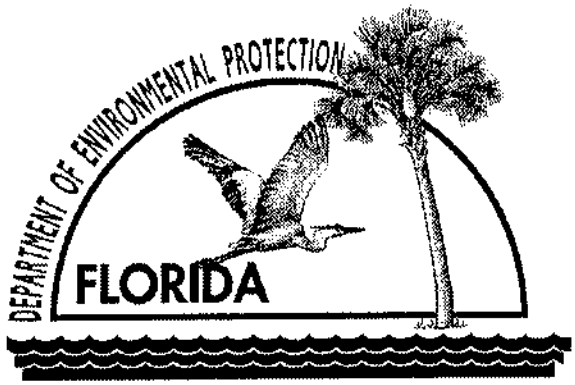


Biological Assessment of

Yulee Middle School Wastewater Treatment Plant

Nassau County

NPDES #FL0029041

Sampled October 1996

June 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: Yulee Middle School WWTP
County: Nassau
NPDES Number: FL0029041
State Permit Expiration Date: 07-31-97

Toxics Sampling Inspection (XSI)

Date Sampled: 28 October 96

Results: Copper detected in the effluent (28 µg/L) was in violation of the Class III water quality standard (Rule 62-302.530(24) FAC). No organic pollutants were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 28 October 96

Results: The effluent was acutely toxic to the water flea, *Ceriodaphnia dubia*, and to the fish, *Cyprinella leedsi,* in both the chlorinated and in the dechlorinated samples (violating Rules 62-302.500(1)(d), 62-302.530(62), and 62-4.244(3)(a) FAC).

Impact Bioassessment Inspection (IBI)

Date Sampled: 28 October 96

Results: Measures of macroinvertebrate community health indicated the test site was degraded. For example, Hester-Dendy taxa richness, the Florida Index, the % filter-feeders, and the EPT Index decreased dramatically between the reference and test sites. The Shannon-Weaver diversity decreased by 44.4% at the test site, compared with the reference site, a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). It is likely that during previous, low flow conditions, the in-stream concentration of the poor quality (toxic) discharge was high enough to have been responsible for the adverse effects seen in the stream. Periphyton results indicated that the discharge was not having a significant impact on the immediate receiving water algal community. Substantial dilution caused by recent flooding apparently nullified the negative effects of nutrient enrichment from the facility.

Water Quality Inspection (WQI)

Date Sampled: 28 October 96

Results: Extremely elevated levels of nutrients were found in the effluent, but no enrichment attributable to the discharge was observed at the test site, probably due to the recent high water. The effluent total phosphorus (10 mg/L), ammonia (19 mg/L), and TKN (44 mg/L) were extremely elevated, but test site values were normal. Note that the effluent unionized ammonia (0.03 mg/L) violated the Class III water quality standard of 0.02 mg/L (Rule 62-302.530(3) FAC), and was high enough to be responsible, at least in part, for the toxicity observed in the bioassays. Algal Growth Potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at both the reference site (12.2 mg dry wt/L) and at the test site (15.2 mg dry wt/L) (Raschke and Schultz 1987). The effluent AGP result was (29.8 mg dry wt/L).

Introduction

The Yulee Middle School Wastewater Treatment Plant is located in Nassau County, Florida (see maps in Appendix). Treatment at this 0.015 MGD extended aeration facility includes screening, aeration, secondary clarification, and digestion. Effluent is chlorinated for disinfection and then routed to an evaporation/percolation cell which intermittently discharges to an unnamed tributary of Lumber Creek. Lumber Creek is a tributary of the Nassau River. The mean effluent flow was 0.0048 MGD in September, 1996, 0.0058 MGD in October, 1996, and 0.0033 MGD in November, 1996.

State permit limits are as follows: flow (0.015 MGD), pH (6.0 to 8.5 SU), total suspended solids and carbonaceous BOD (20.0 mg/L as an annual average, 60 mg/L maximum), chlorine (0.5 minimum for disinfection, 0.01 mg/L maximum at discharge), and fecal coliforms (200 organisms/100 mL as an annual average, 800 organisms/100 mL maximum). The Department reserves the right to require monitoring for toxicity and nutrients in the effluent or the receiving waters if the pond has a continual discharge.

In August, 1993, the effluent was toxic to *Ceriodaphnia dubia* and *Cyprinella leedsi* in both chlorinated and dechlorinated samples. During this same sampling, effluent total ammonia was 28.8 mg/L with an unionized ammonia concentration of 0.7 mg/L. Although pesticides, copper, and organic compounds were also present, these data suggest that unionized ammonia concentrations were largely re-

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	29	16
Florida Index	15	4
SCI	27	21
EPT Index	3	0
% Contribution of Dominant Taxon	14.2	28.6
% Oligochaeta	0.8	4.8
% Diptera	27.6	24.5
% Ephemeroptera	7.9	0
% Coleoptera	3.9	0
% Gastropoda	27.6	44.9
%Isopoda	14.2	18.4
%Pelecypoda	14.2	0
% Amphipoda	0.8	4.8
% Other	3.2	2.7
% Scavengers	14.2	18.4
% Predators	13.4	5.8
% Above Surface Deposit Feeders	16.9	22.1
% Below Surface Deposit Feeders	0.8	4.8
% Suspension Feeders	20.1	0.3
% Scrapers	31.9	44.9
% Shredders	2.8	3.7
Macroinvertebrate Hester-Dendy		
Number of Taxa	22	5
Florida Index	8	0
Shannon-Weaver Diversity	3.6	2.0
EPT Index	3	0
% Oligochaeta	0	7.1
% Diptera	35.3	50.0
% Ephemeroptera	37.7	0
% Gastropoda	10.6	35.7
% Amphipoda	3.6	0
% Other	16.2	7.2
% Predators	9.9	0
% Above Surface Deposit Feeders	39.0	42.8
% Below Surface Deposit Feeders	0	7.2
% Suspension Feeders	9.1	0
% Scrapers	29.4	35.7
% Shredders	1.8	0
% Scavenger	10.9	0
Periphyton Algae		
Number of Taxa	11	10
Shannon-Weaver Diversity	3.01	2.8
Algal Density (#/sq. cm)	1952.9	2120.5
Chlorophyll a (mg/sq. m)	0.1 U	0.2 U
Diatom/Diatom + B-G Abundance Ratio	0.3	0.4
% Blue-green	66.7	57.8
% Green	0	0
% Diatoms	33.3	35.6
% Other	0	6.6
Algal Growth Potential (mg dry wt/l)	12.2	15.2

sponsible for the observed toxicity. All effluent parameters for the past year were in compliance with permit limits.

Methods

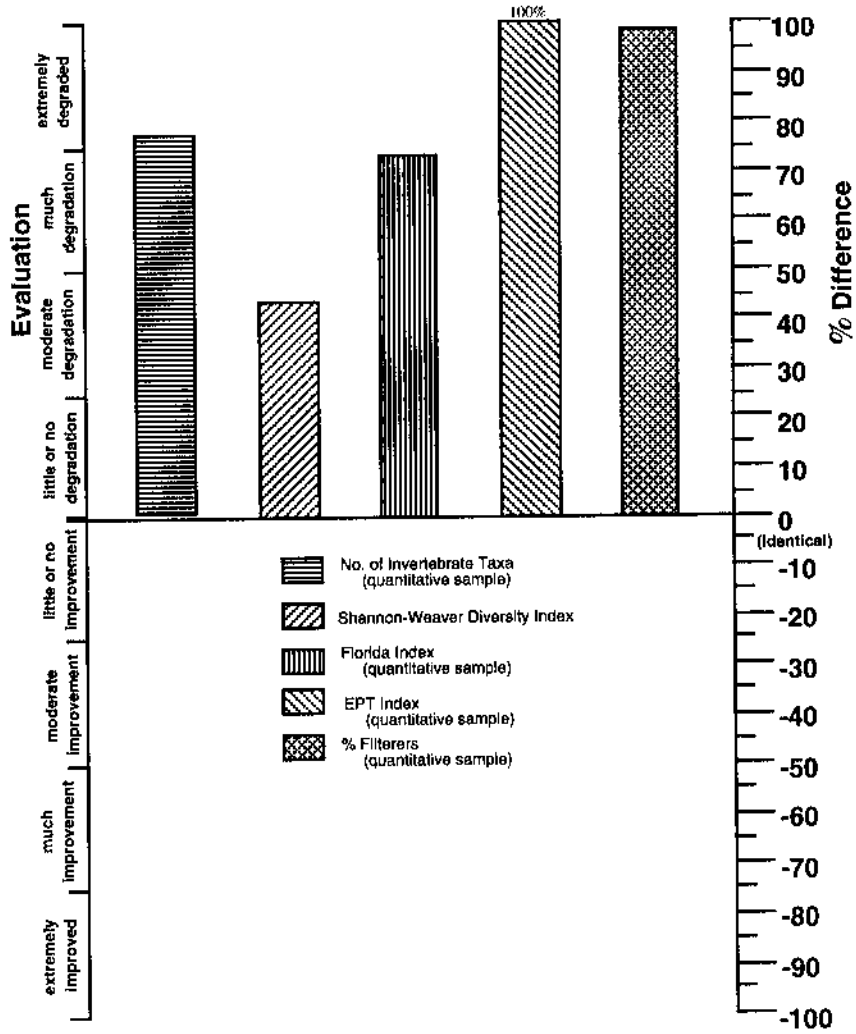
The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in an unnamed stream approximately one mile from the test site) and a test site (in an unnamed tributary of Lumber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

Benthic macroinvertebrate communities were evaluated at the study sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were conducted with Hester-Dendy multiplate samplers. Note that the Hester-Dendy samplers were placed at the time of water chemistry sampling and subsequently incubated for 28 days. Periphyton was sampled via glass slides housed in standard diatometers. 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



Effect of discharge on the benthic macroinvertebrate community.

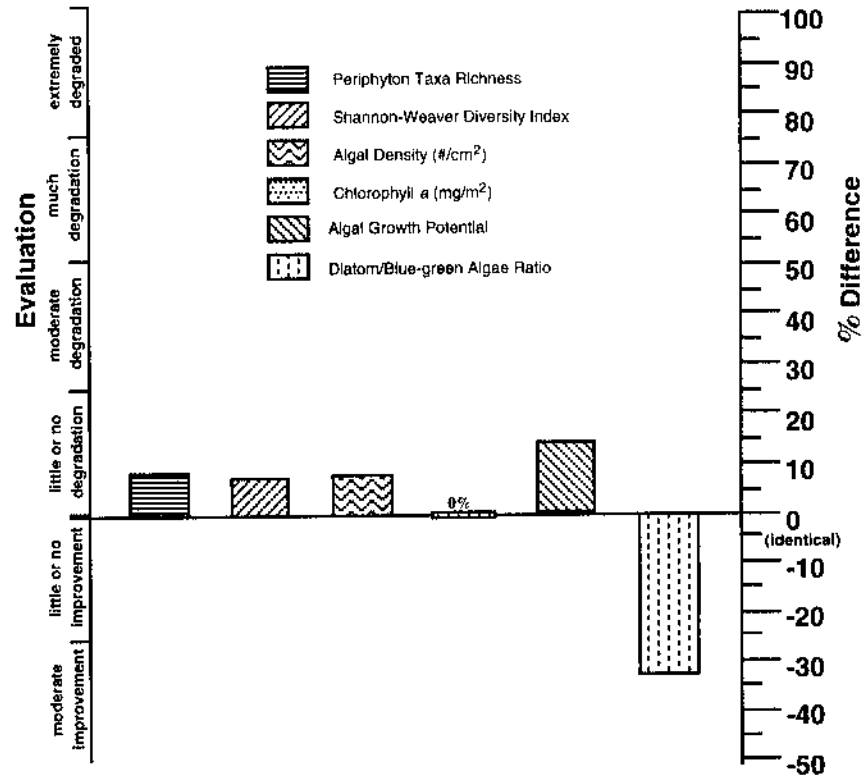
evaluated and scored, with 20 possible points for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points).

Taxa richness: Stress tends to reduce the number of different types of organisms present in a system, although moderate nutrient enrichment may sometimes be 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), Chang *et al.* (1992), and Whitmore (1989), are used as appropriate.

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



Effect of discharge on the algal community.

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

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, 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 Pat O'Conner (DEP Northeast District) and Lyn Burton, Ken Espy, Jennifer Eichelberger, Marshall Faircloth, Russel Frydenborg, Joy Jackson, Robert Kent, 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 was in the "optimal" range at both sites, with 110 points at the reference site and 107 points at the test site. Both sites scored well in terms of available benthic substrates, bank stability, and lack of artificial channelization. Water velocity (0.05 m/sec) was identical at both sites. Dissolved oxygen was lower than the Class III water quality standard at the reference site (4.2 mg/L), but in compliance at the test site (5.3 mg/L). Water was slightly acidic at both receiving water stations, with a pH of 6.1 SU at the reference site and 5.5 SU at the test site. Specific conductance was found to be 116 µmhos/cm at the reference site and 94 µmhos/cm at the test site. Since effluent specific conductance (1,076 µmhos/cm) exceeded the test site value by over an order of magnitude, this suggests the effluent was not a major contributor to stream flow at the time of sampling.

The effluent was acutely toxic to the water flea, *Ceriodaphnia dubia*, and to the fish, *Cyprinella leedsi*, in both the chlorinated and in the dechlorinated samples (violating Rules 62-302.500(1)(d), 62-302.530(62), and 62-4.244(3)(a) FAC). Complete mortality occurred in all full strength effluent samples during the 48 hour acute bioassays.

No organic pollutants were found in the effluent.

At an effluent hardness of 264.7 mg/L, copper detected in the effluent (28 µg/L) was in violation of the Class III water quality standard (which is 27.2 µg/L at the specified hardness) (Rule 62-302.530(24) FAC). All other metals were in compliance with Class III water quality standards.

Extremely elevated levels of nutrients were found in the effluent, but no enrichment attributable to the discharge was observed at the test site, probably due to the recent high water and subsequent dilution. For example, the effluent total phosphorus concentration was 10 mg/L, while the test site total phosphorus was 0.088 mg/L, an average value for a Florida stream. Effluent ammonia was 19 mg/L, which was high enough to be responsible, at least in part, for the toxicity observed in the bioassays. The unionized ammonia was calculated to be 0.03 mg/L, a value that violates the Class III water quality standard of 0.02 mg/L (Rule 62-302.530(3) FAC). Conversely, after dilution in the receiving waters, ammonia was undetected at the test site. While effluent TKN was an extremely elevated 44 mg/L, TKN decreased to 1.0 mg/L at the test site. Effluent nitrate-nitrite was 1.2 mg/L, but undetected at the test site. When considering the elevated nutrients in the effluent, the low nutrient values in the receiving waters were apparently due to dilution caused by recent flooding in the watershed.

Algal Growth Potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at both the reference site (12.2 mg dry wt/L) and at the test site (15.2 mg dry wt/L) (Raschke and Schultz 1987). The effluent AGP result was (29.8 mg dry wt/L).

Measures of macroinvertebrate community health showed the test site to be degraded. 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.

Based upon the results of Hester-Dendy collections (which occurred 28 days after water chemistry sampling), taxa richness decreased from a normal 22 taxa at the reference site, to only 5 taxa at the test site. The Florida Index decreased precipitously, from 8 points at the reference site to 0 points at the test site. Further, the EPT Index decreased from 3 at the reference site to zero at the test site. The Shannon-Weaver diversity index decreased by 44.4% at the test site, compared with the reference site, a violation of Rule 62-302.530(11) FAC. The % filter-feeders dropped from

9.1% at the reference site to 0 % at the test site, another symptom of degraded conditions.

Dip net results were largely similar to the Hester-Dendy findings, although dip net samples were taken at the time of water chemistry sampling. The test site values for the EPT Index (0), Florida Index (4), and % suspension feeders (0.3) were unusually low, while the reference site values were normal. The Stream Condition Index (SCI) score at the reference site (27 points) placed it in the "excellent" category, while the test site SCI value (21 points) placed it in the lowest range of the "good" category (see SCI calculation sheet in Appendix). Under the hydrological conditions (flooding) that prevailed during this study, the Yulee effluent was sufficiently diluted by the receiving waters to preclude poor water quality from being observed in the stream. However, it is possible that under much lower flow conditions (that may have occurred in the past), the in-stream concentration of the toxic effluent was high enough to cause degradation. Further, there apparently was insufficient time for the community to recover since the last stressful episode.

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. Periphyton taxa richness at the reference site (with 11 taxa) was similar to that of the test site (10 taxa). Algal diversity was higher at the reference site (3.0) than the test site (2.8). Algal density (1,953 cells/m^2 to 2,121 cells/m^2) was relatively low and chlorophyll *a* was undetected at both sites. These results indicate that the discharge was not having a significant impact on the immediate receiving water algal community. Substantial dilution caused by recent flooding apparently nullified the negative effects of nutrient enrichment from the facility.

Conclusions

The effluent was acutely toxic to the water flea, *Ceriodaphnia dubia*, and to the fish, *Cyprinella leedsi*, in both the chlorinated and in the dechlorinated samples (violating Rules 62-302.500(1)(d), 62-302.530(62), and 62-4.244(3)(a) FAC).

No organic pollutants were found in the effluent.

At an effluent hardness of 264.7 mg/L, copper detected in the effluent (28 µg/L) was in violation of Class III water quality standards (Rule 62-302.530(24) FAC). All other metals were in compliance with Class III water quality standards.

Extremely elevated levels of nutrients were found in the effluent, but no enrichment attributable to the discharge was observed at the test site, probably due to the recent high water. The effluent total phosphorus (10 mg/L), ammonia (19 mg/L), and TKN (44 mg/L) were extremely elevated, but test site values were normal. Note that the effluent unionized ammonia (0.03 mg/L) violated the Class III water quality standard of 0.02 mg/L (Rule 62-302.530(3) FAC), and was high enough to be responsible, at least in part, for the toxicity observed in the bioassays. When considering the elevated nutrients in the effluent, the low nutrient values in the receiving waters were apparently due to dilution caused by recent flooding in the watershed.

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Periphyton results indicated that the discharge was not having a significant impact on the immediate receiving water algal community. Substantial dilution caused by recent flooding apparently nullified the negative effects of nutrient enrichment from the facility.

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Chemistry summary table for Yulee Middle School.

	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None detected above detection limits.			
Metals (ug/L)			
Aluminum	58		
Arsenic	20 U		
Cadmium	0.1 I		
Copper	28		
Chromium	5 U		
Iron	273		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.04 U		
Zinc	45		
Nutrients (mg/L)			
Ortho-phosphate	9.3 A	0.039 I	0.038 I
Total phosphorus	10	0.083	0.088
Unionized Ammonia	0.031		
Ammonia	19 A	0.042	0.010 U
Nitrate+Nitrite	1.2	0.026 I	0.025 U
TKN	44	0.85	1.0
General Phys-Chem Parameters			
Habitat Assessment		110	107
D.O. (mg/L)	5.8	4.3	5.3
pH (SU)	6.4	6.1	5.5
Conductivity (µmhos/cm)	1,076	116	94
Temperature (°C)	24.0	22.2	20.5
Total Suspended Solids (mg/L)	8	7	13
TSS (mg/L)	8	13	7
CBOD (mg/L)	4	2	2 U
Hardness (mg CaCO3)	264.7		
Algal Growth Potential (mg dry wt/L)	29.8	12.2	15.2
Toxicity			
Bioassay Fish-Chlorinated	Toxic		
Bioassay Invertebrate-Chlorinated	Toxic		
Bioassay Fish-Dechlorinated	Toxic		
Bioassay Invertebrate-Dechlorinated	Toxic		

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

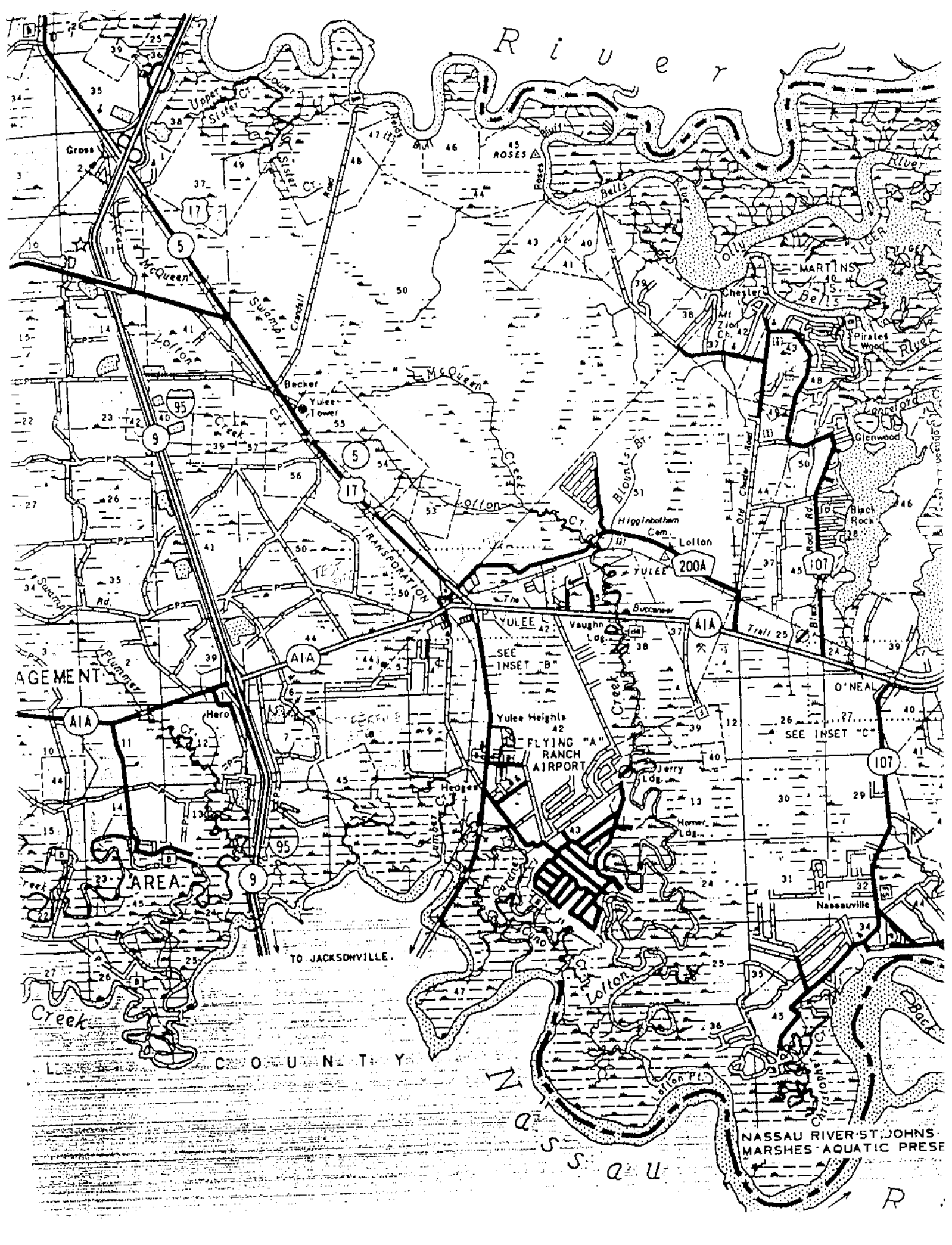
Typical Values for Selected Parameters in Florida Waters

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

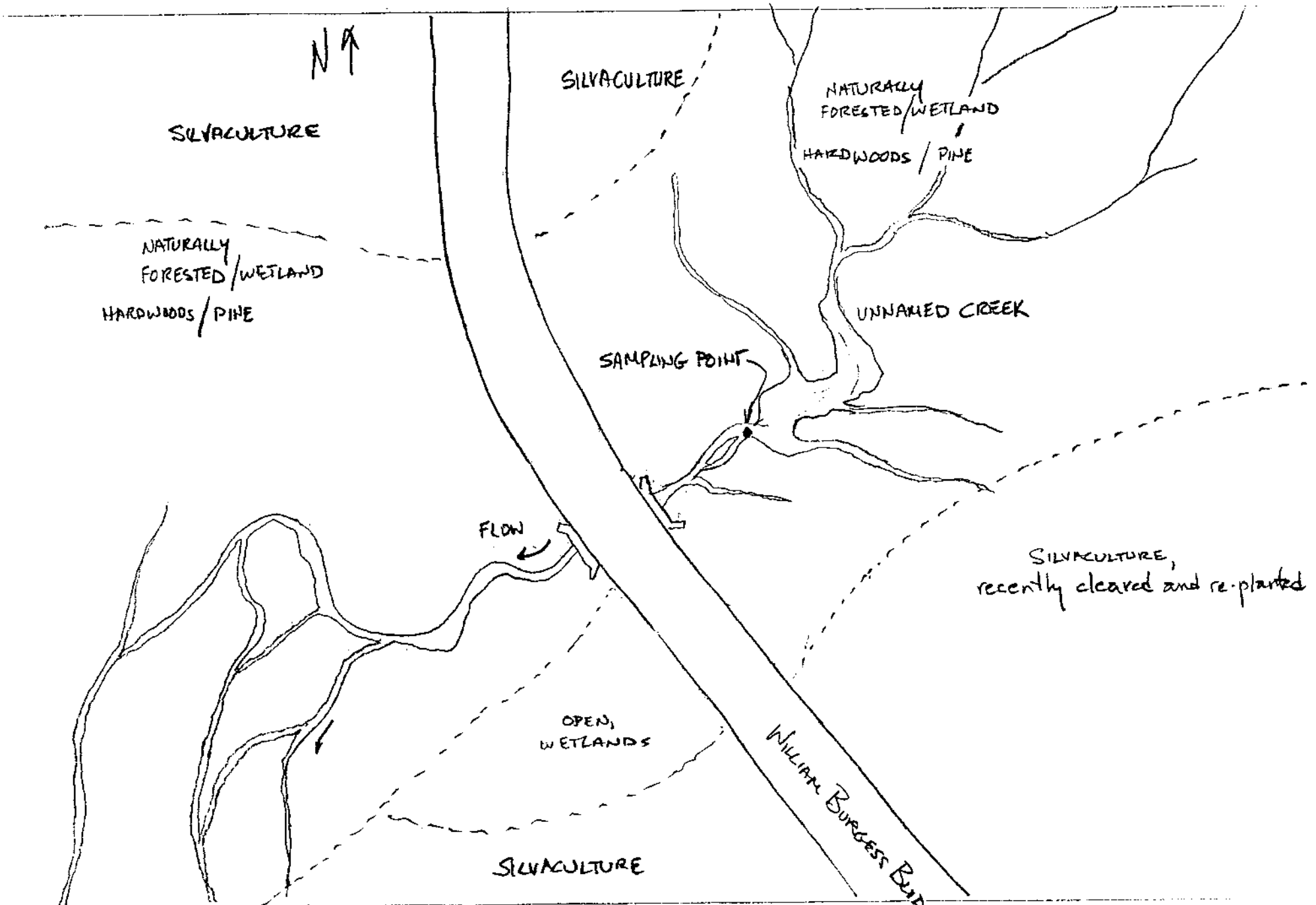
Percentile Distribution

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

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

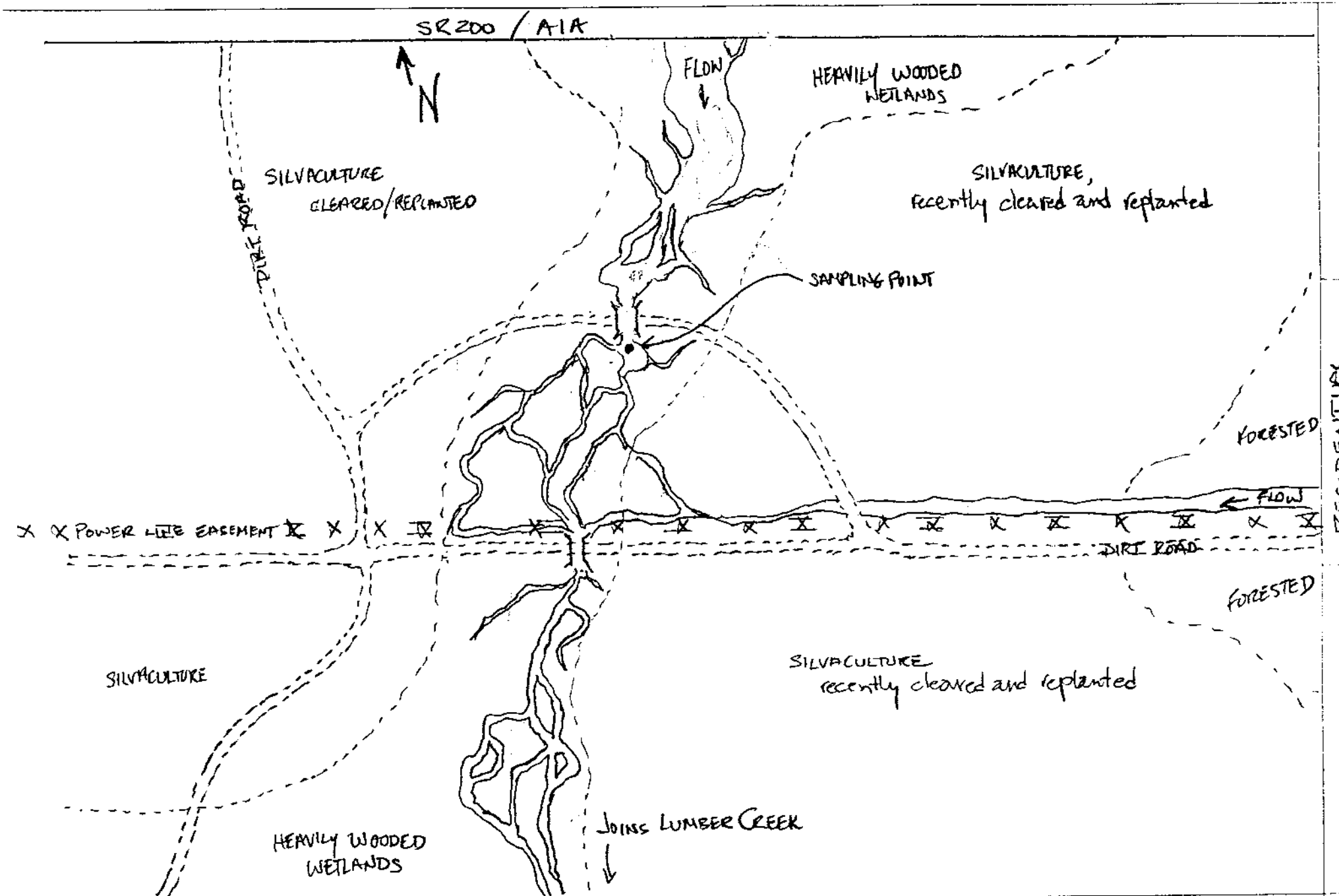

River
Upper Sister Ct.
Lower Sister Ct.
Sister Ct. Road
Gross
Bull
ROSES
Roses Bluff
Bells
Bells River
TIGER
MARTINS
Chester
Mt Zion Ch.
Pirates Wood
McQueen
Swamp
Cassell
Lollon
Becker
Yulee Tower
Creek
Lancaster
Glenwood
Blounts Br.
Old Chester Road
Higginbothem Cem.
Lollon
YULEE
200A
107
Black Rock
TRANSPORTATION
Swamp Rd.
Plummer
AIA
SEE INSET "B"
Vaughn Ldg.
Trail
O'NEAL
SEE INSET "C"
Yulee Heights
FLYING "A" RANCH AIRPORT
Jerry Ldg.
Homer Ldg.
Hedges
Lumber
Hero
AREA
TO JACKSONVILLE
Nassauville
Lollon Pl.
NASSAU RIVER-ST. JOHNS MARSHES AQUATIC PRESE
Nassau
COUNTY


N
I-95
WWTP
1902000.0
TEST SITE
YULEE
1902005.9
REFERENCE SITE
(WETLANDS)
UNNAMED
CREEK
(SALT MARSH)
LUMBER
CREEK
NASSAU RIVER
GARDNER
CREEK



YULEE MIDDLE SCHOOL FYI5 10/28/96 REFERENCE SITE 19020039

National Brand
42-351 100 SHEETS EYE EASE 5 SQUARE
42-352 100 SHEETS EYE EASE 5 SQUARE
42-356 200 SHEETS EYE EASE 5 SQUARE
42-392 100 RECYCLED WHITE 5 SQUARE
42-396 200 RECYCLED WHITE 5 SQUARE
Made in U.S.A.



YULEE MIDDLE SCHOOL FYI5 10/28/96 TEST SITE 19020060

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY KAS

Facility Name: Yulee Middle School		Date Summary Prepared: 10/29/96
Location (attach detailed map): Near U.S. 17 & SR 200A near Yulee	County: Nassau	District: NED
Federal Permit # FL0029041 and expiration date: 7/31/97	State GMS # and 3145001807 State expiration date: 4/29/99	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility:
Biologically treat domestic wastewater from Yulee Middle School.

Description of treatment process:
0.015 mgd extended aeration WWTP with chlorinated effluent discharging to a single evaporation/percolation cell with overflow discharge to a called. Plant components include a static barscreen, aeration, secondary clarification, and digestion. The effluent is chlorinated and discharged to the pond.

Receiving waters: LUMBER CREEK to NASSAU RIVER	Classification: I II (III)

Design Flow: 0.015 mgd	Mean Flow: 0.004 mgd	Flow during survey: ~0.004 mgd.

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

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

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

Parameter	Limit (units)
* CBODS	20 mg/l (annual), 60 mg/l max
TSS	20 mg/l " , 60 mg/l max
NO_3-N	12 mg/l (annual, 12 mg/l max
pH	min 6.0 - max 8.5
Chlorine	0.5 min, 0.01 max
fecal	200 col/100mL annual 800 col/100ml max

Describe special permit conditions and permit modifications:
Department reserves right to require toxicity, nutrient, & stream monitoring if pond has continual discharge.

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Yulee Middle School
(Facility)

Description of permitted outfall(s):

2800 sq. ft. evaporation/percolation cell that has an overflow structure discharging into an unnamed ditch.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: All effluent parameters for past year are in compliance with permitted limits.

Facility appears to be operating satisfactorily.

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

Two 48-hour static acute screening toxicity bioassays were conducted 8/93 using C. dubia + C. leedsi as test species. The effluent was chlorinated at the time of sample collection, with a concentration of 0.7 mg/l in the field and 0.2 mg/l in the lab. Two additional tests were conducted with an dechlorinated aliquot. The chlorinated aliquot was toxic + resulted in 100% mortality to both test species within 24 hours. The dechlorinated aliquot showed 100% mortality within 24hrs for C. leedsi and within 48hrs for C. dubia. Total ammonia concentrations were 28.8 mg/L + 0.7 mg/L. Sample also indicated presence of pesticides, metals, copper, + organics. These and the chlorine concentration may be attributors to the toxicity.

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

In compliance - no trend in data.

Additional information:

Pond discharged 9/95 + 10/95.

Records evaluated for period of 9/95 - 8/96.

Staff contributing to this review (signature):

Tom McElroy (Biologist)

Heather A. Wehry (Inspector)

" " " (Engineer)

Pat O'Connor (Biologist)

( )

( )

Lawton Chiles
Governor

Northeast District
7825 Baymeadows Way, Suite B200
Jacksonville, Florida 32256-7577

Virginia B. Wetherell
Secretary

PERMITTEE:

John L. Ruis, Superintendent
Nassau County School Board
1201 Atlantic Avenue
Fernandina Beach, Florida 32034

I.D. Number: 3145C01807
Permit/Cert Number: DO45-241514
Date of Issue: April 29, 1994
Expiration Date: April 29, 1999
County: Nassau
Lat/Long: 30°37'45"N/81°35'20"W
Section/Township/Range:
Project: Yulee Middle School WWTP

This permit is issued under the provisions of Chapter 403, Florida Statutes, and Florida Administrative Code Rule(s) 17-301, 17-302, 17-4, 17-600, 17-601, 17-610, 17-640, 17-699, 17-7 and 61E12. The above named Permittee is hereby authorized to perform the work or operate the facility shown on the application and approved drawing(s), plans, and other documents attached hereto or on file with the Department and made a part hereof and specifically described as follows:

To operate a 0.015 MGD extended aeration wastewater treatment plant with the chlorinated effluent discharged to a single evaporation/percolation cell with the overflow discharge to a ditch to Lofton Creek to the Nassau River.

This facility is located near U.S. 17 and S.R. 200 A, near Yulee, Nassau County, Florida.

In accordance with application received November 23, 1993 and additional information through March 24, 1994.

Yulee
tot site: 19020060
reference: 19020059

Printed on recycled paper.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE / NAME	STORET STATION NUMBER	DATE (M/D/Y)	TIME	RECEIVING BODY OF WATER
DED / DWQ	19020059	10/28/96	1407	UNAMED CREEK

REMARKS	LOCATION	FIELD ID/NAME
see attached	1/2 mile South of ~~Mills~~ Myers Ferry Rd (SR 2011) 1/4 EAST of 95	REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
20	50						

Local Watershed Erosion (check box): None ☐ Slight ☐ Moderate ☒ Heavy ☐ (both sides of stream)

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

Width of riparian vegetation (m) on least buffered side: 7 1/2 M

List & map dominant vegetation on back

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

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1.5 m

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)	40	4		Riffles			
Leaf Packs or Mats	40	4		Sand			
Aquatic Vegetation				Mud/Muck/Silt	100	4	
Rock or Shell Rubble				Other:			
~~Undercut Banks~~/Roots	100	4					

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 (opt):			Secchi (m
Top	0							
Mid-depth	12"	22.23	6.14	4.24	116			.61
Bottom	24"							

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:
56 55°F, Humid, slight breeze, one inch/last part 7 days.

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

SAMPLING TEAM: Tim McKelvey / Pat Connor

SIGNATURE: Tim McKelvey

DATE: 10-28-96

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

SUBMITTING AGENCY CODE: NED / SUBMITTING AGENCY NAME: FGL	STORET STATION NUMBER: 19620059	DATE (M/D/Y): 10/28/96	RECEIVING BODY OF WATER: UNNAMED CREEK

REMARKS:	LOCATION: 1/2 mile S. of [redacted] Creek / 1/2 East of 95	FIELD ID/NAME:
see attached		REFERENCE

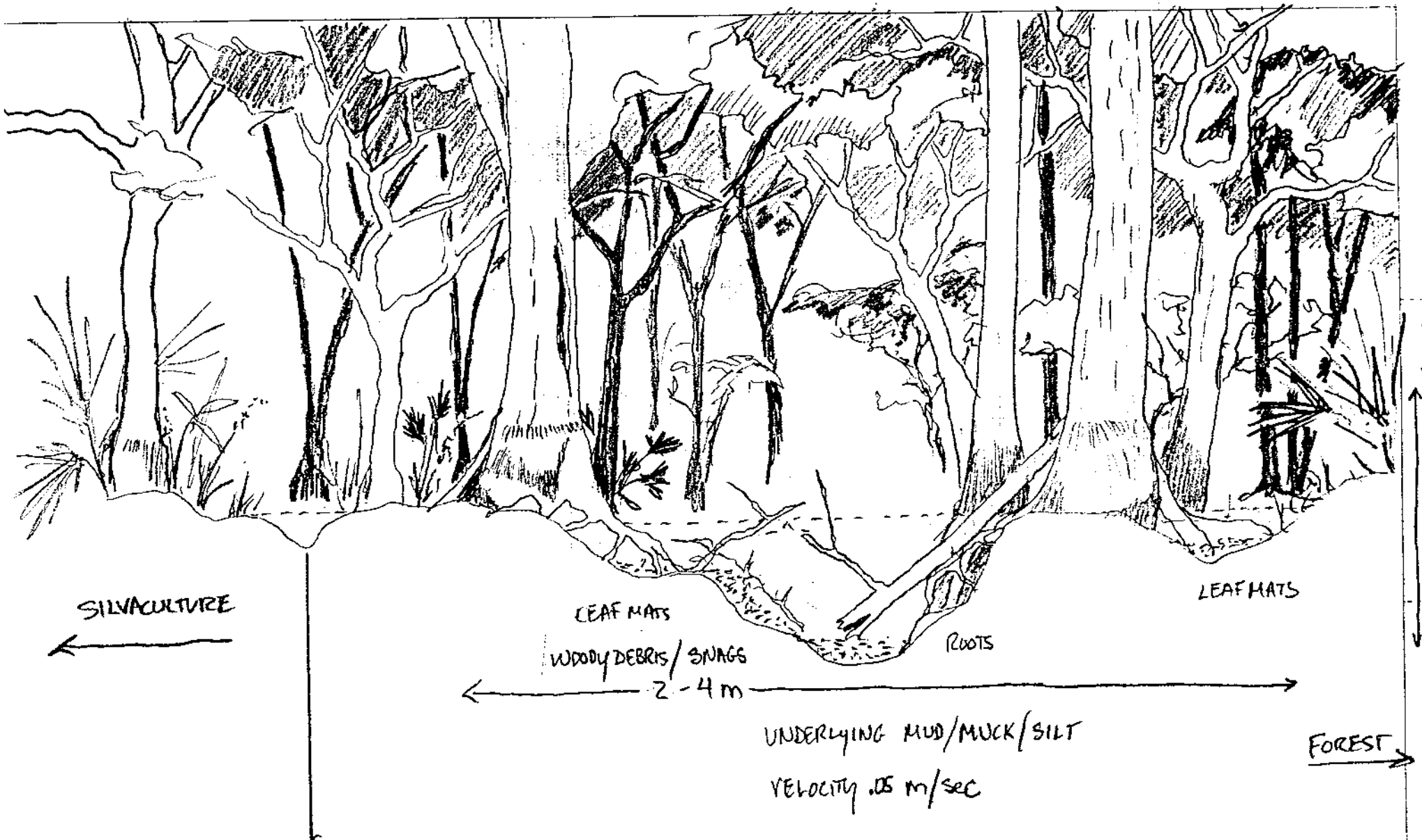
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [20]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. (20) 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, 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 [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 [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]	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 [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 [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 [10]	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

[110] **TOTAL SCORE**

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10-28-96	Tim McKelvey / Pat O'Connor	Tim McKelvey



VISLEE MIDDLE SCHOOL FY15 10/28/96 REFERENCE SITE 19020059

DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: DEP / SUBMITTING AGENCY NAME: ST 31	STORET STATION NUMBER: 1702006.0	DATE (MO/DY): 10-25-96	TIME: 1200	RECEIVING BODY OF WATER: SPICONER CREEK

REMARKS: recently cut and replanted deciduous field adjacent to upstream site	LOCATION: 12 mile Stream [redacted] SR208	FIELD ID/NAME: TEST SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

Width of riparian vegetation (m) on least buffered side: 6-12 m

List & map dominant vegetation on back

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

width 2 - 4 meters velocity .1 m/sec
depth .1 - .5 meters

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1m

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)	25	5	Dumet	Riffles			
Leaf Packs or Mats	25	5	"	Sand			
Aquatic Vegetation	25	5	"	Mud/Muck/Silt			
Rock or Shell Rubble	~			Other:			
Undercut Banks/Roots	25	5	"				

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	Surf	20.5	5.5	5.3	94			.3
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:
80-85°F Clear, slight haze SE

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

SAMPLING TEAM: McKelvey / O Connor

SIGNATURE: [signature]

DATE: 10-25-96

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

SUBMITTING AGENCY CODE: WED SUBMITTING AGENCY NAME: SCS1	STORET STATION NUMBER: 19020006	DATE (M/D/Y): 10 25 96	RECEIVING BODY OF WATER: GARDNER CREEK
REMARKS: Low flow period, previously high flow from rainfall	LOCATION: 1/2 mile South of ~~Hwy~~ SR200		FIELD ID/NAME: TEST SITE

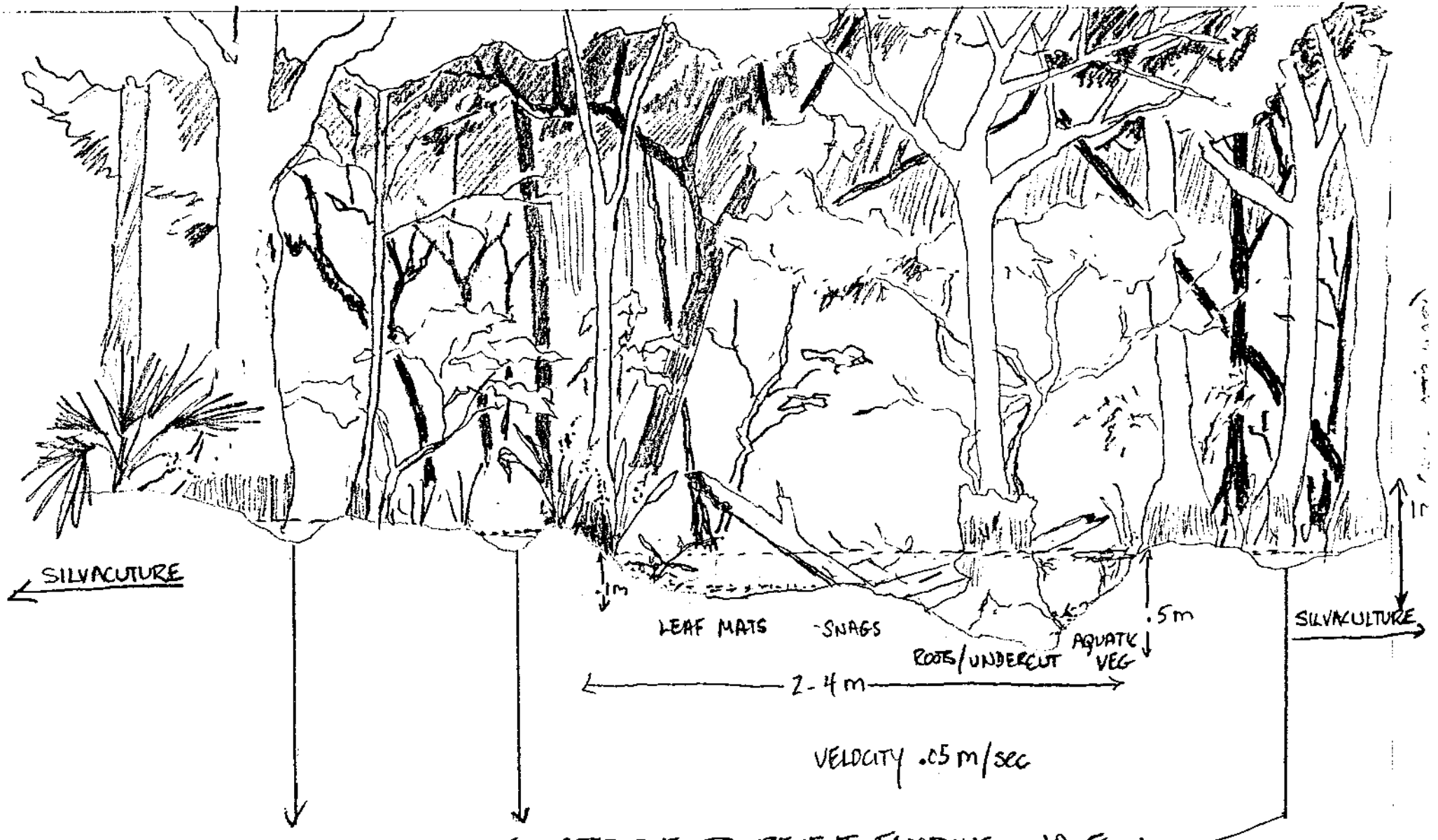
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover 20	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. (20) 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, 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 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 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 14	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 18	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 9	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 16	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.

107 **TOTAL SCORE**

Comments

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10-28-96	TIM McKELVEY / PAT CONNOR	Tim McKelvey



YULEE MIDDLE SCHOOL FYI 5 10/28/96 TEST SITE 19020060

Reference site

Winter 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	29	≥27	26-14	<14		≥ 27	26-14	<14		≥18	17-9	<9	5
EPT Index	4	≥6	5-3	<3		≥ 4	3-2	<2		-	≥3	<3	3
# Chironomid Taxa	14	≥9	8-5	<5		≥9	8-5	<5		≥4	3-2	<2	5
% Contribution of Dominant Taxon	0	≤25	26-62	>62		≤30	31-65	>65		≤37	38-69	>69	5
% Diptera	27.6	-	≤60	>60		-	≤52	>52		-	≤67	>67	3
Florida Index	15	≥ 13	12-7	<7		≥10	9-5	<5		≥ 6	5-3	<3	5
% Suspension feeders/Filterers	9.1	>13	12-7	<7		≥15	14-8	<8		≥ 25	25-13	<13	1
Total Score		Panhandle				Peninsula				Northeast			27
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Test site

Winter Index Period: Stream Condition Index for Florida (SCI) (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	16	≥27	26-14	<14	3	≥ 27	26-14	<14		≥18	17-9	<9	3
EPT Index	0	≥6	5-3	<3	1	≥ 4	3-2	<2		-	≥3	<3	1
# Chironomid Taxa	6	≥9	8-5	<5	5	≥9	8-5	<5		≥4	3-2	<2	5
% Contribution of Dominant Taxon	29	≤25	26-62	>62	5	≤30	31-65	>65		≤37	38-69	>69	5
% Diptera	24.5	-	≤60	>60	3	-	≤52	>52		-	≤67	>67	3
Florida Index	4	≥ 13	12-7	<7	3	≥10	9-5	<5		≥ 6	5-3	<3	3
% Suspension feeders/Filterers	0	>13	12-7	<7	1	≥15	14-8	<8		≥ 25	25-13	<13	1
Total Score		Panhandle				Peninsula				Northeast			21
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Macroinvertebrate taxa list for Yulee Middle School WWTP, collected via 20 dipnet sweeps, on 28 October, 1996.

	Reference Site	Test Site
Oligochaeta		
Eclipidrilus sp.	1	–
Dero trifida	–	4
Dero vaga	–	2
Haemonais waldvogeli	–	1
Gastropoda		
Ancylidae	17	39
Laevapex peninsulae	–	3
Micromenetus dilatatus	17	24
Physella sp.	1	–
Pelecypoda		
Pelecypoda	18	–
Isopoda		
Caecidotea sp.	18	27
Amphipoda		
Amphipoda	–	4
Crangonyx sp.	1	3
Ephemeroptera		
Leptophlebiidae	9	–
Caenis sp.	1	–
Odonata		
Libellulidae	1	–
Pachydiplax longipennis	–	3
Libellula vibrans	1	–
Neurocordulia alabamensis	1	1
Coleoptera		
Neoporus sp.	3	–
Notomicrus sp.	1	–
Stenelmis sp.	1	–
Trichoptera		
Oecetis sp.	1	–
Diptera		
Psychoda sp.	–	1
Clinotanypus sp.	1	–
Ablabesmyia mallochi	8	–
Labrundinia pilosella	2	–
Larsia sp.	1	–
Larsia berneri	–	1
Procladius sp.	1	–
Chironomus sp.	–	5
Dicrotendipes modestus	–	1
Dicrotendipes simpsoni	1	–
Kiefferulus sp.	1	22
Parachironomus sp.	1	–

Polypedilum tritum	–	5
Polypedilum illinoense grp.	3	1
Stenochironomus sp.	3	–
Paratanytarsus sp. A Epler	9	–
Rheotanytarsus exiguus grp.	1	–
Tanytarsus sp.	1	–
Tanytarsus sp. M Epler	1	–
Tanytarsus sp. T Epler	1	–

Benthic macroinvertebrate taxa list for Yulee Middle School WWTP, collected via Hester-Dendy artificial substrates, in Nassau County, on 25, November 1996. Densities in #/m^2, represent the mean of the three replicates.

	Reference Site	Test Site
Hydrozoa		
Hydra sp.	3	–
Oligochaeta		
Dero trifida	–	3
Gastropoda		
Ancylidae	13	–
Laevapex peninsulae	5	13
Micromenetus sp.	3	–
Micromenetus dilatatus	13	–
Physella sp.	3	–
Isopoda		
Caecidotea sp.	40	–
Amphipoda		
Hyalella azteca	13	–
Collembola		
Collembola	–	3
Ephemeroptera		
Leptophlebiidae	24	–
Leptophlebia intermedia	82	–
Leptophlebia bradleyi	19	–
Caenis sp.	13	–
Coleoptera		
Hydrovatus sp.	3	–
Microcylloepus pusillus	3	–
Diptera		
Chironomidae	5	5
Ablabesmyia mallochi	40	–
Labrundinia neopilosella	3	–
Labrundinia pilosella	3	–
Procladius sp.	3	–
Nanocladius sp.	3	–
Dicrotendipes modestus	3	–
Dicrotendipes simpsoni	11	–
Kiefferulus sp.	–	13
Tribelos sp.	3	–
Tribelos jucundus	5	–
Tanytarsus sp. S Epler	34	–
Tanytarsus sp. M Epler	8	–
Tanytarsus sp. T Epler	11	–

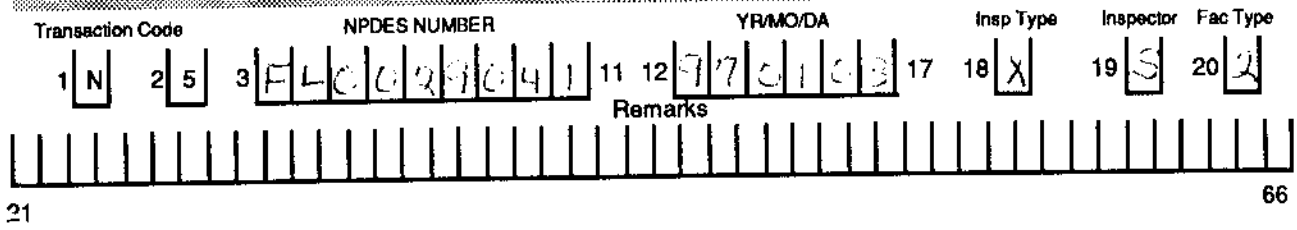
Periphyton taxa list and densities (#/mm^2) for Yulee Middle School WWTP, collected via glass microscope slides in Nassau County, on 25 November, 1996.

	Reference Site	Test Site
Cyanophyceae		
Chroococcus sp.	325	47
Gloeothece sp.	–	47
Microcystis sp.	108	–
Dactylococcopsis sp.	–	94
Lyngbya sp.	488	188
Oscillatoria sp.	380	565
Spirulina sp.	–	283
Bacillariophyceae		
Synedra amphicephala	54	–
Synedra rumpens	–	47
Eunotia curvata	54	–
Navicula pupula	54	–
Anomoeneis serians	54	47
Pinnularia obscura	54	–
Mastogloia smithii	–	283
Amphora ovalis	54	–
Nitzschia sp.	54	–
Nitzschia palea	54	–
Euglenophyceae		
Phacus sp.	–	141

Phytoplankton taxa list for WWTP and Densities (#/mL) for Yulee Middle School, collected via subsurface grabs in Nassau County on 28 October, 1996.

	Reference Site	Test Site
Cyanophyceae		
Chroococcus sp.	42	–
Gloeocapsa sp.	11	10
Rhabdoderma sp.	11	–
Dactylococcopsis sp.	137	101
Oscillatoria sp.	126	181
Bacillariophyceae		
Cyclotella sp.	11	20
Chlorophyceae		
Chlamydomonas sp.	11	–
Euglenophyceae		
Phacus sp.	–	10
Cryptophyceae		
Cryptomonas sp.	–	10

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)

