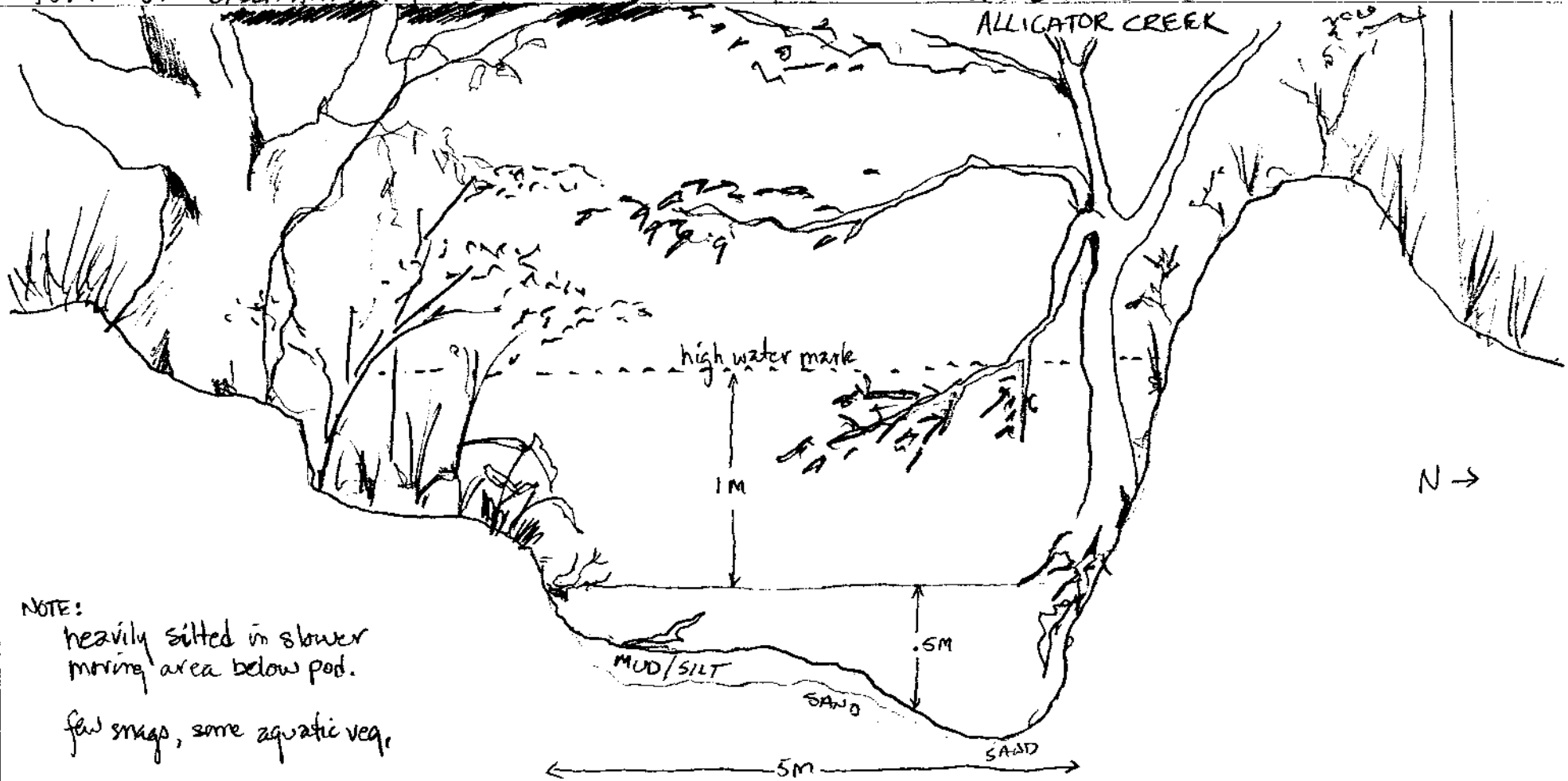
TOWN OF CALLAHAN FHS 7-1996 REFERENCE SITE, UPSTREAM P.O.D. ALLIGATOR CREEK



TOWN OF CALLAHAN FYIS 7-19-96 TEST SITE - DOWNSTREAM OF POD.



TOWN OF CALLAHAN FYI-5 7-19-96 TEST SITE - DOWNSTREAM OF P.O.D.



NOTE:
heavily silted in slower moving area below pod.

few snags, some aquatic veg.

TYPICAL CROSS SECTION OF ALLIGATOR CREEK AT TEST SITE

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Callahan WWTP
County: Nassau
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00 38 40
LIMS Sample #: 145432 **LIMS Job #:** 96-JUL-16-13
sample log 7/22 ar
Test Type: (Screening) Definitive
(Static) Static Renewal Flow-through
Test Number: 1 of 2
Remarks:

Sample Collection: Date 7-15-96 Time 1105
Test Beginning: Date 7-16-96 Time 1315
Test Ending: Date 7-18 96 Time 1400
Organism Batch #: 30 **Diluent Batch #:** 31
Organism Age: <24 hours
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	25.3 @ 25.3	8.3 @ 24.2 °C	1049 @ 1054 998 @ 1006 @ 25.2 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	22.8 @ 22.8	8.6 @ 22.4 °C	1053 @ 1054 1026 ~~971~~ @ 1006 @ 21.8 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	22.1 @ 22.0	8.7 @ 21.4 °C	1021 @ 1054 936 @ 1006 @ 21.8 °C

#3 10:0 ## ml

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	A	5	5	5	8.3		8.2	24.1		21.4	8.0		~~7.5~~ 7.9	175		185
Control B	B	5	5	5			8.2			21.4			~~7.6~~ 7.9			190
Control C	C	5	5	5			8.2			21.4			7.9			190
Control D	D	5	5	5			8.3			21.5			7.8			195
100% A	A	5	5	5	7.7		8.5	24.1		21.6	7.6		8.1	515		~~490~~
100% B	B	5	5	5			8.4			21.6			8.0			535
100% C	C	5	5	5			8.5			21.6			8.0			530
100% D	D	5	5	5			8.5			21.7			7.9			555
Measured/Loaded by:		TM	TM	TM	MF		TM	MF		TM	MF		TM	MF		TM
Recorded by:		TM	TM	TM	DW		LM	DW		LM	DW		LM	DW		LM

#2 7.9 7.9 addition wrong 7-18-96

*1 air bubble 515 um 7-18-96 LM

Investigators' Signatures
Marshall Faircloth
Tina Mikulasky
reviewer

form updated 4/01/96

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.0	—	Pat O'Connor
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR100	DB/DW/ND
Alkalinity (mg/L as $CaCO_3$):	—	75	115	HACH	DB
Hardness (mg/L as $CaCO_3$):	—	80	200	HACH	DB
Total ammonia (mg/L as N):	<.017	<.017	.648	Orion	LM

Ammonia Meter #98136 Ammonia Meter Slope: -59.5 Ammonia Blank: <.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Callahan
County: Nassau
Contact / District: Tim McKelvey / NE
NPDES Permit #: FL00 3840
LIMS Sample #: 175432 **LIMS Job #:** 96-JUL-16-13
sample log 7/17 aw
Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Test Number: 2 of 2
Remarks:

Sample Collection: Date 7-15-96 Time 1105
Test Beginning: Date 7-16-96 Time 1415
Test Ending: Date 7-18-96 Time 1410
Organism Batch #: 52 **Diluent Batch #:** well
Organism Age: 12 days old
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 7.0 @ 7.0	25.3 @ 25.3	8.3 @ 24.7°C	1101 @ 1054 998 @ 1006 @ 25.2°
24 hr	7.0 @ 7.0 7.0 @ 7.0	22.8 @ 22.8	8.6 @ 22.4°C	1053 @ 1054 1026 @ 1000 @ 21.8°
48 hr	7.0 @ 7.0 7.0 @ 7.0	22.1 @ 22.0	8.7 @ 21.4°C	1021 @ 1054 936 @ 1000 @ 21.8°

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	B13	5	5	5	8.0	8.4	8.4	24.2	22.0	21.1	8.0	8.0	8.2	250	240	235
Control	B14	5	5	5	8.0	8.4	8.4	24.2	21.8	21.0	8.0	8.2	8.1	250	245	240
Control	B15	5	5	5	8.0	8.4	8.4	24.1	21.8	20.9	8.1	8.0	8.1	250	245	240
Control	B16	5	5	5	8.0	8.4	8.4	24.1	21.7	20.8	8.1	8.2	8.2	250	245	240
100 %	B17	5	5	5	7.5	8.1	8.1	24.1	21.9	21.0	7.1	7.5	~~7.9~~	540	525	515
100 %	B18	5	5	5	7.5	8.1	8.1	24.2	21.9	21.1	7.1	7.5	~~7.8~~	540	520	515
100 %	B19	5	5	5	7.5	8.0	8.1	24.1	21.9	21.0	7.1	7.5	7.6	540	520	510
100 %	B20	5	5	5	7.5	8.1	8.1	24.1	21.9	20.9	7.1	7.5	7.6	540	520	510
Measured/Loaded by:		MF	DW	LM	MF	ND	JM	MF	ND	TM	MF	ND	TM	MF	ND	TM
Recorded by:		TM	DW	LM	DW	TM	LM	DW	TM	LM	DW	JM	LM	DW	TM	LM

K 7.6 7.6 water not acclimated yet. 7/18/96 LM

Investigators' Signatures

Marshall Faircloth
Tim Brown
Tim Mendel
Tina Mikulski
Dave Griffitt
Vicky Laughlin
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):			0.0	—	PAT/Conv
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR100	DB/DW/N
Alkalinity (mg/L as $CaCO_3$):	130	—	115	HACH	DB
Hardness (mg/L as $CaCO_3$):	130	—	200	HACH	DB
Total ammonia (mg/L as N):	<.017	—	.648	Orion	LM

Ammonia Meter #98136 Ammonia Meter Slope: -59.5 Ammonia Blank: <.017 Control Salinity: 0 ppt Sample Salinity: 0

CALLAHAN NWTP

REFERENCE SITE

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	40	≥ 31	30-16	<16		≥ 26	25-14	<14		≥ 22	21-12	<12	5
EPT Index	6	≥ 7	6-4	<4		≥ 4	3-2	<2		-	≥2	<2	3
# Chironomid Taxa	14	≥9	8-5	<5		≥7	6-4	<4		≥7	6-4	<4	5
% Contribution of Dominant Taxon	13,9	≤22	23-61	>61		≤29	30-64	>64		≤31	32-66	>66	5
% Diptera	34,9	-	≤50	>50		-	≤37	>37		-	≤47	> 47	3
Florida Index	12	≥ 16	15-8	<8		≥7	6-4	<4		≥ 8	7-4	<5	5
% Suspension feeders/Filterers	25,0	≥ 12	11-6	<6		-	≥7	<7		-	≥7	<7	3
Total Score		Panhandle				Peninsula				Northeast			29
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 SITE

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	33	≥ 31	30-16	<16		≥ 26	25-14	<14		≥ 22	21-12	<12	5
EPT Index	2	≥ 7	6-4	<4		≥ 4	3-2	<2		-	≥2	<2	3
# Chironomid Taxa	9	≥9	8-5	<5		≥7	6-4	<4		≥7	6-4	<4	5
% Contribution of Dominant Taxon	13,1	≤22	23-61	>61		≤29	30-64	>64		≤31	32-66	>66	5
% Diptera	35,8	-	≤50	>50		-	≤37	>37		-	≤47	> 47	3
Florida Index	15	≥ 16	15-8	<8		≥7	6-4	<4		≥ 8	7-4	<5	5
% Suspension feeders/Filterers	15,3	≥ 12	11-6	<6		-	≥7	<7		-	≥7	<7	3
Total Score		Panhandle				Peninsula				Northeast			29
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 Callahan Wastewater Treatment Plant, collected via 20 discrete dip net sweeps in Alligator Creek, on 15 July 1996.

	Reference Site	Test Site
Amphipoda		
Hyalella azteca	7	1
Talitroides sp.	1	–
Coleoptera		
Ancyronyx variegatus	–	1
Dubiraphia vittata	–	1
Microcylloepus pusillus	2	2
Prionocyphon sp.	–	1
Stenelmis hungerfordi	6	–
Stenelmis sp.	11	1
Undetermined Elmidae	4	–
Decapoda		
Cambarus sp.	1	–
Diptera		
Ablabesmyia mallochi	1	–
Ablabesmyia rhamphe grp.	–	5
Atrichopogon sp.	1	–
Conchapelopia sp.	1	–
Cryptochironomus sp.	1	–
Dicrotendipes sp.	1	–
Labrundinia pilosella	–	1
Labrundinia sp.	1	–
Nanocladius sp.	–	6
Palpomyia/Bezzia grp.	–	1
Parachironomus carinatus	–	2
Parachironomus sp.	–	1
Pentaneura inconspicua	–	5
Polypedilum convictum grp.	1	1
Polypedilum illinoense grp.	8	17
Polypedilum scalaenum grp.	1	–
Rheotanytarsus distinctissimus grp.	1	–
Simulium sp.	23	1
Stenochironomus sp.	3	1
Tanytarsus sp.	4	1
Tanytarsus sp. A Epler	–	3
Tanytarsus sp. F Epler	1	–
Tanytarsus sp. M Epler	7	–
Tribelos jucundus	1	–
Tribelos sp.	1	–
Xenochironomus xenolabis	1	–
Undetermined Chironomidae	–	3
Undetermined Tabanidae	–	1
Ephemeroptera		

Baetis intercalaris	1	–
Baetis propinquus	13	–
Baetis sp.	–	4
Caenis sp.	15	6
Heptagenia flavescens	1	–
Stenacron interpunctatum	1	–
Undetermined Baetidae	3	–
Gastropoda		
Amnicola sp.	–	10
Micromenetus dilatatus	4	–
Micromenetus sp.	–	13
Physella sp.	–	4
Undetermined Pisidiidae	7	18
Isopoda		
Caecidotea sp.	8	1
Odonata		
Argia sp.	–	5
Calopteryx sp.	1	1
Enallagma signatum	–	1
Enallagma sp.	–	5
Hetaerina sp.	2	–
Ischnura sp.	1	–
Undetermined Coenagrionidae	–	1
Undetermined Corduliidae	–	1
Oligochaeta		
Allonais paraguayensis	–	1
Dero pectinata	1	–
Dero trifida	2	3
Limnodrilus hoffmeisteri	3	6
Nais communis	5	–
Nais simplex	1	–
Nais sp.	1	–
Slavina appendiculata	1	–
Stylaria lacustris	–	1
Trichoptera		
Cheumatopsyche sp.	4	–
Turbellaria		
Dugesia tigrina	1	–

Benthic macroinvertebrate taxa list for Callahan Wastewater Treatment Plant, collected via Hester–Dendy artificial substrates in Alligator Creek, on 15 July 1996. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site
Amphipoda		
Crangonyx sp.	–	3
Coleoptera		
Ancyronyx variegatus	48	407
Dineutus sp.	3	40
Dubiraphia vittata	–	37
Microcylloepus pusillus	3	8
Stenelmis sp.	3	11
Undetermined Elmidae	–	11
Decapoda		
Procambarus sp.	–	3
Diptera		
Ablabesmyia mallochi	–	11
Ablabesmyia rhamphe grp.	–	3
Cladotanytarsus sp.	–	3
Conchapelopia sp.	–	3
Cricotopus bicinctus grp.	–	3
Cricotopus or *Orthocladius* sp.	–	3
Dicrotendipes modestus	8	5
Dicrotendipes simpsoni	21	8
Dicrotendipes sp.	–	5
Hemerodromia sp.	–	11
Labrundinia pilosella	8	3
Labrundinia sp.	3	–
Larsia decolorata	–	3
Nanocladius sp.	–	45
Nilotanypus fimbriatus	–	3
Parachironomus carinatus	–	3
Parachironomus directus	–	3
Parachironomus sp.	–	11
Paratanytarsus sp.	–	11
Paratanytarsus sp. C Epler	–	32
Pentaneura inconspicua	3	119
Polypedilum convictum grp.	–	3
Polypedilum fallax	3	3
Polypedilum halterale grp.	3	–
Polypedilum illinoense grp.	8	180
Polypedilum scalaenum grp.	3	53
Psychoda sp.	–	3
Rheocricotopus robacki	–	16
Rheotanytarsus distinctissimus grp.	–	5
Rheotanytarsus exiguus grp.	–	8

Rheotanytarsus sp.	–	3
Simulium sp.	13	63
Stenochironomus sp.	–	40
Tanytarsus sp.	8	40
Tanytarsus sp. A Epler	–	13
Tanytarsus sp. C Epler	–	3
Tanytarsus sp. D Epler	–	48
Tanytarsus sp. F Epler	5	5
Tanytarsus sp. L Epler	–	16
Tanytarsus sp. M Epler	16	11
Tanytarsus sp. S Epler	–	3
Tanytarsus sp. T Epler	3	16
Thienemannimyia grp.	5	3
Tribelos fuscicornis	–	3
Tribelos jucundus	5	5
Tribelos sp.	–	3
Undetermined Chironomidae	13	61
Ephemeroptera		
Argia sp.	–	5
Baetis alachua	11	–
Baetis propinquus	106	16
Baetis sp.	13	–
Caenis sp.	–	48
Stenacron interpunctatum	61	85
Stenacron sp.	103	108
Undetermined Baetidae	8	–
Undetermined Ephemeroptera	–	8
Undetermined Heptageniidae	–	77
Gastropoda		
Amnicola dalli johnsoni	–	8
Ferrissia hendersoni	24	40
Hebetancylus excentricus	–	5
Micromenetus dilatatus	3	40
Micromenetus sp.	3	–
Physella sp.	–	3
Undetermined Ancylidae	48	63
Undetermined Gastropoda	–	8
Undetermined Planorbidae	–	3
Isopoda		
Caecidotea sp.	3	–
Nemertea		
Prostoma rubrum	–	3
Oligochaeta		
Dero trifida	–	79
Haber speciosus	–	3
Limnodrilus hoffmeisteri	–	16
Nais communis	3	24
Pristinella longisoma	–	3
Slavina appendiculata	–	3

Stylaria lacustris	–	8
Undetermined Enchytraeidae	–	16
Trichoptera		
Cheumatopsyche sp.	–	8
Macrostemum carolina	3	–
Trombidiformes		
Atractides sp.	–	3
Hygrobates sp.	–	3
Undetermined Oribatei	3	–
Turbellaria		
Dugesia tigrina	0	3

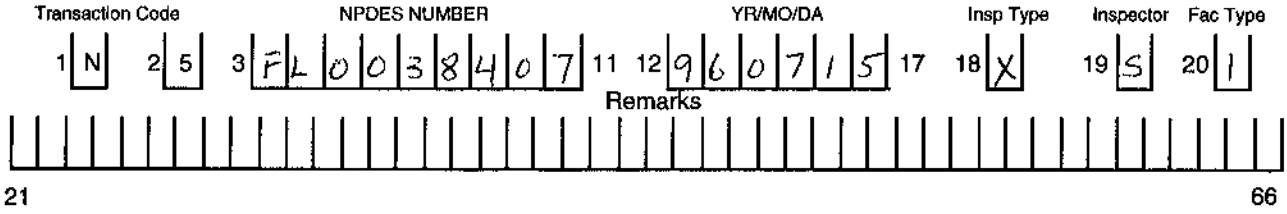
Periphyton taxa list and densities (#/cm^2) for Callahan Wastewater Treatment Facility, collected via glass microscope slides in Alligator Creek, on 15 July 1996.

	Reference Site	Test Site
Bacillariophyceae		
Achnanthes affinis	–	437
Achnanthes exigua	100	437
Achnanthes flexella	100	–
Achnanthes hungarica	100	–
Achnanthes lanceolata	–	875
Amphora ovalis	–	656
Cocconeis placentula	–	6559
Cyclotella meneghiniana	–	875
Diploneis sp.	100	219
Eunotia pectinalis	100	437
Eunotia sp.	–	875
Gomphonema parvulum	–	875
Gyrosigma sp.	–	219
Navicula capitata	100	–
Navicula cryptocephala	–	219
Navicula exigua	–	875
Navicula placenta	–	219
Navicula pupula	100	437
Navicula radiosa	–	1530
Navicula viridula	–	437
Nitzschia commutata	–	219
Nitzschia fonticola	100	–
Nitzschia microcephala	–	219
Nitzschia obtusa	–	219
Nitzschia palea	100	1093
Pinnularia biceps	–	219
Pinnularia sp.	–	219
Stauroneis smithi	–	219
Surirella linearis	100	–
Surirella ovata	–	219
Surirella robusta	–	219
Chrysophyceae		
Mallomonas sp.	–	219
Cyanophyceae		
Chroococcus sp.	–	437
Oscillatoria sp.	400	656
Phormidium sp.	400	–

Phytoplankton taxa list and densities (#/mL) for Callahan Wastewater Treatment Facility, collected via subsurface grabs in Alligator Creek, on 15 July 1996.

	Reference Site	Test Site
Bacillariophyceae		
Cyclotella sp.	–	21
Navicula sp.	20	11
Chlorophyceae		
Closterium sp.	10	–
Scenedesmus sp.	10	21
Cryptophyceae		
Cryptomonas sp.	–	11
Cyanophyceae		
Anabaena sp.	–	11
Aphanothece sp.	–	11
Lyngbya sp.	10	–
Oscillatoria sp.	40	116

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)

