

Biological Assessment of

City of Lake Butler Wastewater Treatment Facility

Union County

NPDES #FL0028428

Sampled September 1995

January 1996

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger: City of Lake Butler WWTF
County: Union
NPDES Number: FL0028428
State Permit Expiration Date: 25 April 1997

Toxics Sampling Inspection (XSI)

Date Sampled: 25 September, 1995

Results: Silver was detected in the effluent at 0.62 µg/L, which is in violation of Rule 62-302.530(60) FAC. No organic priority pollutants were detected in the effluent.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 25 September 1995

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 25 September 1995

Results: Virtually every measure of macroinvertebrate community health demonstrated the negative effect of the discharge. Taxa richness, Shannon-Weaver diversity, the Florida Index, EPT Index, and percent filter feeders were all substantially decreased at the test site when compared to the reference site. The 37.8 % decrease in diversity at the test site represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). The lack of pollution sensitive taxa at the test site (*e.g.*, the EPT Index was zero) demonstrates that the discharge was causing an imbalance of aquatic fauna, prohibited by Rule 62-302.530(48)(b) FAC. The test site only scored 13 points on the SCI, placing it in the "severe degradation" category. For the most part, periphyton parameters did not show the classical adverse effects of a highly nutrient enriched discharge. Although taxa richness and the diatom to blue-green algae ratio decreased slightly at the test site (18 % and 11%, respectively), other parameters such as diversity, algal density, and chlorophyll *a* appeared "better" at the test site than at the reference site. The low algal density and chlorophyll *a* at the test site is contrary to the extreme nutrient enrichment found there. This suggests that the periphyton in Silver Run Creek may be subject to stress, such as periodic "slugs" of chlorine or other substances toxic to algae.

Water Quality Inspection (WQI)

Date Sampled: 25 September 1995

Results: The Lake Butler WWTF discharge caused substantial increases in the nutrient concentrations in the waters of the test site. Test site concentrations of ortho-phosphate (0.64 mg/L), total phosphorus (0.67 mg/L), and nitrate-nitrite (2.9 mg/L), were higher than those found in over 90% to 95% of other Florida streams. AGP at the test site (163.2 mg dry wt/L) greatly exceeded the "problem threshold" of 5 mg dry wt/L. AGP of the effluent was 475.6 mg dry wt/L. Effluent fecal coliforms (400 organisms/100 mL) exceeded the facility's permit limit. Class III standards for fecal and total coliforms were exceeded at both the reference and test sites.

Introduction

The City of Lake Butler Wastewater Treatment Facility is located on Southeast 5th Street in Lake Butler, Union County, Florida (see map in Appendix). Treatment at this 0.5 MGD municipal wastewater treatment facility consists of a rotating biological contact system. Effluent is then chlorinated, dechlorinated, and aerated prior to discharge into the Class III Silver Run Creek. Mean flow from the facility has been 0.39 MGD.

Permit parameters for the facility are as follows: BOD and TSS (10 mg/L annual average, 12.5 mg/L monthly average, 15 mg/L weekly average, and 20 mg/L maximum), organic nitrogen (3 mg/L annual average, 3 mg/L monthly average, 4.5 mg/L weekly average, and 6 mg/L maximum), ammonia (2 mg/L annual average, 2 mg/L monthly average, 3 mg/L weekly average, and 4 mg/L maximum), dissolved oxygen (6.0 mg/L minimum), pH (6.0 to 8.5 SU), chlorine (0.5 mg/L minimum for disinfection, 0.01 mg/L maximum after dechlorination), fecal coliforms (200 organisms/100 mL maximum).

A previous bioassessment of this facility (FDER 1993) uncovered effluent violations of silver (1.2 µg/L) and toxicity (to *Ceriodaphnia dubia*), as well as severe degradation in the macroinvertebrate community of Silver Run Creek. During 1994, the facility's monthly ammonia limit was exceeded twice, and the monthly organic nitrogen limit was exceeded once.

Major characteristics of invertebrate community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative		
Number of Taxa	27	12
Florida Index	11	3
SCI	19	9
EPT Index	4	0
% Contribution of Dominant Taxon	19.5	51.6
% Oligochaeta	0	0.6
% Diptera	27.4	81.0
% Ephemeroptera	2.7	0
% Trichoptera	5.3	0
% Odonata	0.9	0.1
% Coleoptera	47.8	0.8
% Gastropoda	0.9	17.5
% Other	5.3	0
% Predators	25.7	14.8
% Above Surface Deposit Feeders	33.6	37.2
% Below Surface Deposit Feeders	0	0.6
% Suspension Feeders	7.1	0
% Scrapers	25.2	17.8
% Shredders	5.3	29.5
% Other	3.1	0
Macroinvertebrate Hester-Dendy		
Number of Taxa	31	20
Florida Index	23	9
Shannon-Weaver Diversity	3.97	2.47
EPT Index	10	0
% Oligochaeta	1.4	0
% Diptera	26.8	90.3
% Ephemeroptera	43.0	0
% Trichoptera	15.5	0
% Plecoptera	4.9	0
% Coleoptera	2.8	0.9
% Gastropoda	0.7	8.6
% Megaloptera	4.2	0.2
% Predators	16.6	14.6
% Above Surface Deposit Feeders	31.7	42.7
% Below Surface Deposit Feeders	1.4	0
% Suspension Feeders	14.1	0.1
% Scrapers	31.3	9.1
% Shredders	4.9	33.5

In April, 1993, staff from the Department's Point Source Evaluation Section conducted a water quality intensive survey of the City of Lake Butler WWTF and Silver Run Creek. Nutrients in Silver Run Creek downstream of the discharge were elevated and silver levels in the discharge and downstream sampling sites exceeded the Class III criterion of 0.07 ug/L. Effluent samples were 3.8 ug/L and 4.0 ug/L.

An investigation and sampling program by the City of Lake Butler revealed that film development by hospitals, dentists, and film labs represented the primary contributors of silver to the wastewater facility. The city sewer ordinance addressed the issue and pretreatment standards were included.

The WWTF is currently operating under a consolidated State/EPA NPDES permit which requires the facility to achieve compliance via either an upgrade or a reuse/land application system. The City of Lake Butler plans to construct a spray irrigation system for reuse and to expand and improve the wastewater treatment system. There is an agreement with the Florida Department of Corrections to use and expand the nearby Florida Reception Center WWTP to provide treatment for both the Town of Lake Butler and the Florida Reception Center.

Major characteristics of algal community structure of control and test sites.

	Reference Site	Test Site
Periphyton Algae		
Number of Taxa	22	18
Shannon-Weaver Diversity	2.97	3.76
Algal Density (#/sq. cm)	98,804	11,041
Chlorophyll a (mg/sq. m)	6.5	0.4
Diatom/Diatom + B-G Abundance Ratio	0.99	0.88
% Blue-green	0.6	9.4
% Green	2.1	15.6
% Diatoms	97.3	71.9
% Other	0	3.1
Algal Growth Potential (mg dry wt/l)	1.5	163.1

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 Richard Creek above the confluence with Silver Run Creek) and a test site (located 100 m downstream of the discharge in Silver Run Creek, above the confluence with Richard Creek). 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.

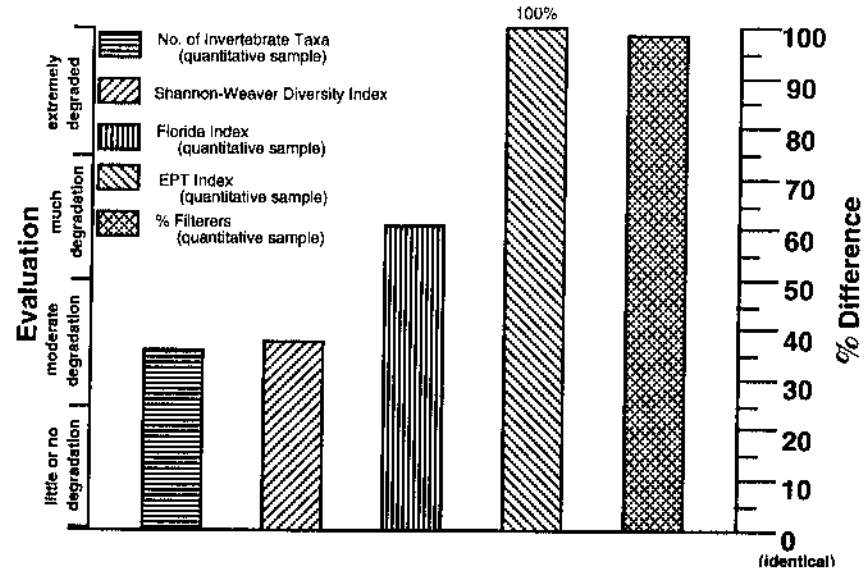
Benthic macroinvertebrate communities were evaluated at reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Phytoplankton was sampled at both reference and test sites by subsurface grabs (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). Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

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

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

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a mea-



Effect of discharge on the benthic macroinvertebrate community.

sure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

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

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

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

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

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

The Stream Condition Index for Florida (SCI) is a composite macroinvertebrate metric (EA Engineering 1994). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition (see SCI calculation table in Appendix).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, 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 Pat O'Connor (DEP Northeast District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Tina Mikulski, 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, scoring 135 points, was better than that of the test site, which scored 100 points. The lower habitat score at the test site was pre-

dominantly due to reduced bank stability and a reduced riparian zone buffer. In contrast, scores for productive instream substrates, water velocity, lack of artificial channelization, and riparian zone vegetation quality were virtually identical at both study sites. The two stream segments were similar with respect to system width (2 m), depth (0.5 m), and velocity (0.3 m/s). Land use near the reference site consisted almost equally of natural forest, silviculture, and pasture. Land use near the test site included pasture, natural forest, and residential areas. Cattle were noted near both sites. Water and sediment at the test site smelled of sewage.

Dissolved oxygen was sufficient to support aquatic life at both study stations (6.5 mg/L and 6.9 mg/L at the reference and test sites, respectively). Both streams were slightly acidic (pH was 6.1 SU at the reference site and 6.6 SU at the test site). Conductivity was somewhat higher at the test site (360 µhmos/cm) than at the reference site (225 µhmos/cm). Water temperature was noticeably higher at the test site (26.2 °C) than it was at the reference site (21.8 °C).

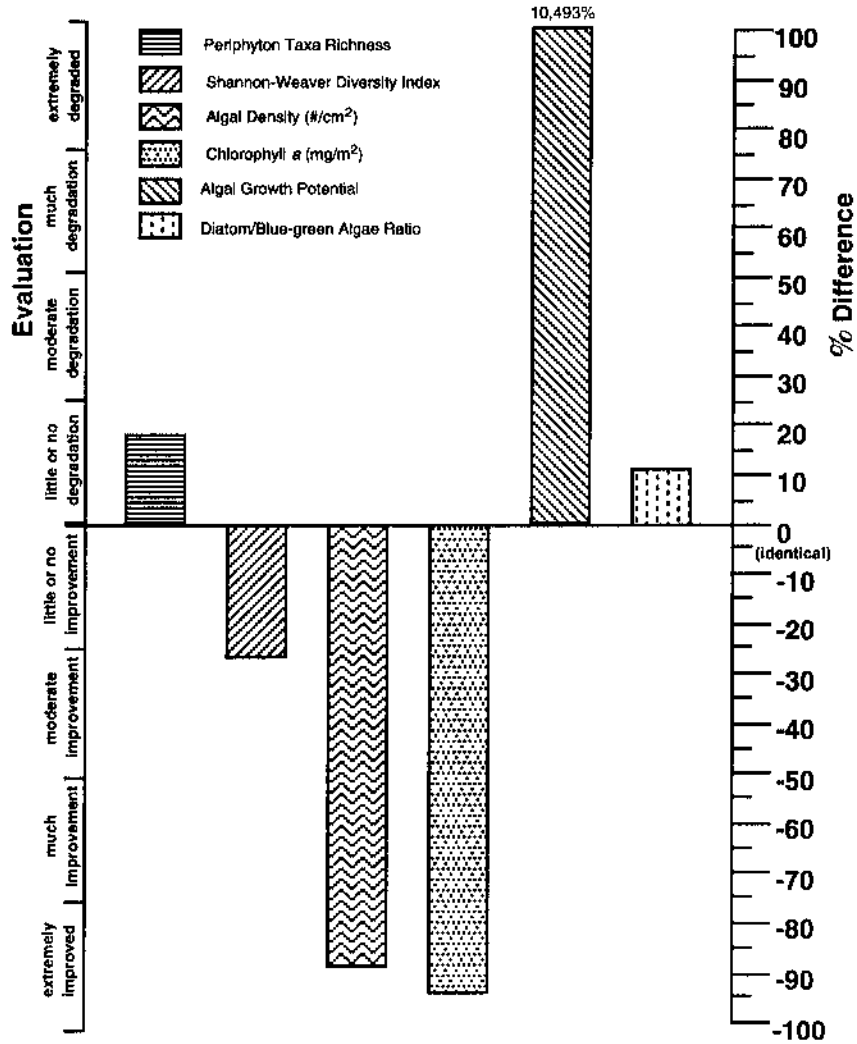
No organic priority pollutants were detected in the effluent sample.

Of the metals analyzed for, aluminum (120 µg/L), copper (7 µg/L), iron (158 µg/L), silver (0.62 µg/L) and zinc (15 µg/L) were found in the discharge at levels above quantitation limits. The effluent silver concentration (0.62 µg/L) substantially exceeded Class III water quality standards (0.07 µg/L), violating Rule 62-302.530(60) FAC. At a calculated hardness of 160.3 mg/L $CaCO_3$, all other metals were in compliance with ambient standards.

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

Effluent fecal coliforms (400 organisms/100 mL) were in violation of permit limits. Class III standards for fecal and total coliforms were exceeded at both the reference site (2100 organisms/100 mL and 3500 organisms/100 mL, respectively) and at the test site (2000 organisms/100 mL and 4500 organisms/100 mL, respectively). The elevated coliform values at both sites may have been related to runoff from nearby cattle pastures.

The Lake Butler WWTF discharge was associated with substantial increases in the nutrient concentrations in the waters of the test site. Total phosphorus increased from 0.029 mg/L at the reference site to 0.67 mg/L at the test site. Ortho-phosphate was undetected at the reference site, increasing to 0.64 mg/L at the test site. These test site ortho-phosphate and total phosphorus values are higher than those found in 90% of other Florida streams. Nitrate-nitrite increased from 0.12 mg/L at the reference site



Effect of discharge on the algal community.

to 2.9 mg/L at the test site. This test site value is considerably higher than those found in 95% of other Florida streams. Ammonia increased from 0.042 mg/L at the reference site to 0.052 mg/L at the test site. Although ortho-phosphate, total phosphorus, and nitrate-nitrite values were extremely elevated in the effluent (and in the downstream receiving waters), ammonia and organic nitrogen values for the discharge were within permit limits.

Algal growth potential (AGP) rose from 1.5 mg/dry wt/L at the reference site to 163.2 mg dry wt/L at the test site, an increase of 10,493%. AGP at the test site greatly exceeded the "problem threshold" of 5 mg dry wt/L (Raschke and Schultz 1987). AGP of the effluent was 475.6 mg dry wt/L. The extremely high AGP at the test site corresponded to the nutrient enrichment found there.

Quantitative measures of benthic macroinvertebrate community health indicated that the effluent was having an extremely adverse effect on the biota in Silver Run Creek. The Figure on p. 3 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, virtually every measure of community health demonstrated the negative effect of the discharge. Macroinvertebrate taxa richness decreased from 31 taxa at the reference site to 20 taxa at the test site (a 35.5% reduction). Similarly, Shannon-Weaver Diversity decreased from 3.97 at the reference site to 2.47 at the test site. This 37.8 % decrease in diversity at the test site represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC).

Taxa sensitive to pollution, such as those which receive Florida Index points or EPT taxa, were rare or absent from the test site. For example, the Florida Index declined from 23 at the reference site to 9 at the test site. The EPT Index decreased from 10 at the reference site to 0 (zero) at the test site. Additionally, the filter feeders were extremely rare at the test site, decreasing from 14.1 % at the reference site to 0.1 % at the test site. These data clearly demonstrate that the discharge was causing an imbalance of aquatic fauna, prohibited by Rule 62-302.530(48)(b) FAC.

Qualitative (dip net) macroinvertebrate sampling also demonstrated the negative effects of the discharge on Silver Run Creek. As with the Hester-Dendy data, the number of taxa, the Florida Index, the EPT Index, and the percent filter feeders were all decreased at the test site when compared to the reference site. The macroinvertebrate community at the test site was dominated by the chironomid, *Polypedilum illinoense* grp., in both types of samples (54.9% and 51.6% in the Hester-Dendy and dipnet samples, respectively). The reference site was dominated by pollution sensitive taxa, such as the ephemeropteran, *Acerpenna pygmaeus,* in the Hester-Dendy samples (21.8%) and by the coleopteran, *Stenelmis* sp., in the dipnet sample (19.5%). The reference site scored 25 on the Stream Condition Index, which placed it in the "moderate impairment" category, while the test site scored 13, which placed it in the "severe degradation" category.

The Figure on p. 4 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. Both phytoplankton (freewater) and periphyton (attached) algal populations were sampled for this bioassessment. Since the attached algae are considered most important in lotic systems, it is the periphyton data which will be used to compare the reference and test sites.

For the most part, periphyton parameters did not show the classical adverse effects of a highly nutrient enriched discharge. Although taxa richness and the diatom to bluegreen algae ratio decreased slightly at the test site (18% and 11%, respectively), other parameters such as diversity, algal density, and chlorophyll *a* appeared "better" at the test site than at the reference site. The low algal density and chlorophyll *a* at the test site is contrary to the extreme nutrient enrichment found there. This suggests that the periphyton in Silver Run Creek may be subject to stress, such as periodic "slugs" of chlorine or other substances toxic to algae.

Conclusions

No organic priority pollutants were detected in the effluent sample.

Silver was detected in the effluent at 0.62 µg/L, which is in violation of Rule 62-302.530(60) FAC.

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

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The Lake Butler WWTF discharge caused substantial increases in the nutrient concentrations in the waters of the test site. Test site concentrations of orthophosphate (0.64 mg/L), total phosphorus (0.67 mg/L), and nitrate-nitrite (2.9 mg/L), were higher than those found in over 90% to 95% of other Florida streams.

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Virtually every measure of macroinvertebrate community health demonstrated the negative effect of the discharge. Taxa richness, Shannon-Weaver diversity, the Florida Index, EPT Index, and percent filter feeders were all substantially decreased at the test site when compared to the reference site. The 37.8 % decrease in diversity at the test site represents a violation of the biological integrity criterion (Rule 62-302.530(11) FAC). The lack of pollution sensitive taxa at the test site (*e.g.*, the EPT Index was zero) demonstrates that the discharge was causing an imbalance of aquatic fauna, prohibited by Rule 62-302.530(48)(b) FAC. The reference site scored 25 on the Stream Condition Index, which placed it in the "moderate impairment" category, while the test site scored 13, placing it in the "severe degradation" category.

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Chemistry summary table for

Lake Butler WWTF	Effluent	Reference Site	Test Site
Organic Constituents (ug/L)			
None Detected			
Metals (ug/L)			
Aluminum	120 I		
Arsenic	10 U		
Cadmium	0.080 U		
Copper	7 I		
Chromium	10 U		
Iron	158 A		
Lead	10 U		
Mercury	0.10 U		
Nickel	4 U		
Selenium	30 U		
Silver	0.62 A		
Zinc	15 I		
Nutrients (mg/L)			
Ortho-phosphate	2.4 A	0.020 U	0.64
Total phosphorus	2.6 A	0.029 I	0.67
Ammonia	0.10 A	0.042 A	0.052
Nitrate+Nitrite	12 A	0.12 A	2.9
TKN	2.0 A	2.1	1.2
General Phys-Chem Parameters			
Habitat Assessment		135	100
D.O. (mg/L)	10.2	6.5	6.9
pH (SU)	6.5	6.1	6.6
Conductivity (µmhos/cm)	919	225	360
Temperature (°C)	28.3	21.8	26.2
Hardness (mg/L CaCO3)	160.3		
Total Suspended Solids (mg/L)	6	1	4
Biological Oxygen Demand, 5 day (mg/L)	4	<2	<2
Algal Growth Potential (mg dry wt/L)	475.6	1.5	163.1
Toxicity			
Bioassay Fish	No Mortality		
Bioassay Invertebrate	No Mortality		
MIcrobiological Communities (org/100 mL)			
Fecal coliform	400 AQ	2100 Q	2000 Q
Total coliform	3400 AQ	3500 Q	4500 Q

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

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

Q - Sample held beyond normal holding time

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

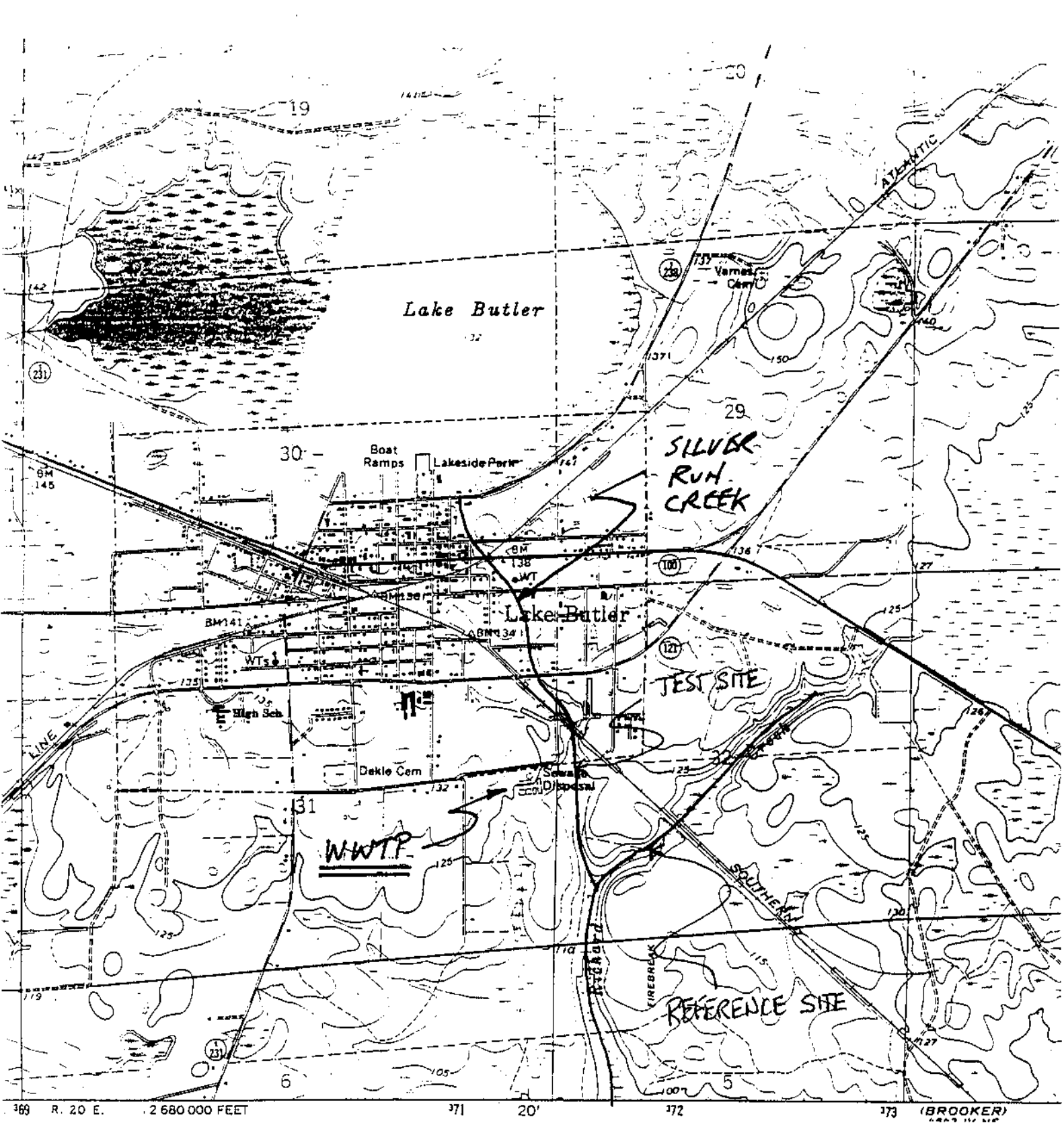
Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

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



SCALE 1:24000

MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

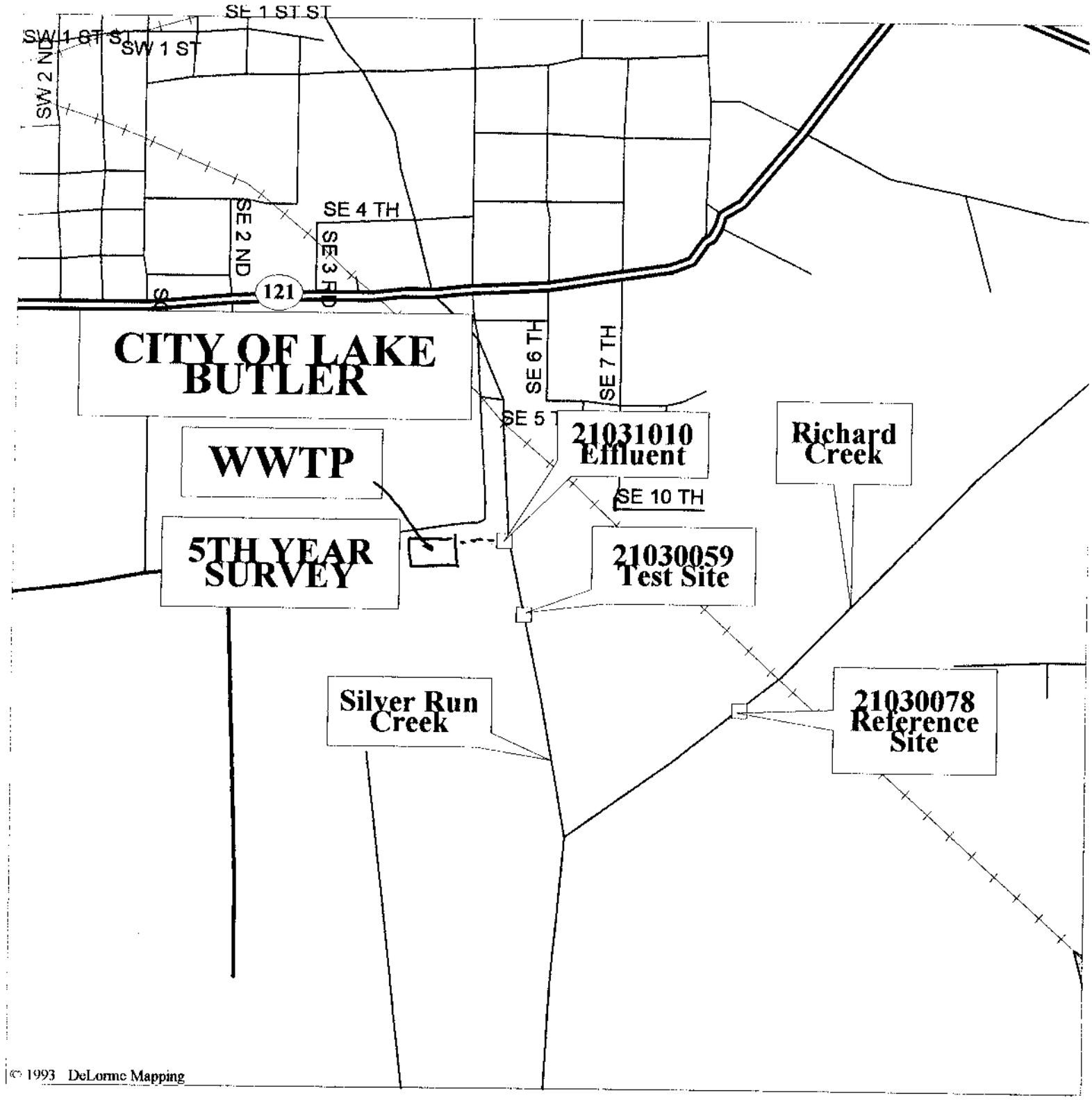
KILOMETER

CONTOUR INTERVAL 5 FEET
DATUM IS MEAN SEA LEVEL

LAKE BUTLER, FLA.

N3000—W8215/7.5

1966
PHOTOINSPECTED 1984
AMS 4544 III SE—SERIES V847



LEGEND

- State Route
- Population Center
- Street, Road
- Major Street/Road
- State Route
- Railroad
- River

Scale 1:9,375 (at center)

1000 Feet

200 Meters

Mag 15.00
Thu Sep 21 15:06:47 1995

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: City of Lake Butler WWTF		Date Summary Prepared: 9/22/95
Location (attach detailed map):	County: Union	District: NED
Federal Permit # FL0028428 and expiration date: 6/30/96	State GMS # and 3163M01817 State expiration date: 4/25/97	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility: Secondary treatment of domestic wastewater.

Description of treatment process: A 0.500 MGD rotating biological contactor wastewater treatment plant. The treated effluent is chlorinated, dechlorinated, and post aerated prior to discharge.

Receiving waters: Silver Run Creek	Classification: I II (III)	
Design Flow: 0.5 MGD	Mean Flow: 0.39 MGD	Flow during survey:

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

therefore, the best time to sample is: Anytime

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

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

Parameter	Limit (units)
See Attached	

Describe special permit conditions and permit modifications: See Attached Conditions 23 and 25.

Lake Butler WWTF
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):
Treated effluent is discharged through a pipe set into a concrete structure on the bank of Silver Run Creek.

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: Monthly average ammonia exceeded the 2 mg/L limit in October 1994 and November 1994 with values of 2.5 mg/L and 3.2 mg/L, respectively. Organic nitrogen exceeded the monthly average limit of 3 mg/L with a value of 4.2 mg/L in October 1994.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
Consent order signed in April 1992. City payed a penalty of $11,337.66.

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
Ammonia and organic nitrogen have improved over the past year as compared to the previous year (8/93 → 7/94) (8/94 → 7/95)

Additional information:

Staff contributing to this review (signature):

Kris McKelvey (Biologist)

(Inspector)

Jon Dinges (Engineer)

Pat O'Connor (biologist)

( )

( )

PERMITTEE:

Mr. Bruce C. Spragg
City of Lake Butler WWTP

I.D. Number: 3163M01817
Permit/Cert Number: DT63-236947
Date of Issue: February 25, 1994
Expiration Date: April 25, 1997

16. Pursuant to Rule 17-640.500(1)(f) FAC, the Agricultural Use Plan shall be updated and submitted to the Department annually beginning one year from the date of operation permit issuance. The pH of the residuals soil mixture and a summary of the total domestic wastewater residuals, nitrogen, and heavy metals applied on an annual basis shall be submitted with the annual update to the Agricultural Use Plan.

17. In accordance with Chapter 17-601 FAC, the monitoring requirements and effluent limitations for this plant are as follows:

PARAMETER	EFFLUENT LIMIT	MINIMUM FREQUENCY	SAMPLE TYPE	SAMPLE LOCATION
Flow (mgd)	0.500 Annual Average	Daily, 5/week	A	Influent or Effluent
$CBOD_5$ (mg/l)	(a)	Weekly	(b)	Influent (c) & Effluent (d)
TSS (mg/l)	(a)	Weekly	(b)	Influent (c) & Effluent (d)
NH_3-N (mg/l)	(a)	Weekly	(b)	Effluent (d)
ON (mg/l)	(a)	Weekly	(b)	Effluent (d)
DO (mg/l)	6.0 Minimum	Daily, 5/week	Grab or Instrument	Effluent (d)
pH Units	Minimum 6.0 Maximum 8.5	Daily, 5/week	Grab or Instrument	Effluent (d)
Chlorine Residual(mg/l)	0.5 Minimum (e) 0.01 Maximum	Daily, 5/week Daily, 7/week	Grab or Instrument	ccc Dechlor. Effluent
Fecal Coliform no./100 (ml)	200 (i)	Weekly	Grab	Effluent (d)
Toxicity	See Specific Condition Number 18			
Nutrient Monitoring	See Specific Condition Number 19			
Stream Monitoring	See Specific Condition Number 20			
Testing Methods	See Specific Condition Number 21			

(a)

	ANNUAL	MONTHLY	WEEKLY	ONE TIME MAXIMUM
$CBOD_5$	10	12.5	15	20
TSS	10	12.5	15	20
ON	3	3	4.5	6
NH_3-N	2	2	3	4

* Rule 17-600.740, FAC
A. Recording flowmeter and totalizer required.

(b) 8-hour minimum flow-proportioned composite sample.

21. Field testing, sample collection and preservation, laboratory testing, including quality control procedures, and all record keeping shall comply with Chapter 17-160, FAC. Each reclaimed water parameter has an applicable method detection limit (MDL) and a practical quantitative limit (PQL) as follows:

ANALYTE	RECOMMENDED MDL	TARGETS PQL	EPA METHOD
Silver	0.2	0.2	272.2
Cadmium	3.0	10.0	200.7
Copper	6.0	25.0	200.7
Lead	1.0	2.0	239.2
Nickel	15.0	10.0	200.7
Zinc	2.0	5.0	200.7 or
	5.0	5.0	289.1
Total chlorine Residual	10.0	10.0	330.1 or
	200.0	200.0	330.5
Nitrate	100.0	100.0	352.1

Units are microgram per liter
Equivalent methods are subject to approval by the Department.

22. Pursuant to Rule 17-602.360(1)(e), an operation and maintenance log shall be maintained on-site in a location accessible to 24-hour inspection and current to the last operation and maintenance performed. The log at a minimum shall include identification of the plant; the signature and certification number of the operator; date and time in and out; specific operation and maintenance performed; tests performed and samples taken and major repairs made.

23. The applicant has agreed to perform a Water Quality Based Effluent Limits (WQBEL) study to determine appropriate effluent limits and the impact on the receiving stream. Alternately, the applicant will investigate the feasibility and relative cost effectiveness of land application as a means of effluent disposal (reuse feasibility study required). The applicant will continue to investigate and mitigate the silver and toxicity which have been observed. An I and I investigation will be performed and corrective action initiated. A cooperative venture for reuse with the Department of Corrections may be considered. An increase in surface water discharge requires an Antidegradation Study. The schedule for compliance is as follows:

1. Date when planning is expected to be complete 5/01/95
2. Date when design will be complete. 11/01/95
3. Date construction permit application will be submitted to upgrade or eliminate the existing discharge. 10/01/95
4. Date construction will begin. 1/01/96
5. Date construction is to be completed. 11/01/96
6. Date that full compliance with Chapter 403, Florida Statues and rules of the Department will be achieved. 2/01/97

24. The Permittee shall, prior to 60 days before the expiration of this permit, apply for an operation permit on forms and in a manner prescribed by the Department, Section 17-4.09, FAC. It is highly recommended that the wastewater treatment plant and disposal system be evaluated prior to the submittal of an operation permit application so it can be established that there are no violations of current Department regulations. If there is noncompliance, the Department should be contacted as to the appropriate type of permit to obtain.

25. This facility is continuing to review and reduce silver from entering the city sewer system. A local pretreatment ordinance is being reviewed by the city at this time. Beginning March 1, 1994, the city shall sample the effluent from the WWTP for silver on a weekly basis. The city has the option to continue to sample within their collection system for purposes of identifying sources of silver. A full report of findings must be submitted to the Jacksonville Department of Environmental Protection domestic waste section within 60 days of permit issuance.

26. Permit monitoring requirements and reclaimed water limitations for this plant are subject to being changed to meet Water Quality Based reclaimed water Limits (WQBEL) Sections 17-600.430 and Chapter 17-650, FAC.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL REGULATION

For Ernest E. Frey, P.E.
Director of District Management

FILING AND ACKNOWLEDGEMENT
FILED, on this date, pursuant to S120.52 , Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

Clerk 2/28/94 Date

FY15

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP - NED	STORET STATION NUMBER: 21038078	DATE (M/D/Y): 9-25-95	TIME: 1300	RECEIVING BODY OF WATER: Richards Creek

REMARKS: Waterlevel down since H.D. deployment	LOCATION: Richards Creek above confluence with Silver Run Creek	FIELD ID/NAME: REFERENCE SITE

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
40		30					

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

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

Width of riparian vegetation (m) on least buffered side: 18+

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

velocity

.5m depth

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): 1.5m

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	6		Sand	20	2	dipnet
Leaf Packs or Mats	5	6	dipnet	Mud/Muck/Silt			
Aquatic Vegetation	0			Other:			
Rock or Shell Rubble	0			Other:			
Shorezone (Roots/Veg.)	35	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):			Secchi (m):
Top								.5
Mid-depth	.25m	21.75	6.12	6.45	225			
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:

Warm, partly cloudy

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

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

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

SUBMITTING AGENCY CODE: 7051 / SUBMITTING AGENCY NAME: FDEP-NED WAX	STORET STATION NUMBER: 21030078	DATE (M/D/Y): 9-25-95	RECEIVING BODY OF WATER: [illegible]

REMARKS: Water level data since H.D. deployment.	LOCATION: Richards Creek above confluence with Silver Fox Creek	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 [18]	Max. observed: >0.25 m/sec. but < 2 m/sec 20 **(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 [18]	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 [16]	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 riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. **(20)** 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 15 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

[135] **TOTAL SCORE**

Comments

ANALYSIS DATE: 9-25-95	ANALYST: Tim McElvey	SIGNATURE: Tim McElvey

FY15

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 5)

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP - NED JAX	STORET STATION NUMBER: 21030059	DATE (M/D/Y):	TIME: 1500	RECEIVING BODY OF WATER: Silver Run Creek

REMARKS: water level down 2ft since H.D. department.	LOCATION:	FIELD ID/NAME: [illegible] 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)
30		50		20			

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: 4m

List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark (m above bed): [illegible]

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

2 meters
.5 - 2.4
1ft/sec.

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)	15	6		Sand	50	2	
Leaf Packs or Mats	15	6		Mud/Muck/Silt			
Aquatic Vegetation	5			Other:			
Rock or Shell Rubble	2			Other:			
Shorezone (Roots/Veg.)	30	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								
Mid-depth	.3	26.21	6.65	6.85	316			.6
Bottom	.6							

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

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

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

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

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

Weather Conditions/Notes:
partly cloudy, humid, hot 90°F+
slight breeze 5-10 from the EAST.

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

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

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

FYI S

SUBMITTING AGENCY CODE: 8031 / SUBMITTING AGENCY NAME: FDEP-NED TAT	STORET STATION NUMBER: 21030059	DATE (M/D/Y): 9-25-95	RECEIVING BODY OF WATER: SILVER RUN CREEK

REMARKS: FYI S	LOCATION: TEST SITE BELOW P.O.D.	FIELD ID/NAME: TEST SITE

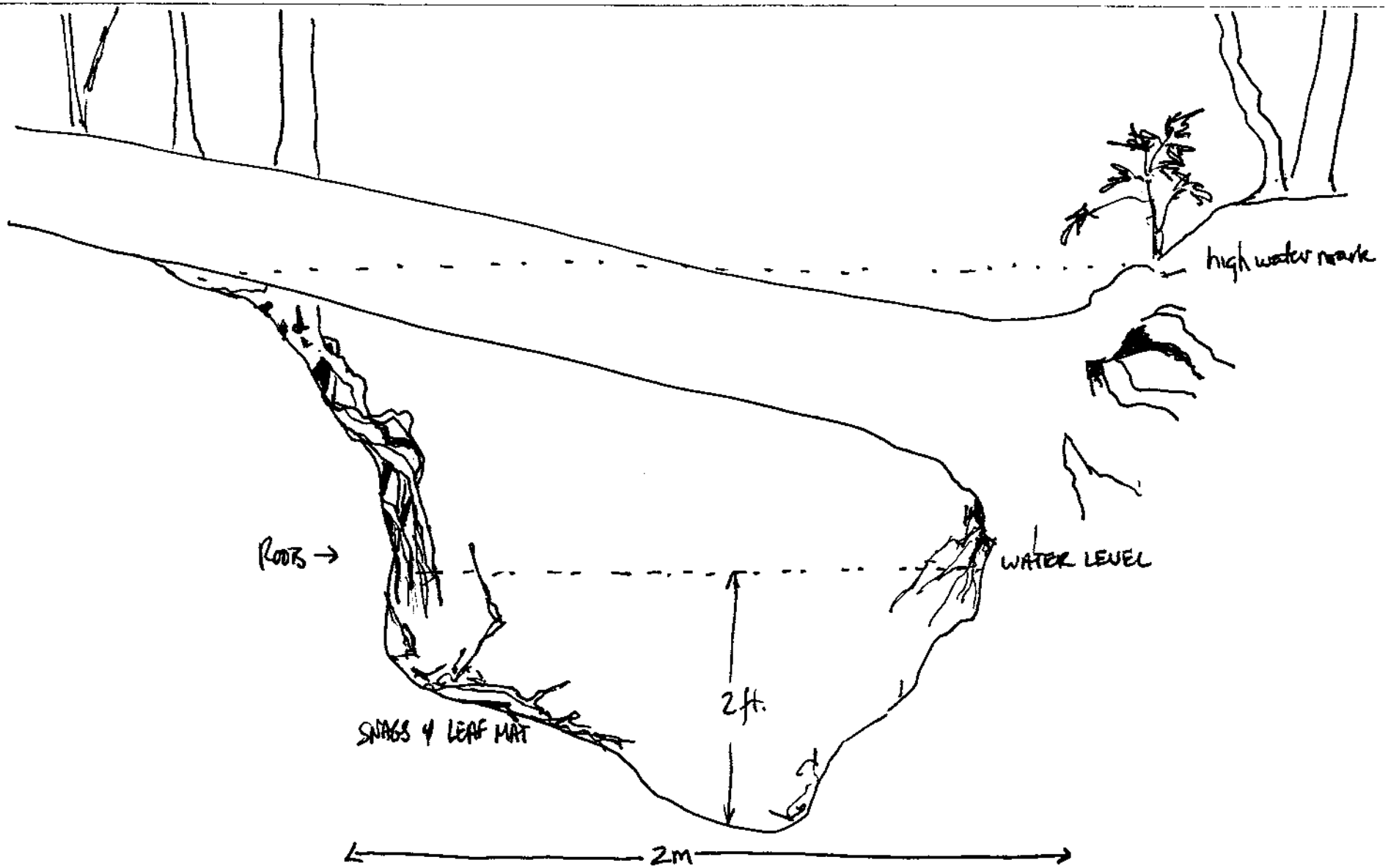
Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [16]	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 (16)	20% to 40% snags, logs, tree roots, emergent vegetation, 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 [18]	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 [6]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 8 7 (6)	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width [5]	Width of native vegetation (least buffered side) greater than 18 m 20 19 18 17 16	Width of native vegetation (least buffered side) 12 m to 18 m 15 14 13 12 11	Width of native vegetation 6 to 12 m, human activities still close to system 10 9 8 7 6	Less than 6 m of native buffer zone due to intensive human activities (5) 4 3 2 1
Riparian Zone Vegetation Quality [15]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 20 19 18 17 16	50% to 80% of riparian zone is vegetated, but one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. (15) 14 13 12 11	25% to 50% of riparian zone is vegetated, but one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 10 9 8 7 6	Less than 25% of streambank surfaces are vegetated. Poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 5 4 3 2 1

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

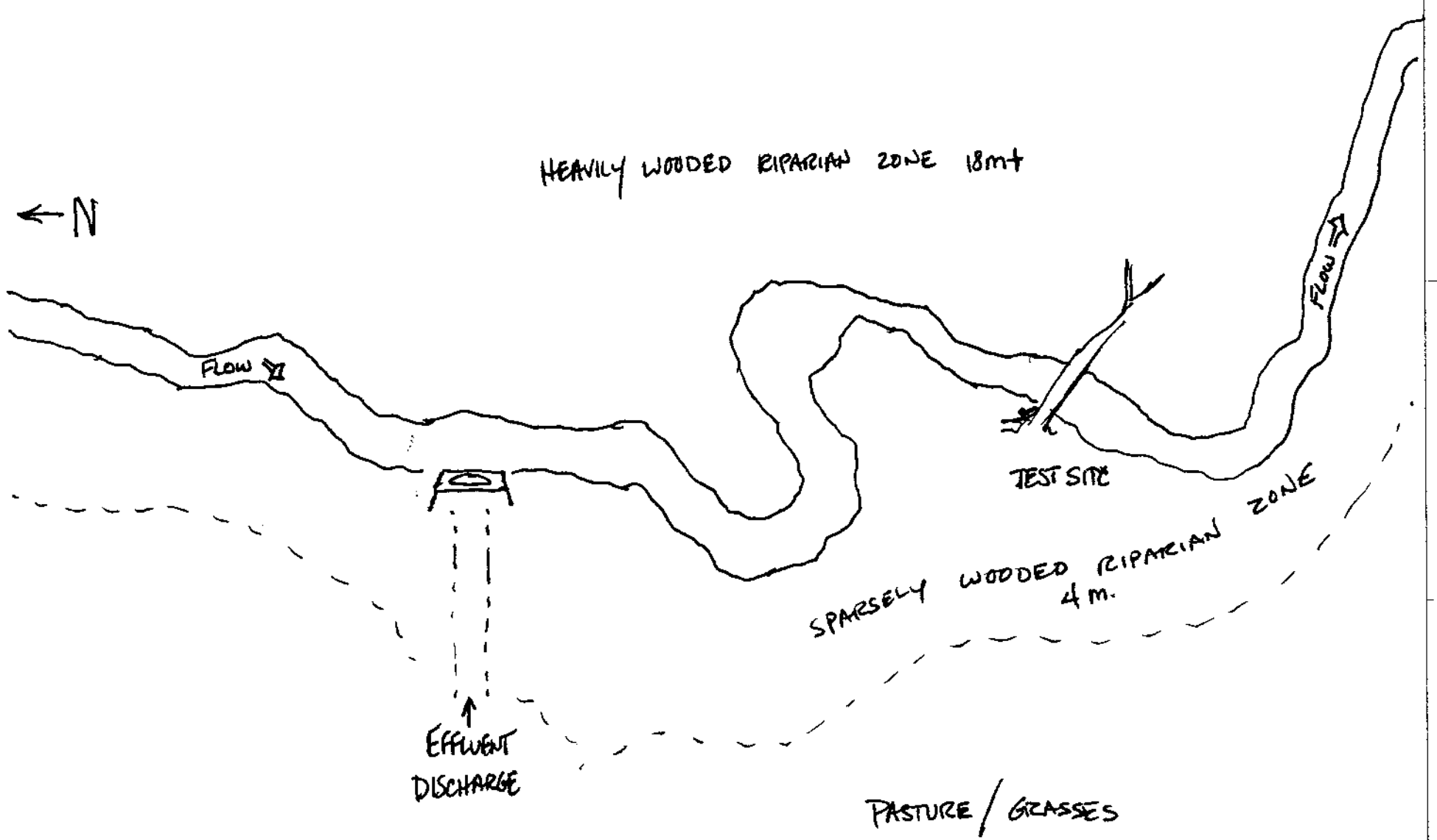
Comments Water level down 2ft.

[100] **TOTAL SCORE**

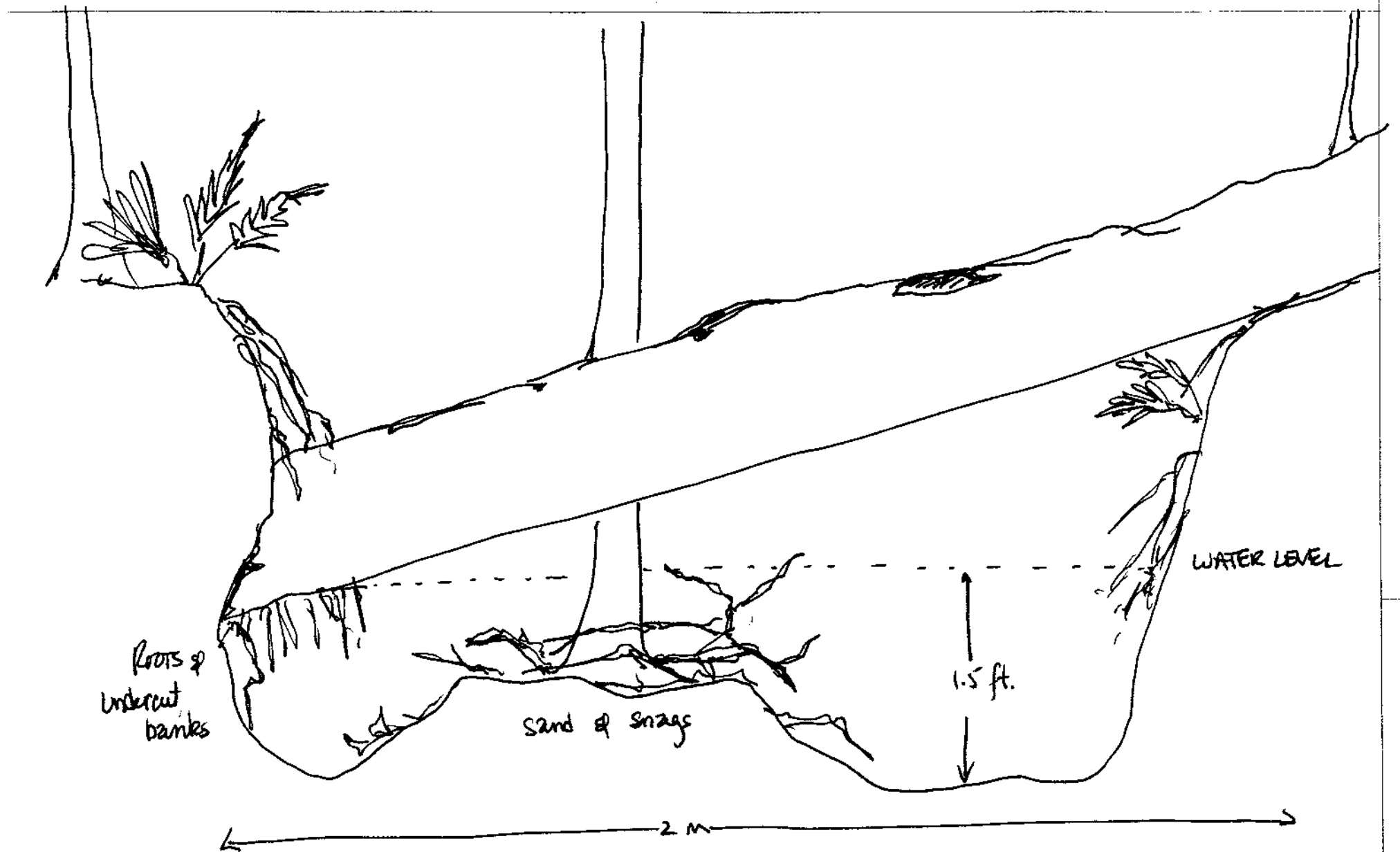
ANALYSIS DATE: 9-25-95	ANALYST: Tim McKelvey	SIGNATURE: Tim McKelvey



LAKE BUTLER FYI.S TEST SITE 9-25-95 SILVER RUN CREEK



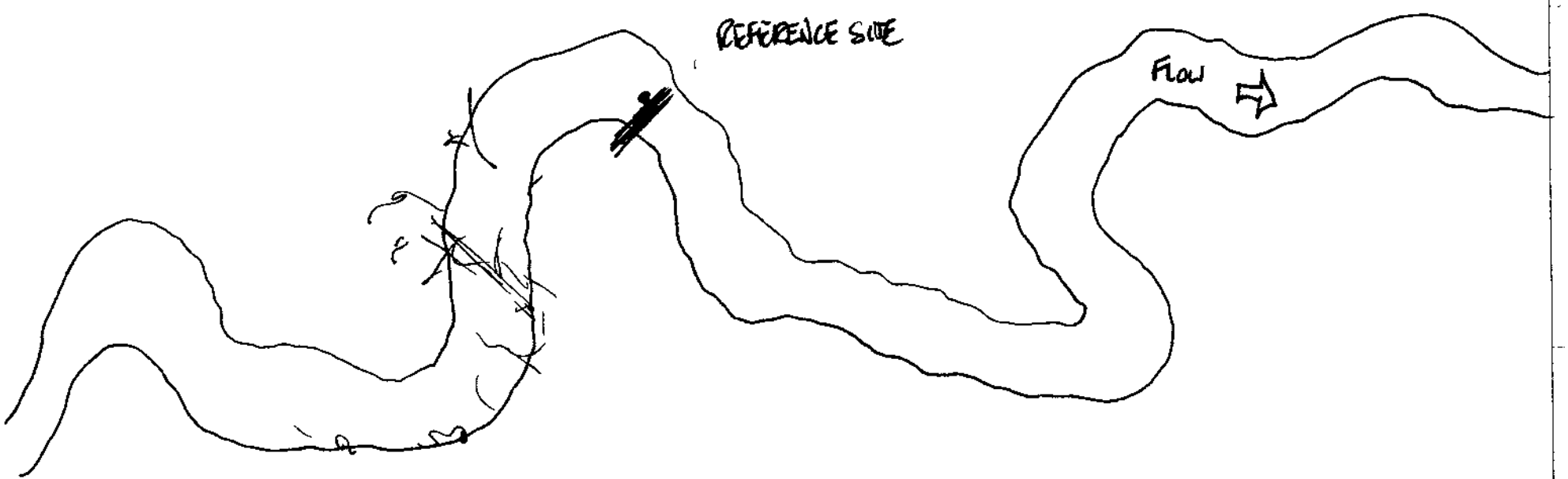
LAKE BUTLER FLIS TEST SITE 9-25-95 SILVER RUN CREEK



LAKE BUTLER FLIS RICHARDS CREEK REFERENCE SITE

National Brand

HEAVILY WOODED RIPARIAN ZONE 18+ M



HEAVILY WOODED RIPARIAN ZONE 18+ M

N

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Lake Butler, City of
County: Union
Contact / District: Tim McKelvey / Northeast
NPDES Permit #: FL00 24828
LIMS Sample #: 118120 (bamp de log 19695) **LIMS Job #:** 95-Sep-26-24

Sample Collection: Date 9-25-95 Time 1700
Test Beginning: Date 9-26-95 Time 1420
Test Ending: Date 9-28-95 Time 1420
Organism Batch #: 45 **Diluent Batch #:** 39
Organism Age: < 24 hours
Test Organism: Ceriodaphnia dubia

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

Test Number: 1 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.2 @ 23.2	8.2 @ 24.8 °C	109.1 @ 102.3 993 @ 1013 @ 23.9 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.5	8.3 @ 24.7 °C	107.9 @ 102.3 978 @ 1013 @ 24.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.7	8.4 @ 24.2 °C	1004.0 @ 1032.0 109.4 @ 102.3 996 @ 1013 @ 24.0 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	A	5	5	5	8.2		8.3	23.5		24.1	7.9		7.9	200		200
Control B	B	5	5	5			8.3			24.1			7.8			200
Control C	C	5	5	5			8.3			24.1			7.8			200
Control D	D	5	5	5			8.3			23.9			7.7			200
100 %	A	5	5	5	~~6.4~~		8.2	23.9		23.9	8.0		7.9	465		485
100 %	B	5	5	5			8.2			24.2			7.8			495
100 %	C	5	5	5			8.2			24.2			7.8			485
100 %	D	5	5	5			8.2			24.0			7.7			495
Measured/Loaded by:		MF	MF	MF	LM		JN	LM		JN	LM		JN	LM		JN
Recorded by:		MF	MF	MF	JN		TR	JN		TR	JN		TR	JN		TR

7.2 * JN 9-26-95 Work with this data

Investigators' Signatures

Marshall Faircloth
Jennifer Sparrow
Tina Kaden

reviewer

form updated 5/05/95

Water Quality Parameters	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.0	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	—	<0.03	<0.03	DR 100	TM
Alkalinity (mg/L as $CaCO_3$):	—	75	90	Hach	LM
Hardness (mg/L as $CaCO_3$):	—	80	170	Hach	LM
Total ammonia (mg/L as N):	—	<0.017	<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -58.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: City of Lake Butler WWTP
County: Union
Contact / District: Tim McKelvey
NPDES Permit #: FL0024828
LIMS Sample #: 118120 LIMS Job #: 95-SEP-25-24

Sample Collection: Date 9-25-95 Time 1700
Test Beginning: Date 9-26-95 Time 1420
Test Ending: Date 9-29-95 Time 1420
Organism Batch #: 44 Diluent Batch #: well
Organism Age: 11 days
Test Organism: Cyprinella leedsi

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.2 @ 23.2	8.2 @ 24.8 °C	109.1 @ 102.3 993 @ 1013 @ 23.9 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.5 @ 23.5	8.3 @ 24.7 °C	102.9 @ 102.3 978 @ 1013 @ 24.1 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.7 @ 23.7	8.4 @ 24.2 °C	104.0 @ 103.0 109.4 @ 102.3 996 @ 1013 @ 24.0 °C

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h	0 hr	24 h	48 h
Control A	104	5	5	5	7.7	8.2	8.3	24.0	23.8	24.0	7.8	7.7	7.8	255	255	290
Control B	183	5	5	5	7.9	8.2	8.3	24.0	23.8	23.6	7.7	7.7	7.8	245	245	250
Control C	79	5	5	5	7.9	8.2	8.3	24.0	23.8	23.8	7.6	7.8	7.8	245	245	245
Control D	58	5	5	5	7.9	8.2	8.3	24.0	23.8	23.6	7.5	7.8	7.8	245	245	245
100% A	209	5	5	5	6.9	7.4	7.6	24.0	23.8	23.9	7.4	6.8	7.6	495	485	490
100% B	1265	5	5	5	7.0	7.4	7.7	25.1	23.8	23.8	7.1	6.8	7.4	495	485	490
100% C	21	5	5	5	7.0	7.4	7.7	25.1	23.8	23.8	6.9	6.7	7.1	495	485	490
100% D	504	5	5	5	7.0	7.4	7.7	25.0	23.8	23.8	6.8	6.6	7.1	490	485	490
Measured/Loaded by:		MF	MF	MF	VM	JLS	JN	VM	JLS	JN	VM	JLS	JN	VM	JLS	JN
Recorded by:		MF	MF	MF	JN	JN	TR	JN	JN	TR	JN	JN	TR	JN	JN	TR

Investigators' Signatures

Daniel Faircloth
Joy Hammond
Mf Mont
Jennifer Spangler
Gina Mikula
Robin C. Rader

reviewer form updated 5/05/95

Water Quality Parameters	Salt Water Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			0.0	—	Tim McKelvey
Lab Total Residual Cl2 (mg/L):	<0.03	—	<0.03	DR100	VM
Alkalinity (mg/L as $CaCO_3$):	120	—	90	hach	VM
Hardness (mg/L as $CaCO_3$):	130	—	170	hach	VM
Total ammonia (mg/L as N):	<0.017	—	<0.017	Orion	JN

Ammonia Meter #98136 Ammonia Meter Slope: -58.7 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

Stream Condition Index for Florida (SCI)

CITY OF LAKE BUTLER WWTF

REFERENCE SITE

Calculation & Interpretation of the Stream Condition Index for Florida (SCI) (Draft 1994)									
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	**Value**	**Panhandle (65, 75a)**				**Peninsula (75b, c, d)**			
		5	3	1	Score	5	3	1	Score
Number of Taxa	27	≥ 31	16–30	0–15		≥ 27	14–26	0–13	5
EPT Index	4	≥ 7	4–6	0–3			≥ 4	0–3	3
% Contribution of Dominant Taxon	19.5		≤ 20	> 20			≤ 37	> 37	3
Florida Index	11	≥ 18	9–17	0–8		≥ 7	4–6	0–3	5
% Diptera	27.4		≤ 38	> 38			≤ 32	> 32	3
% Suspension feeders/ Collector-Filterers	7.1	≥ 12	7–11	0–6		≥ 8	4–7	0–3	3
% Shredders	5.3		≥ 10	0–9			≥ 13	0–12	1
% Crustacean+Mollusks (Peninsula only)	4.4	–	–	–			≥ 16	0–15	1
# Crustacean+Mollusks (Peninsula only)	2	–	–	–			≥ 4	0–3	1
Total Score		**Panhandle**				**Peninsula**			25
Interpretation of Score		**No Impairment**			**29-23**	**No Impairment**			**33-27**
		Moderate Impairment			**22-15**	**Moderate Impairment**			**26-17**
		Severe Degradation			**14-7**	**Severe Degradation**			**16-9**

TEST SITE

Calculation & Interpretation of the Stream Condition Index for Florida (SCI) (Draft 1994)									
Macroinvertebrate Dip Net (20 sweeps of most productive substrates)	**Value**	**Panhandle (65, 75a)**				**Peninsula (75b, c, d)**			
		5	3	1	Score	5	3	1	Score
Number of Taxa	12	≥ 31	16–30	0–15		≥ 27	14–26	0–13	1
EPT Index	0	≥ 7	4–6	0–3			≥ 4	0–3	1
% Contribution of Dominant Taxon	51.6		≤ 20	> 20			≤ 37	> 37	1
Florida Index	3	≥ 18	9–17	0–8		≥ 7	4–6	0–3	1
% Diptera	81		≤ 38	> 38			≤ 32	> 32	1
% Suspension feeders/ Collector-Filterers	0	≥ 12	7–11	0–6		≥ 8	4–7	0–3	1
% Shredders	29.5		≥ 10	0–9			≥ 13	0–12	3
% Crustacean+Mollusks (Peninsula only)	17.5	–	–	–			≥ 16	0–15	3
# Crustacean+Mollusks (Peninsula only)	1	–	–	–			≥ 4	0–3	1
Total Score		**Panhandle**				**Peninsula**			13
Interpretation of Score		**No Impairment**			**29-23**	**No Impairment**			**33-27**
		Moderate Impairment			**22-15**	**Moderate Impairment**			**26-17**
		Severe Degradation			**14-7**	**Severe Degradation**			**16-9**

Benthic macroinvertebrate taxa list for City of Lake Butler WWTF, collected via Hester-Dendy artificial substrates in Richard Creek (reference) and Silver Run Creek (test), on 25 September, 1995. Densities, in number/m^2, represent the mean of three replicates.

	Reference Site	Test Site
Oligochaeta		
Dero trifida	5	–
Gastropoda		
Physella sp.	–	312
Ancylidae	3	8
Gastropoda	–	11
Trombidiformes		
Hygrobates sp.	3	–
Ephemeroptera		
Acerpenna pygmaeus	79	–
Baetis sp.	3	–
Stenacron interpunctatum	3	–
Stenonema smithae	77	–
Plecoptera		
Neoperla sp.	19	–
Coleoptera		
Ancyronyx variegata	3	13
Stenelmis sp.	8	21
Megaloptera		
Corydalus cornuta	16	8
Trichoptera		
Cheumatopsyche sp.	19	–
Chimarra sp.	3	–
Lype diversa	29	–
Nyctiophylax sp.	5	–
Oecetis sp.	3	–
Diptera		
Ablabesmyia mallochi	3	124
Ablabesmyia rhamphe grp.	–	13
Chironomus sp.	–	193
Cladotanytarsus sp.	3	–
Conchapelopia sp.	11	–
Cryptochironomus sp.	–	16
Dicrotendipes simpsoni	–	11
Hemerodromia sp.	13	–
Larsia berneri	–	13
Meropelopia sp.	–	5
Pentaneura inconspicua	3	37
Polypedilum sp.	–	13
Polypedilum convictum grp.	13	–
Polypedilum fallax	3	24

Polypedilum illinoense grp.	5	2087
Polypedilum scalaenum grp.	–	156
Rheocricotopus robacki	8	–
Rheotanytarsus distinctissimus grp.	8	–
Rheotanytarsus exiguus grp.	8	–
Simulium sp.	5	–
Stenochironomus sp.	5	90
Tanytarsus sp.	3	–
Tanytarsus sp. J (Epler)	3	–
Tanytarsus sp. L (Epler)	3	–
Tanytarsus sp. M (Epler)	5	–
Thienemannimyia grp.	–	13
Tribelos fuscicornis	–	50
Tribelos jucundus	–	11
Chironomidae	–	595

Benthic macroinvertebrate taxa list for the City of Lake Butler WWTF, collected via 20 discrete dip net sweeps in Richard Creek (reference) and Silver Run Creek (test), on 25 September, 1995.

	Reference Site	Test Site
Oligochaeta		
Limnodrilus hoffmeisteri	–	240
Gastropoda		
Micromenetus dilatatus	35	–
Physella sp.	–	6538
Pelecypoda		
Pisidiidae	143	–
Ephemeroptera		
Ephemeroptera	107	–
Odonata		
Argia sp.	287	–
Argia tibialis	35	–
Dromogomphus spinosus	–	48
Hagenius brevistylus	35	–
Coenagrionidae	71	–
Hemiptera		
Trochopus sp.	71	–
Coleoptera		
Dineutus sp.	35	–
Dubiraphia sp.	287	–
Microcylloepus pusillus	395	–
Stenelmis sp.	503	96
Elmidae	719	192
Trichoptera		
Cheumatopsyche sp.	35	–
Lype diversa	35	–
Oecetis sp.	107	–
Trichoptera	35	–
Diptera		
Ablabesmyia mallochi	143	1490
Ablabesmyia rhamphe grp.	35	240
Chironomus sp.	–	2259
Conchapelopia sp.	35	769
Cryptochironomus sp.	35	–
Hemerodromia sp.	71	–
Hexatoma sp.	71	–
Labrundinia sp.	35	–
Palpomyia/Bezzia grp.	35	–
Pentaneura inconspicua	107	240
Polypedilum sp.	–	480
Polypedilum illinoense grp.	107	18846
Polypedilum scalaenum grp.	–	480

Rheocricotopus robacki	71	–
Stenochironomus sp.	107	–
Tanytarsus sp. L (Epler)	35	–
Tanytarsus sp. M (Epler)	179	–
Tribelos jucundus	–	240
Chironomidae	35	5288

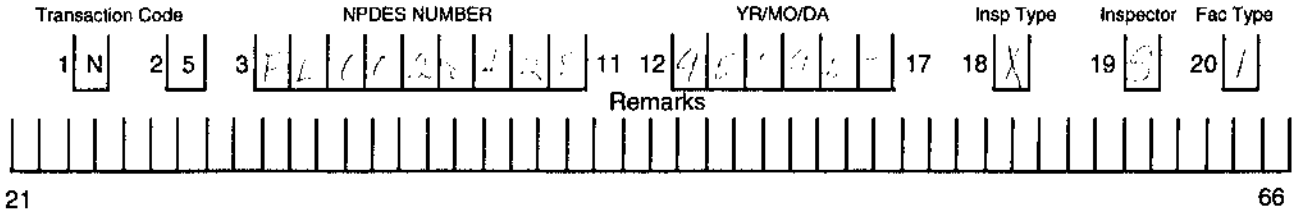
Periphyton taxa list and densities (#/cm^2) for City of Lake Butler WWTF, collected via glass microscope slides in Richard Creek (reference) and Silver Run Creek (test), on 25 September, 1995.

	Reference Site	Test Site
Cyanophyceae		
Aphanocapsa sp.	292	–
Aphanothece sp.	–	345
Chroococcus sp.	292	345
Lyngbya sp.	–	345
Chrysophyceae		
Mallomonas sp.	–	345
Bacilliariophyceae		
Achnanthes sp.	585	–
Achnanthes exigua	5846	–
Achnanthes lanceolata apiculata	585	–
Achnanthes lanceolata dubia	292	345
Achnanthes peragalli	–	345
Cocconeis placentula	4677	–
Cyclotella meneghiniana	–	2070
Eunotia sp.	35078	–
Eunotia curvata	585	–
Eunotia incisa	2046	–
Eunotia pectinalis	4969	690
Frustulia rhomboides	–	345
Gomphonema gracile	585	–
Gomphonema parvulum	2631	690
Gomphonema subclavatum	877	–
Hantzschia amphioxys	–	345
Navicula arvensis	4385	–
Navicula capitata hungarica	292	–
Navicula cocconeiformis	–	345
Navicula minima	27770	–
Navicula placentula	877	–
Navicula viridula	292	–
Nitzschia amphibia	–	345
Nitzschia fonticola	292	–
Nitzschia palea	1754	1035
Pinnularia sp.	–	345
Pennales	1754	1035
Chlorophyceae		
Characium sp.	585	–
Chlorococcum sp.	585	345
Cosmarium sp.	–	345
Onychonema laeve latum	–	690
Scenedesmus sp.	877	–
Chlorophyceae	–	345

Phytoplankton taxa list and densities (#/mL) for City of Lake Butler WWTF, collected via subsurface grabs in Richard Creek (reference) and Silver Run Creek (test), on 25 September, 1995.

	Reference Site	Test Site
Cyanophyceae		
Aphanothece sp.	–	10
Chroococcus sp.	–	10
Dactylococcopsis sp.	10	–
Lyngbya sp.	20	–
Microcystis sp.	–	31
Oscillatoria sp.	–	123
Rhabdoderma sp.	–	144
Spirulina sp.	–	62
Synechococcus sp.	–	21
Bacillariophyceae		
Achnanthes lanceolata	10	–
Cyclotella sp.	–	10
Cymbella sp.	20	–
Navicula sp.	10	–
Nitzschia sp.	10	31
Pennales	–	31
Chlorophyceae		
Chlamydomonas sp.	10	–
Chlorococcum sp.	–	31
Coelastrum sp.	–	92
Cosmarium sp.	–	10
Tetraedron sp.	10	10
Euglenophyceae		
Euglenophyceae	–	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)

