#201



Biological Assessment of

City of Mulberry Wastewater Treatment Plant

Polk County

NPDES #FL0020338

Sampled February 1997

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August 1997

Biology Section
Division of Administrative and Technical Services

Comprehensive Quality Assurance Plan No. 870346G

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: City of Mulberry WWTP
County: Polk
NPDES Number: FL0020338
State Permit Expiration Date: 6 March 1998

Toxics Sampling Inspection (XSI)

Date Sampled: 24 February 1997

Results: Atrazine (0.057 µg/L) was detected in the effluent at a concentration well below chronically toxic levels. Iron (31 µg/L) and zinc (66 µg/L) were found in the effluent at concentrations that complied with Class III water quality standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 24 February 1997

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 24 February 1997

Results: Measures of macroinvertebrate health indicated the discharge was not negatively affecting the benthic community. Hester-Dendy taxa richness, Florida Index, Shannon-Weaver diversity, and the EPT Index values indicated healthy conditions at the reference and test sites alike. The Stream Condition Index scores at the reference site (29) and at the test site (27) placed these sites in the "excellent" category. An additional background site, located in the North Prong of the Alafia River upstream of Ellis Branch, had an SCI score of 21, placing it in the low range of the "good" category. No undesirable amounts of algal biomass were observed at the test site. Flow characteristics appeared to delay the effects of the nutrient enrichment found in the system. However, areas downstream with longer water retention times, such as the lower portions of the Alafia River or Hillsborough Bay, may be negatively affected by the substantial nutrient loading from this basin.

Water Quality Inspection (WQI)

Date Sampled: 24 February 1997

Results: The North Prong of the Alafia River was extremely enriched with ortho-phosphate (ranging from 9.6 mg/L at the background site to 5.5 mg/L at the test site). These levels are 5 to 10 times higher than those found in over 95% of other Florida streams. In contrast, effluent ortho-phosphate, with 2.3 mg/L, was lower than the receiving water levels. Nitrate-nitrite concentrations at the receiving water stations exceeded the values found in approximately 85% to 90% of other Florida streams. The phosphorus enrichment appeared to be the result of factors other than the discharge (*e.g.*, stormwater runoff from phosphate mining and agricultural areas). Algal growth potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at the background site (7.0 mg dry wt/L), the reference site (41.5 mg dry wt/L), and at the test site (35.5 mg dry wt./L). The effluent AGP was 2.9 mg dry wt/L.

Introduction

The City of Mulberry wastewater Treatment Plant is located in Polk County, Florida (see maps in Appendix). This is a 0.75 MGD Type I domestic facility, with a sequencing batch reactor, automatic backwash filters, chlorination for disinfection, reaeration, and subsequent dechlorination. The facility treats incoming domestic wastewater in batches, with 6 to 8 separate discharge events per day. An average of 0.341 MGD of treated effluent is released into the Class III North Prong of the Alafia River.

Permit limits are as follows: CBOD (5.0 mg/L as an annual average), TSS (5.0 mg/L as an annual average), total nitrogen (3.0 mg/L as an annual average), dissolved oxygen (5.5 mg/L minimum), pH (6.0 to 8.5 SU), and fecal coliforms (non-detectable). Although the facility lies within the area subject to the Grizzle-Figg Rule, the total phosphorus limit for the discharge has been waived.

Monthly operating report data from December, 1995, to November, 1996, shows general compliance with permit limits, with some exceptions. The total nitrogen limit was exceeded on 4 occasions, the fecal coliform limit was exceeded 3 times, the dissolved oxygen was less than allowed levels on 8 separate instances, and the TSS limit was violated one time. In February of 1992, the effluent was acutely toxic to the water flea, *Ceriodaphnia dubia*.

Major characteristics of community structure of study sites.

	Background Site	Reference Site	Test Site
Macroinvertebrate Qualitative			
Number of Taxa	33	50	23
Florida Index	8	23	12
SCI	21	29	27
EPT Index	2	9	5
% Contribution of Dominant Taxon	36.3	15.3	17.6
% Oligochaeta	1.6	11.2	10.3
% Diptera	22.1	32.1	32.3
% Ephemeroptera	12.1	12.8	14.7
% Trichoptera	0	7.0	5.9
% Odonata	3.7	0.4	0
% Coleoptera	3.2	7.4	1.5
% Amphipoda	36.3	9.1	17.6
% Gastropoda	8.4	16.8	5.9
% Pelecypoda	1.0	1.4	7.3
% Other	12.0	1.7	4.4
% Predators	13.2	7.1	8.1
% Above Surface Deposit Feeders	36.3	32.9	34.6
% Below Surface Deposit Feeders	1.0	10.3	10.3
% Suspension Feeders	1.6	5.5	9.6
% Scrapers	11.3	22.4	8.8
% Shredders	30.8	14.4	19.1
% Plant Piercers	0	4.2	5.1
Macroinvertebrate Hester-Dendy			
Number of Taxa		39	45
Florida Index		31	24
Shannon-Weaver Diversity		3.59	3.14
EPT Index		8	8
% Oligochaeta		0.1	3.8
% Diptera		42.6	58.3
% Ephemeroptera		22.3	6.8
% Trichoptera		22.2	19.0
% Amphipoda		1.4	6.1
% Gastropoda		6.4	0.5
% Coleoptera		3.1	5.1
% Other		1.2	0.3
% Predators		4.7	5.7
% Above Surface Deposit Feeders		39.8	39.7
% Below Surface Deposit Feeders		0.1	3.7
% Suspension Feeders		16.3	17.1
% Scrapers		14.0	3.2
% Shredders		17.8	27.8
% Plant Piercers		6.5	2.3
Phytoplankton Algae			
Number of Taxa	17	16	12
Shannon-Weaver Diversity	3.86	3.78	3.11
Algal Density (#/mL)	197.3	172.6	450.4
Chlorophyll a (µg/L)	1 U	0.88 U	1 U
% Green	25.0	23.8	12.5
% Diatoms	45.8	59.5	80.4
% Cryptophytes	6.2	0	1.8
% Blue-Green	22.9	9.5	5.4
% Other	0	7.2	0
Algal Growth Potential (mg dry wt/l)	6.98	41.46	35.49

Methods

The focus of this investigation was to determine the discharge's effects on the receiving waters. A comparison of biological community health was made between a reference site (located upstream of the discharge in the North Prong of the Alafia River) and a test site (located downstream of the discharge in the North Prong of the Alafia River). An additional background station, located in the North Prong of the Alafia River upstream of Ellis Branch, was established to determine the degree of human influences on the reference and test site other than the Mulberry WWTP. Note that the reference and test site receive water from the City of Lakeland's Glendale WWTP and stormwater runoff from the City of Mulberry (see maps in Appendix), but the "background" site does not. 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 site samples. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.

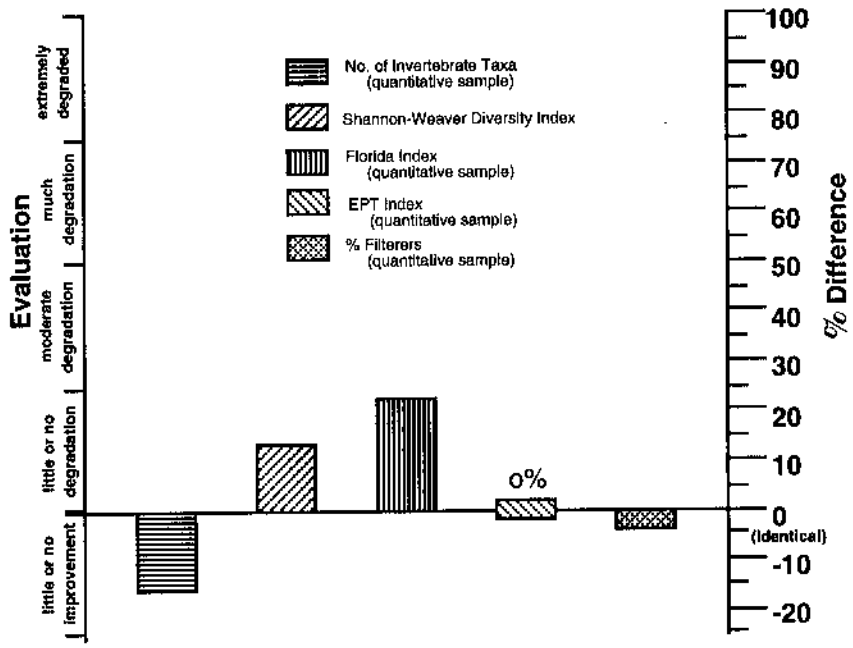
Benthic macroinvertebrate communities were evaluated at background, reference and test sites. Invertebrates were collected from multiple natural substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Additional invertebrate collections at the reference and test sites were accomplished using Hester-Dendy multiplate samplers which were incubated for 28 days (Ross 1990). Phytoplankton was sampled at background, reference, and test sites via subsurface grabs, and phytoplankton chlorophyll *a* was also determined (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 freshwater stream biota were evaluated and scored, with 20 points possible for each factor. Based on the sum of these individual scores, overall habitat quality is assigned to one of four categories: Optimal (105-140 points); Suboptimal (70-104 points); Marginal (35-69 points); and Poor (0-34 points). For marine systems, overall habitat quality is also assigned to one of four categories: Optimal (75-100 points); Suboptimal (50-75 points); Marginal (25-49 points); and Poor (0-24 points) (see habitat assessment field sheets in Appendix B).

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.



Effect of discharge on the benthic macroinvertebrate community.

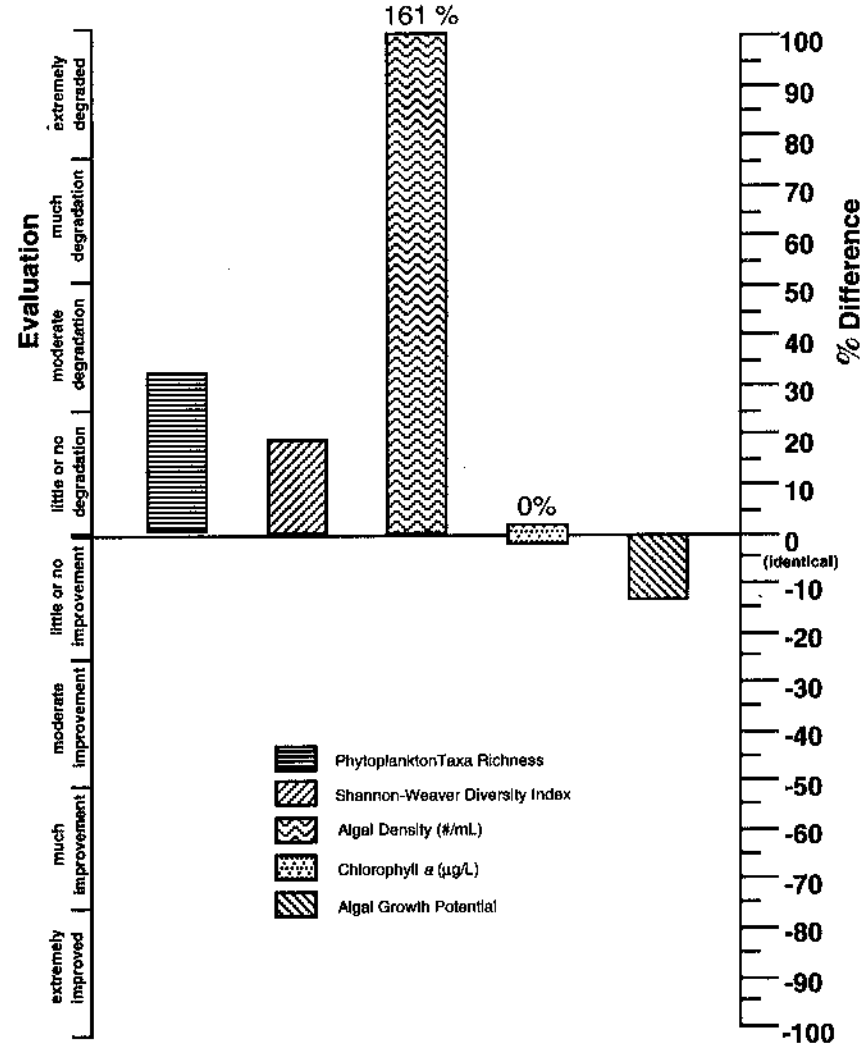
Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single type of organism (a high % contribution of the dominant taxon) is a related measure which is also associated with disturbance.

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

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

Community structure: Substantial shifts in the 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.



Effect of discharge on the algal community.

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

The Stream condition Index for Florida (SCI) is a composite macroinvertebrate metric (Barbour *et al.* 1996). The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected reference condition.

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: Charles Kovach, Andrea Grainger, and Joe Squitieri (DEP Southwest District) and Lyn Burton, Jennifer Eichelberger, Ken Espy, Marshall Faircloth, Russel Frydenborg, Maosen Hua, Joy Jackson, Elizabeth Miller, Urania Quintana, Landon Ross, Lisa Tamburello, David Whiting, and Vicki Whiting (Tallahassee Biology Laboratory). The report was reviewed by the Point Source Bioassessment Review Committee, consisting of Jan Mandrup-Poulsen, Wayne Magley, and Mike Tanski, as well as District representatives.

Results and Discussion

The habitat quality assessment at the background site, with 99 points, and at the reference site, with 77 points, ranked these stations in the suboptimal category. The test site, with a slightly lower habitat score (69 points) fell into the marginal category. All three sites had adequate in-stream habitat, but lost points in the categories of artificial channelization, habitat smothering, bank stability, or riparian buffer zone quality/width. Water velocity at the background site (0.07 m/sec) was lower than the velocity observed at the reference and test sites (0.2 m/sec each). The increased velocity at these sites can be attributed changes in channel characteristics, as well as potential flow augmentation from Ellis Branch.

Water at the reference and test sites was adequately oxygenated, with dissolved oxygen concentrations ranging from 5.7 mg/L to 6.4 mg/L. Dissolved oxygen at the background site was 4.0 mg/L, a concentration less than the Class III water quality standard of 5.0 mg/L. The pH ranged from 6.5 SU at the background site to 7.0 SU at the remaining sites. Conductivity was highest at the background site (974 µmhos/cm) and lowest at the test site (919 µmhos/cm).

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

Atrazine (0.057 µg/L) was detected in the effluent at a concentration well below chronically toxic levels. Iron (31 µg/L) and zinc (66 µg/L) were found in the effluent at concentrations that complied with Class III water quality standards.

The North Prong of the Alafia River was extremely enriched with ortho-phosphate, with concentrations ranging from 9.6 mg/L at the background site to 5.5 mg/L at the test site. These levels are 5 to 10 times higher than those found in over 95% of other Florida streams (see Table of Typical Water Quality Values in Appendix). Similarly, total phosphorus, ranging from 9.9 at the background site to 5.8 at the test site, was substantially higher than the values encountered in 95% of other Florida streams. Effluent total phosphorus (2.5 mg/L) and total phosphorus (2.3 mg/L) were lower than the receiving water levels. Nitrate-nitrite concentrations (0.72 mg/L at the background site, 0.39 mg/L at the reference site, and 0.54 mg/L at the test site) exceeded the values found in approximately 85% to 90% of other Florida streams. Both the phosphorus and nitrate-nitrite enrichment appeared to be predominantly the result of factors other than the discharge (*e.g.*, stormwater runoff from phosphate mining and agricultural areas).

Algal growth potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987) at the background site (6.7 mg dry wt/L), the reference site (41. 5 mg dry wt/L), and at the test site (35.5 mg dry wt/L). The effluent AGP was 2.9 mg dry wt./L.

Measures of macroinvertebrate health indicated the discharge was not negatively affecting the benthic community. The figure on p. 2 indicates the degree of difference between the invertebrate populations of the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the control.

The Hester-Dendy sample results indicated that most macroinvertebrate parameters were fairly similar between the reference and test sites. Note that the Hester-Dendys at the background site were not recovered due to vandalism. Taxa richness increased from 39 taxa at the reference site to 45 at the test site. The Florida Index was 31 at the reference site and 24 at the test site, with both Florida Index values indicating healthy conditions. Shannon-Weaver diversity was 3.6 at the reference site and 3.1 at the test site. The test site diversity was average for a Florida stream, and the reference site diversity was moderately high (see Table of Typical Water Quality Values in Appendix). Both sites scored an identical 8 on the EPT Index and had very similar numbers of suspension feeders (16.3% to 17.1%).

The Hester-Dendy results suggest healthy conditions prevailed at the reference and test sites, despite the nutrient enrichment and suboptimal habitat. The instream flow was apparently sufficient to prevent the observed nutrient enrichment from causing negative influences on the invertebrate community.

The dip net results demonstrated that the biota of the reference and test sites were healthier than the background station. The Stream Condition Index scores at the reference site (29) and at the test site (27) placed these sites in the "excellent" category for peninsular Florida streams. The background site, with an SCI score of 21, was in the lowest range of the "good" category, probably related to the low dissolved oxygen and lower water velocity there. Apparently, the flow augmentation from Ellis Branch had a beneficial effect on the invertebrate community of the North Prong of the Alafia River.

The figure on p. 3 represents changes in the phytoplankton algal community. As was noted with the macroinvertebrates, larger differences (that is, higher percentages) correspond with greater degrees of degradation. In general, phytoplankton was sparse throughout the system, ranging from 172 organisms/mL at the reference site to 450 organisms/mL at the test site. Algal taxa richness varied from 17 taxa (at the background station) to 12 taxa (at the test site). Shannon-Weaver diversity ranged from 3.9 at the background site to 3.1 at the test site. Chlorophyll *a* was undetected at all stations (with a detection limit of 0.88 µg/L to 1.0 µg/L). No undesirable amounts of algal biomass were found at the test site. Again, flow or other aspects of the system (*e.g.*, low light penetration at the background site, where the Secchi depth was 0.3 m) appeared to delay the effects the extreme nutrient enrichment found in the system. It is possible, however, that areas downstream with longer water retention times, such as the lower portions of the Alafia River or Hillsborough Bay, may be affected by the nutrient loading from this basin.

Conclusions

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

Atrazine (0.057 µg/L) was detected in the effluent at a concentration well below chronically toxic levels. Iron (31 µg/L) and zinc (66 µg/L) were found in the effluent at concentrations that complied with Class III water quality standards.

The North Prong of the Alafia River was extremely enriched with ortho-phosphate (ranging from 9.6 mg/L at the background site to 5.5 mg/L at the test site). These levels are 5 to 10 times higher than those found in over 95% of other Florida streams. In contrast, effluent ortho-phosphate, with 2.3 mg/L, was lower than the receiving water levels. Nitrate-nitrite concentrations at the receiving water stations exceeded the values found in approximately 85% to 90% of other Florida streams. Both the phosphorus nitrate-nitrite enrichment appeared to be predominantly the result of factors other than the discharge (*e.g.*, stormwater runoff from phosphate mining and agricultural areas).

Algal growth potential (AGP) exceeded the 5 mg dry wt/L "problem threshold" at the background site (6.7 mg dry wt/L), the reference site (41. 5 mg dry wt/L), and at the test site (35.5 mg dry wt/L). The effluent AGP was 2.9 mg dry wt/L.

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No undesirable amounts of algal biomass were observed at the test site. Again, flow characteristics appeared to delay the effects the extreme nutrient enrichment found in the system. It is possible, however, that areas downstream with longer water retention times, such as the lower portions of the Alafia River or Hillsborough Bay, may be affected by the substantial nutrient loading from this basin.

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Chemistry Summary Table for City of Mulberry WWTP.	Effluent	Background Site	Reference Site	Test Site
Organic Constituents (ug/L)				
Atrazine	0.057 I			
Metals (ug/L)				
Aluminum	200 U			
Arsenic	10 U			
Cadmium	5.0 U			
Copper	25 U			
Chromium	10 U			
Iron	31			
Lead	5.0 U			
Mercury	0.10 U			
Nickel	5.0 U			
Selenium	10 U			
Silver	5.0 U			
Zinc	66			
Nutrients (mg/L)				
Ortho-phosphate	2.3 A	9.6	5.9	5.5
Total phosphorus	2.5	9.9	5.9	5.8
Ammonia	0.79	0.031 A	0.023 A	0.023 A
Nitrate+Nitrite	2.7 A	0.72	0.39 A	0.54
TKN	2.0	0.76	0.70	0.72
General Phys-Chem Parameters				
Habitat Assessment		99	77	69
D.O. (mg/L)	8.0	4.00	5.66	6.42
pH (SU)	7.8	6.5	7.0	7.0
Conductivity (µmhos/cm)	287	974	929	919
Temperature (°C)	23.71	18.13	19.20	20.19
Total Suspended Solids (mg/L)				14
Biological Oxygen Demand, 5 day (mg/L)	1.4	0.95 Q	0.73 Q	0.98
Turbidity (NTU's)				7.3
Hardness (mg CaCO3)	163.4			
Algal Growth Potential (mg dry wt/L)	2.88	6.98	41.46	35.49
Toxicity				
Bioassay Fish-Dechlorinated	No Mortality			
Bioassay Invertebrate-Dechlorinated	No Mortality			
Microbiological Communities (org/100 mL)				
Fecal coliform				
Total coliform				
Escherichia coli				

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)

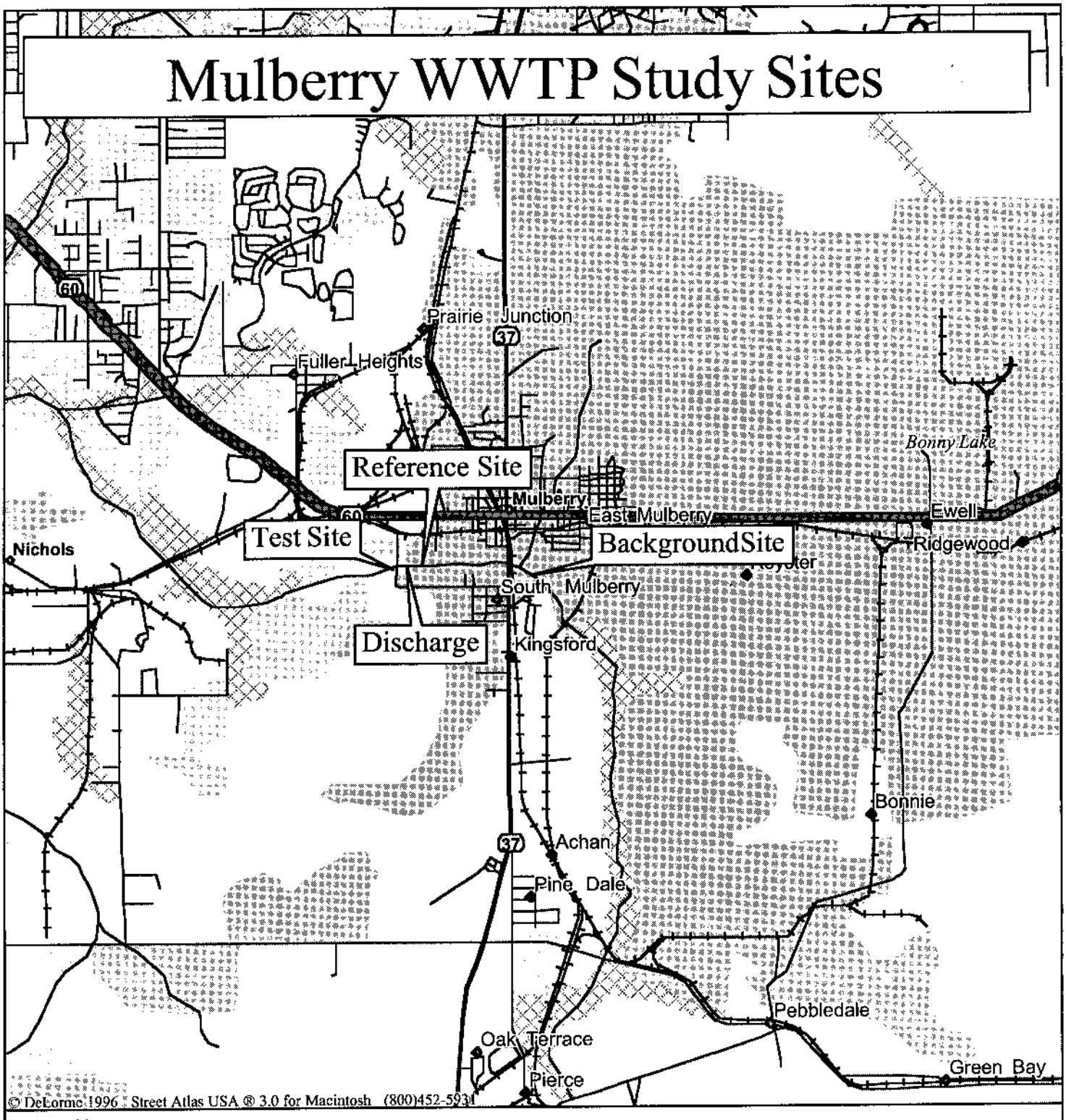
Percentile Distribution

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 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

Mulberry WWTP Study Sites



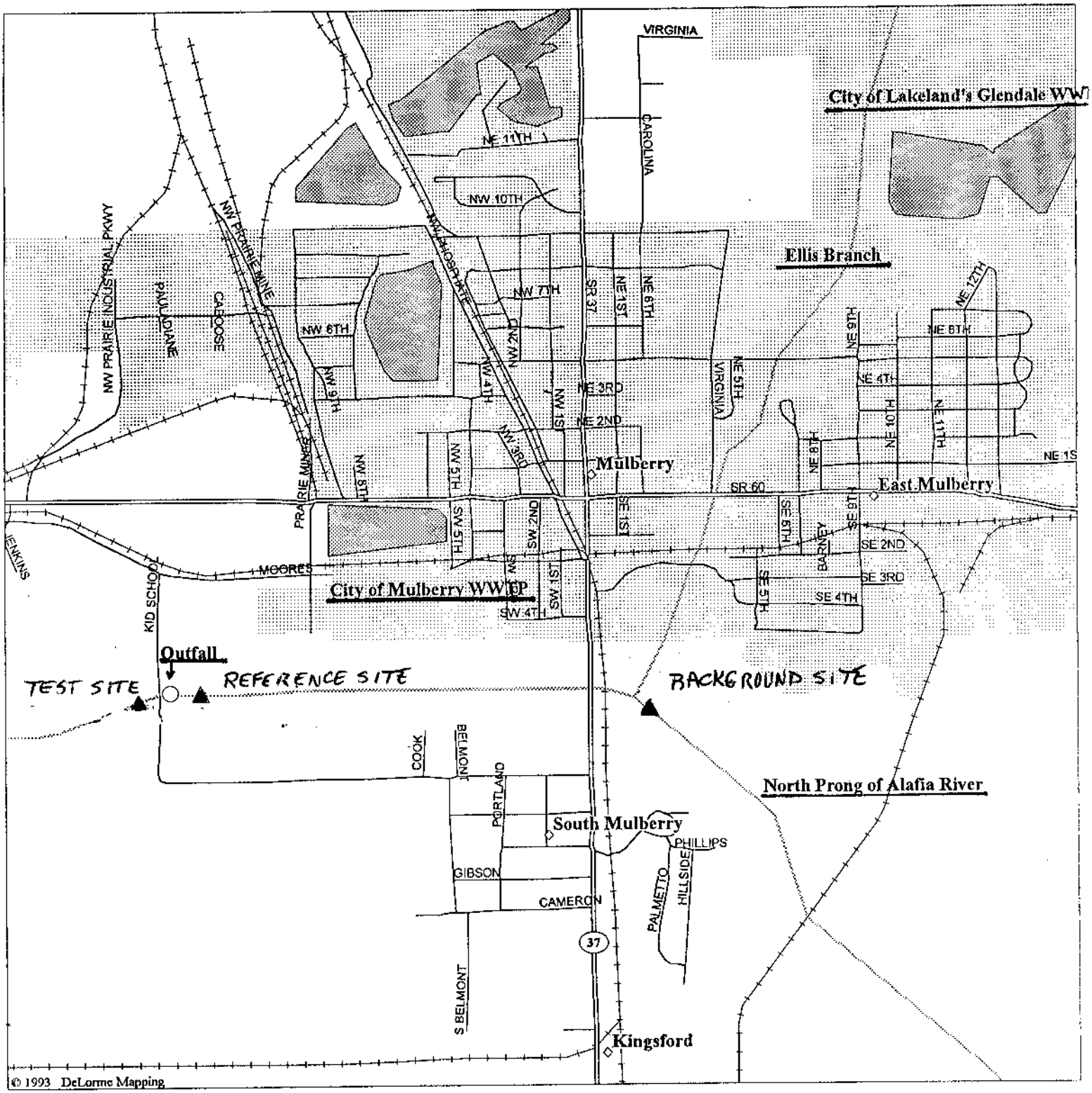
Mag 13.00
Thu Jun 26 08:58 1997
Scale 1:62,500 (at center)

1 Miles

2 KM

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

Map Showing the Three Monitoring Sites for the City of Mulberry's FYI-5 conducted on 02/24/97



STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: City of Mulberry WWTP		Date Summary Prepared: 1/3/97
Location (attach detailed map): see attachment	County: Polk	District: Southwest
Federal Permit # and expiration date: FL0020338 3/6/98	State GMS # and State expiration date: 4053M02246 3/6/98	Facility Type: Industrial (Municipal) Federal Agricultural Other (list):

Function of facility:
Treatment of domestic waste for a small city

Description of treatment process:
A 0.750 MGD Type I, sequencing batch reactor with ABW filters, chlorinated and dechlorinated

Receiving waters: North Prong of Alafia River	Classification: I II (III)	
Design Flow: 0.750 MGP	Mean Flow: .341 MGD (3 month ADF)	Flow during survey:

Discharge is: Continuous Intermittent Seasonal Rainfall dependent
Other (describe) Batch flow - 6 to 8 per day
therefore, the best time to sample is: must catch sample during discharge sequence

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)
CBOD	5.0 mg/L (annual average)
TSS	5.0 mg/L (annual average)
Total Nitrogen	3.0 mg/L (annual average)
DO	5.5 mg/L
pH	6 - 8.5
TRC	0.01 mg/L
Fecal Coliform	Non-detectable

Describe special permit conditions and permit modifications:
Phosphorus limit waived

City of Mulberry
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):
001 outfall discharges to the North Prong of the Alafia River

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: A review of MORs from 12/95 through 11/96 shows general compliance and compliance with the annual averages under Grizzle Figg. There were isolated violations as noted.
- TN monthly limit of 3.75 exceeded in 6/96
- TN weekly limit of 4.25 exceeded once in 6/96, 3/96 & 1/96
- Fecal max of <1 exceeded once in 6/96 and twice in 7/96 with values of 3 CFUs/100ml
- The D.O. limit of 5.5, minimum was exceeded a total of eight times in 5 & 6/96
- Plant upset on 3/17/96 caused a TSS violation = 109 mg/L.

Describe previous impact bioassessments, WQBEL's, and previous or current enforcement actions:
- A DEP XSI and CBI were conducted on samples collected 11/~~25~~2/92. Toxicity was observed in Ceriodaphnia dubia, LC50 < 100% after 48 hours. No metals appeared at toxic concentrations; no organics were detected; none of the 24 pesticides analyzed for were detected.
- Mulberry was required to upgrade to AWT & show MNI through Grizzle-Figg

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set: No data to compare.

Additional Information:

Staff contributing to this review (signature):

Cindrea Granger	(Biologist)
Joseph Iglesias	(Inspector)
	(Engineer)
	( )
	( )
	( )

Memorandum

Florida Department of
Environmental Protection

FACILITY OVERVIEW

Facility: Mulberry, City of Permit No.: FL0020338

County: Polk GMS ID No.: 4053M02244

Month/Year Storet #	.760 Flow 050053	5 CBOD 050084	5 TSS 900146	3 TN	<1 (high) F.C. 031616	5.5 min Other DO. (mg/l)
Nov 96	.276	1.1	2.8	2.7	<1	6.7
Oct	.346	1.0	2.5	2.4	<1	6.7
Sept	.403	1.4	2.29	1.5	<1	6.9
Aug	.330	1.6	2.9	2.1	3 (2x) 6/22	6.8
July	.363	1.6	2.6	1.4	3 20th	6.2
June	.311	2.1	2.8	4.3 Also July	<1	6.3 5,9,18,1 <5.5
May	.285	2.1	1.8	2.3	<2	6.4 11,17,30,31 <5.5 pH<6 min
April	.323	3.2	1.0	2.4	<2	6.7
March	.327	3.18	5.3	3.44 July	<2	6.6
Feb	.326	2.41	1.06	2.52	<2	7.5
Jan	.393	2.27	1.14	3.2 1 monthly	<2	6.8
Dec. 95	.284	1.97	1.19	2.12	<2	6.7
Total	3967.	24.0	30.2	30.3	-	-
Average	.331	2.0	2.5	2.5	-	-

Comments:

Reviewed By: [signature]

Date: 1/7/97

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	24020069	2/24/97	0820	North Prong Alafia River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
This site was very different from up & down sites	Polk	City of Mulberry	BACKGROUND site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		50		20	5	25	

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

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

Width of riparian vegetation (m) on least buffered side: 50

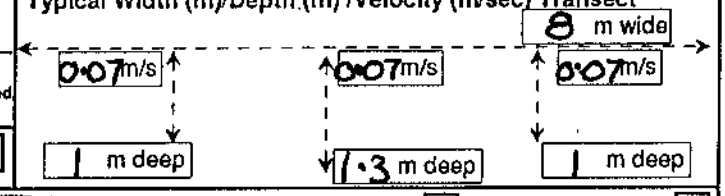
List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: 0.5 (m above present water level) + 1.3 (present depth in m) = 1.8 (m above bed)

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



Canopy Cover % : Open : ☐ Lightly Shaded (11-45%): ☑ 30% Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☐ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☒ Other: ☐

Sediment Oils: Absent: ☑ Slight: ☐ Moderate: ☐ Profuse: ☐ 0.3m of decaying leaf

Sediment Deposition: Sludge: ☐ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other: Litter

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags) ✓	10	3		Sand			
Leaf Packs or Mats				Mud/Muck/Silt			
Aquatic Vegetation ✓	35	7	net	Other: Leaf litter decay	50	7	NT
Rock or Shell Rubble				Other:			
Undercut banks/Roots ✓	5	3		*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	0.1	18.14	6.52	4.12	0.974			0.3
Mid-depth	0.6	18.13	6.53	4.00	0.974			
Bottom	1.3	18.12	6.53	3.99	0.975			

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: ☑ H_2S

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:
Sunny, mild, no clouds

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger / Kovach	Andrea Grainger	2/24/97

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		2/24/97	North Prong Alafia River

REMARKS:	LOCATION:	FIELD ID/NAME:
	City of Mulberry	BACKGROUND Site

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover [10]	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 [8]	Max. observed: >0.25 m/sec. but < 2 m/sec 20 19 18 17 16	Max. observed; 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed; 0.05 to 0.1 m/sec 10 9 (8) 7 6	Max. observed; <0.05 m/sec, or spate occurring; > 2 m/sec 5 4 3 2 1
Artificial Channelization [18]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 (18) 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Deposition [5]	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 thick rotting layer of leaf litter
Bank Stability [17]	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 [16]	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.

[99] **TOTAL SCORE**

Comments: The rotting leaf litter probably was the cause of the H_2S present.

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2/24/97	Granger	Candrea Granger

24020061

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	240 20070	2/24/97	1040	North Prong Alafia River

REMARKS:	COUNTY:	LOCATION:	FIELD ID:
lots of riffles upstream of this site	POLK	City of Mulberry WWTP	REFERENCE Site

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		50		20	5	25	

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

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

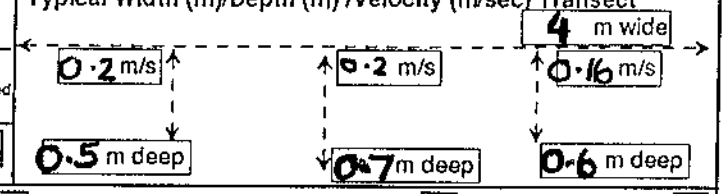
Width of riparian vegetation (m) on least buffered side: 1 — *List & map dominant vegetation on back*

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

Artificially Impounded ☐ yes

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

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



Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☑ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☑ Slight: ☐ Moderate: ☐ Profuse: ☐

Sediment Deposition: Sludge: ☐ Sand smothering: none / slight / moderate / severe Silt smothering: none / slight / moderate / severe Other: on side of bank

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	3		Sand			
Leaf Packs or Mats				Mud/Muck/Silt	25	5	
Aquatic Vegetation	40	5		Other:			
Rock or Shell Rubble	25	5		Other:			
Undercut banks/Roots	5	2		*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								VOB
Mid-depth	0.3	19.20	6.97	5.66	929.0			
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: ☑ (slightly) Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes: Sunny, mud, no cloud cover

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Kovach / Grainger	Andrea Grainger	2/24/97

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		2/24/97	North Prong Alafia River

REMARKS:	LOCATION:	FIELD ID/NAME:
	City of Mulberry	REFERENCE SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **10**	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 **13**	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 **16**	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 **13**	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 **2**	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 **8**	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

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

77 TOTAL SCORE

Comments: Lots of riffles due to phosphate boulders + flows from Glendale WWTP

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2/24/97	Grainger	Candrea Grainger

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5-10-96)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	240 20068	2/24/97	1030	North Prong Alafia River

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
deer carcasses on banks	Polk	City of Mulberry	TEST Site.

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
		50		20	5	25	

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

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

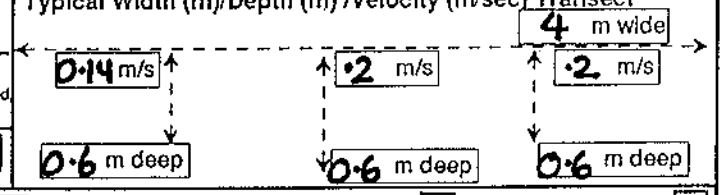
Width of riparian vegetation (m) on least buffered side: *List & map dominant vegetation on back*

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

Artificially Impounded ☐ yes

High Water Mark: 0.3 (m above present water level) + 0.6 (present depth in m) = 0.9 (m above bed)

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



Canopy Cover % : Open : ☒ Lightly Shaded (11-45%): ☐ Moderately Shaded (46-80%): ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

Sediment Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Anaerobic: ☐ Other: ☐

Sediment Oils: Absent: ☒ Slight: ☐ Moderate: ☐ Profuse: ☐ on bank sides

Sediment Deposition: Sludge: ☐ Sand smothering: none slight moderate severe Silt smothering: none slight moderate severe Other:

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	2	net	Sand			
Leaf Packs or Mats				Mud/Muck/Silt	20	5	net.
Aquatic Vegetation	30	5	net	Other:			
Rock or Shell Rubble	40	5	net	Other:			
Undercut banks/Roots	5	3	net.	*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top								
Mid-depth	0.35	20.19	7.00	6.42	919 µS/cm			VOB
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): slightly Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes:
Sunny, mild, a little cloud cover.

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Grainger / Kovach	Edward Grainger	2/24/97

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		2/24/97	North Prong Alafia River

REMARKS:	LOCATION:	FIELD ID/NAME:
	City of Mulberry	TEST SITE

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Bottom Substrate/ Available Cover **8**	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs (partially decayed), undercut banks, rubble, or other stable habitat. 20 19 18 17 16	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat, frequently disturbed or removed. 10 9 **8** 7 6	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious, substrates unstable. 5 4 3 2 1
Water Velocity **13**	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 **16**	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 **16**	Less than 20% of habitats affected by sand or silt accumulation 20 19 18 17 **16**	20%-50% of habitats affected by sand or silt accumulation 15 14 13 12 11	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement 10 9 8 7 6	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent 5 4 3 2 1
Bank Stability **8**	Stable. No evidence of erosion or bank failure. Little potential for future problems. 20 19 18 17 16	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 15 14 13 12 11	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 10 9 **8** 7 6	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 5 4 3 2 1
Riparian Buffer Zone Width **2**	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 **6**	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

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

69 TOTAL SCORE

Comments: Lots of deer deer carcasses on banks

ANALYSIS DATE:	ANALYST:	SIGNATURE:
2/24/97	Grainger	Andrea Grainger

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Mulberry WWTP
County: Polk
Contact / District: Kent Edwards / Southwest
NPDES Permit #: FL0020338
LIMS Sample #: 169316 **LIMS Job #:** 97-FEB-25-25
sample log: 2-27-97

Sample Collection: Date 2-24-97 Time 1125
Test Beginning: Date 2-25-97 Time 1430
Test Ending: Date 2-27-97 Time 1430
Organism Batch #: 12 **Diluent Batch #:** well H2O
Organism Age: 10 days
Test Organism: Ceriodaphnia dubia

Test Type: (Screening) / Definitive
(Static) / Static Renewal / Flow-through
Temperature range: room 24.8-25.8°C
incubator 24.4-25.6°C
Test Number: 2 of 2
Remarks: D = dead, M = missing

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0	23.3 @ 23.3	8.2 @ 25.2 °C	1028 @ 101.8
	9.0 @ 9.0			980 @ 100.1 @ 24.2 °C
24 hr	7.0 @ 7.0	23.3 @ 23.3	8.2 @ 25.3 °C	1038 @ 101.8
	9.0 @ 9.0			996 @ 100.1 @ 25.2 °C
48 hr	7.0 @ 7.0	23.2 @ 23.3	8.2 @ 25.1 °C	1034 @ 101.8
	9.0 @ 9.0			996 @ 100.1 @ 25.0 °C

MF 2-27-97 entered 2/28/97 ORIG

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) 0 hr	UNCORRECTED Cond. (mmhos/cm) 24 h	UNCORRECTED Cond. (mmhos/cm) 48 h
Control A	E1	5	5	5	8.0	8.3	8.4	23.6	23.8	24.1	8.0	7.8	7.8	245	250	255
Control B	E2	5	5	5	7.9	8.3	8.4	23.5	23.7	23.9	8.0	7.8	7.8	245	250	250
Control C	E3	5	5	5	7.9	8.3	8.4	23.5	23.8	23.9	8.0	7.9	7.9	245	250	250
Control D	E4	5	5	5	7.9	8.3	8.5	23.6	23.8	23.9	8.0	7.9	7.9	245	250	250
100 % A	E5	5	5	5	7.5	8.2	8.5	25.8	23.9	23.9	7.9	7.6	7.8	730	710	715
100 % B	E6	5	5	5	7.5	8.2	8.4	26.0	23.8	23.9	7.9	7.6	7.8	740	710	715
100 % C	E7	5	5	5	7.5	8.1	8.4	26.1	23.8	23.9	7.8	7.6	7.8	740	710	715
100 % D	E8	5	5	5	7.5	8.2	8.5	26.1	23.8	23.9	7.8	7.6	7.8	740	710	715
Measured/Loaded by:		JS	JD	ND	MF	ND	KR	MF	ND	KR	MF	ND	KR	MF	ND	MF
Recorded by:		MF	ND	MF	KR	KR	JS	KR	KR	JS	KR	KR	J	KR	KR	JS

Investigators' Signatures
Marshal Faircloth
Julie Sharpe
Bellie Kalston
Kirk Leigh

AT Wolf
reviewer

form updated 4/01/96

Water Quality Parameters

Salt Water / (Well Water) / 20% Min Water

	Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):	Not measured		
Lab Total Residual Cl2 (mg/L): <0.03 / <0.03	<0.03	DR 100	JS
Alkalinity (mg/L as $CaCO_3$): 125 / 70	170	Hach	KR/ND
Hardness (mg/L as $CaCO_3$): 130 / 90	180	Hach	KR/ND
Total ammonia (mg/L as N): <0.017 / <0.017	<0.017	Orion	MF

Ammonia Meter #98136 Meter Slope: -54.0 Ammonia Blank: <0.017

Control Salinity: A (0) ppt — Aqua Slope MF 2-25-97
Sample Salinity: 0 ppt

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Mulberry WWTP
County: Polk
Contact / District: Kent Edwards / Southwest
NPDES Permit #: FL00
LIMS Sample #: 169316 **LIMS Job #:** 97-FEB-25-25
sample log: 2-27-97
Test Type: (Screening) | Definitive
(Static) | Static Renewal | Flow-through
Temperature range: room 24.8-25.8°C
incubator 24.4-25.6 °C
Test Number: 1 of 2
Remarks: D = dead, M = missing

Sample Collection: Date 2-24-97 Time 1125
Test Beginning: Date 2-25-97 Time 1415
Test Ending: Date 2-27-97 Time 1415
Organism Batch #: 6 **Diluent Batch #:** 6
Organism Age: <24 hours
Test Organism: Ceriodaphnia dubia

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
meter #	7851	90H018262	90H018262	G9005749
0 hr	7.0 @ 7.0 9.0 @ 9.0	23.3 @ 23.3	8.2 @ 25.0 °C	102.8 @ 101.8 980 @ 1001 @ 24.2 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.3 @ 23.3	8.2 @ 25.3 °C	103.2 @ 101.3 996 @ 1001 @ 25.2 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	23.2 @ 23.3	8.2 @ 25.1 °C	103.4 @ 101.8 981 @ 1001 @ 25.0 °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		24.7	8.0		7.7	155		165
Control B	B	5	4 ID	4 ID			8.3			24.5			7.7			170
Control C	C	5	5	5			8.3			24.5			7.8			170
Control D	D	5	5	5			8.3			24.4			7.8			170
100% A	A	5	5	5	7.7		8.7	24.8		24.6	7.9		7.8	680		685
100% B	B	5	5	5			8.7			24.6			7.7			720
100% C	C	5	5	5			8.7			24.5			7.8			740
100% D	D	5	5	5			8.7			24.5			7.8			720
Measured/Loaded by:		MF	KR	JS	MF		KR	MF		KR	MF		KR	MF		KR
Recorded by:		MF	KR	JS	KR		ND	KR		JS	KR		JS	KR		JS

Investigators' Signatures
Marshall Faircloth
Julie Shapo
Billie Ralston

	Salt Water: Well Water	Salt Water: 20% Min Water	Water Quality Parameters: Sample	Method	Measured by
Field Total Residual Cl2 (mg/L):			Not measured		
Lab Total Residual Cl2 (mg/L):	<0.03	<0.03	<0.03	DR 100	JS
Alkalinity (mg/L as $CaCO_3$)	125	70	170	Hach	KR/ND
Hardness (mg/L as $CaCO_3$)	130	90	180	Hach	KR/ND
Total ammonia (mg/L as N)	<0.017	<0.017	<0.017	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: -54.0 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 0 ppt

reviewer

form updated 4/01/96

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	50	≥27	26-14	<14		≥ 27	26-14	<14	5	≥18	17-9	<9	
EPT Index	9	≥6	5-3	<3		≥ 4	3-2	<2	5	-	≥3	<3	
# Chironomid Taxa	18	≥9	8-5	<5		≥9	8-5	<5	5	≥4	3-2	<2	
% Contribution of Dominant Taxon	15.3	≤25	26-62	>62		≤30	31-65	>65	5	≤37	38-69	>69	
% Diptera	32.1	-	≤67	>67		-	≤52	>52	3	-	≤67	>67	
Florida Index	23	≥ 13	12-7	<7		≥10	9-5	<5	5	≥ 6	5-3	<3	
% Suspension feeders/Filterers	5.5	≥ 13	12-7	<7		≥15	14-8	<8	1	≥ 25	25-13	<13	
Total Score		Panhandle				Peninsula			(29)	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Test Site

Winter Index Period: Stream Condition Index for Florida (SCI) (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	23	≥27	26-14	<14		≥ 27	26-14	<14	3	≥18	17-9	<9	
EPT Index	5	≥6	5-3	<3		≥ 4	3-2	<2	5	-	≥3	<3	
# Chironomid Taxa	8	≥9	8-5	<5		≥9	8-5	<5	3	≥4	3-2	<2	
% Contribution of Dominant Taxon	17.6	≤25	26-62	>62		≤30	31-65	>65	5	≤37	38-69	>69	
% Diptera	32.3	-	≤67	>67		-	≤52	>52	3	-	≤67	>67	
Florida Index	12	≥ 13	12-7	<7		≥10	9-5	<5	5	≥ 6	5-3	<3	
% Suspension feeders/Filterers	9.6	≥ 13	12-7	<7		≥15	14-8	<8	3	≥ 25	25-13	<13	
Total Score		Panhandle				Peninsula			(27)	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Background 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	33	≥27	26-14	<14		≥ 27	26-14	<14	5	≥18	17-9	<9	
EPT Index	2	≥6	5-3	<3		≥ 4	3-2	<2	3	-	≥3	<3	
# Chironomid Taxa	7	≥9	8-5	<5		≥9	8-5	<5	3	≥4	3-2	<2	
% Contribution of Dominant Taxon	36.3	≤25	26-62	>62		≤30	31-65	>65	3	≤37	38-69	>69	
% Diptera	22.1	-	≤60	>60		-	≤52	>52	3	-	≤67	>67	
Florida Index	8	≥ 13	12-7	<7		≥10	9-5	<5	3	≥ 6	5-3	<3	
% Suspension feeders/Filterers	1.6	≥ 13	12-7	<7		≥15	14-8	<8	1	≥ 25	25-13	<13	
Total Score		Panhandle				Peninsula			(21)	Northeast			
Interpretation of Score		Excellent			27-33	Excellent			27-33	Excellent			26-31
		Good			21-26	Good			21-26	Good			20-25
		Poor			14-20	Poor			14-20	Poor			14-19
		Severely Degraded			7-13	Severely Degraded			7-13	Severely Degraded			7-13

Benthic macroinvertebrate taxa list for the City of Mulberry WWTP, collected via 20 discrete dip net sweeps in the North Prong of the Alafia River, on 24 February, 1997.

	Background Site	Reference Site	Test Site
Acarina			
Arrenurus sp.	4	-	-
Piona sp.	1	-	-
Amphipoda			
Hyalella azteca	69	44	12
Coleoptera			
Undetermined Curculionidae	2	-	-
Cyphon sp.	1	-	-
Dubiraphia vittata	3	8	-
Undetermined Elmidae	-	5	-
Microcylloepus pusillus	-	4	-
Peltodytes sp.	-	1	1
Stenelmis sp.	-	18	-
Collembola			
Undetermined Collembola	2	-	-
Decapoda			
Palaemonetes sp.	-	1	-
Palaemonetes kadiakensis	-	-	2
Palaemonetes paludosus	2	6	-
Diptera			
Ablabesmyia mallochi	1	1	-
Undetermined Chironomidae	4	13	1
Chironomus sp.	20	9	1
Clinotanypus sp.	2	9	1
Cricotopus bicinctus	-	5	-
Cricotopus/Orthocladius grp.	-	4	-
Endochironomus subtendens	-	1	-
Endotribelos hesperium	-	4	-
Hemerodromia sp.	-	4	-
Palpomyia/bezzia grp.	-	5	3
Paralauterborniella nigrohalterale	-	1	-
Pentaneura inconspicua	-	7	2
Phaenopsectra punctipes grp.	-	1	-
Polypedilum sp.	-	3	2
Polypedilum convictum grp.	-	53	6
Polypedilum halterale grp.	10	9	3
Polypedilum illinoense grp.	2	7	1
Pseudochironomus sp.	1	-	-
Simulium sp.	-	5	-
Stempellinella sp.	-	1	-
Tanytarsus sp.	1	3	-
Tanytarsus sp. A Epler	-	3	-
Tanytarsus sp. M Epler	-	1	-
Tanytarsus sp. T Epler	1	3	1

Thienemanniella sp.	-	-	1
Thienemanniella xena	-	3	-
Ephemeroptera			
Acerpenna pygmaeus	-	-	1
Undetermined Baetidae	-	-	2
Baetis sp.	-	8	-
Baetis intercalaris	-	2	-
Caenis sp.	22	2	1
Callibaetis sp.	1	-	-
Callibaetis floridanus	-	1	-
Undetermined Ephemeroptera	-	6	-
Labiobaetis sp.	-	4	-
Tricorythodes albilineatus	-	39	6
Gastropoda			
Amnicola dalli johnsoni	6	3	-
Undetermined Ancylidae	-	3	1
Undetermined Gastropoda	1	-	-
Undetermined Hydrobiidae	-	4	1
Micromenetus floridensis	1	-	-
Planorbella duryi	-	1	-
Pseudosuccinea columella	3	-	-
Pyrogophorus platyrachis	5	70	2
Hemiptera			
Mesovelia sp.	2	-	-
Ranatra sp.	1	-	-
Isopoda			
Caecidotea sp.	-	1	1
Lepidoptera			
Undetermined Lepidoptera	6	-	-
Megaloptera			
Corydalus cornutus	1	-	-
Nemertina			
Prostoma rubrum	1	-	-
Odonata			
Argia sp.	-	2	-
Enallagma sp.	1	-	-
Ischnura sp.	5	-	-
Undetermined Zygoptera	1	-	-
Oligochaeta			
Aulodrilus pigueti	-	5	2
Haber speciosus	1	4	-
Limnodrilus hoffmeisteri	1	37	5
Nais communis	-	3	-
Nais pardalis	-	3	-
Pristinella jenkinae	-	1	-
Slavina appendiculata	1	-	-
Undetermined Tubificidae	-	1	-
Pelecypoda			
Corbicula fluminea	-	6	5

Undetermined Pisidiidae	2	-	-
Undetermined Unionidae	-	1	-
Trichoptera			
Cheumatopsyche sp.	-	8	1
Hydroptila sp.	-	18	2
Undetermined Hydroptilidae	-	-	1
Neotrichia sp.	-	3	-
Oecetis sp.	-	1	-
Oxyethira sp.	-	1	-
Undetermined Trichoptera	-	3	-
Turbellaria			
Dugesia sp.	2	-	-

Benthic macroinvertebrate taxa list for the City of Mulberry WWTP, collected via Hester-Dendy artificial substrates in the North Prong of the Alafia River, on 24 February, 1997. Densities, in number/m^2, represent the mean of three replicates.

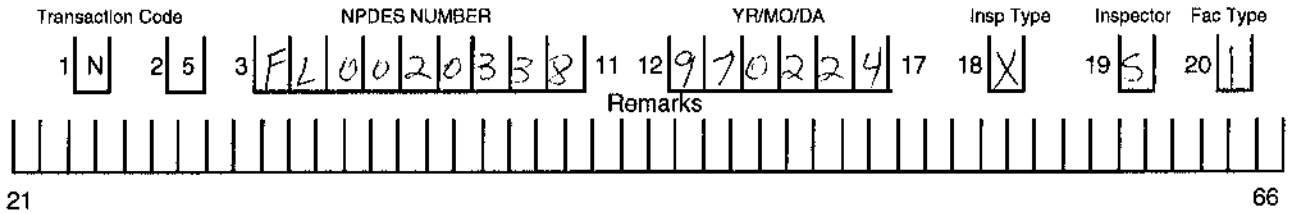
	Reference Site	Test Site
Acarina		
Atractides sp.	-	1
Hygrobates sp.	2	-
Amphipoda		
Hyalella azteca	11	128
Coleoptera		
Dineutus sp.	2	2
Microcylloepus pusillus	-	6
Stenelmis sp.	23	100
Diptera		
Undetermined Chironomidae	6	31
Corynoneura sp.	1	-
Cricotopus bicinctus	7	17
Cricotopus/Orthocladius grp.	17	26
Cryptochironomus sp.	-	1
Endotribelos hesperium	-	12
Hemerodromia sp.	9	14
Meropelopia sp.	2	-
Mesosmittia sp.	1	-
Paratanytarsus sp. C Epler	-	4
Pentaneura inconspicua	10	80
Polypedilum convictum grp.	242	932
Polypedilum fallax	-	5
Polypedilum illinoense grp.	1	12
Polypedilum scalaenum grp.	-	17
Rheocricotopus robacki	1	26
Rheotanytarsus sp.	1	-
Rheotanytarsus exiguus grp.	5	-
Simulium sp.	4	6
Stempellinella sp.	-	4
Tanytarsus sp.	1	4
Tanytarsus sp. A Epler	3	4
Tanytarsus sp. C Epler	-	1
Tanytarsus sp. L Epler	1	5
Tanytarsus sp. O Epler	-	1
Tanytarsus sp. T Epler	1	10
Thienemanniella sp.	1	-
Thienemanniella similis	11	4
Thienemanniella xena	12	14
Thienemannimyia grp.	1	-
Ephemeroptera		
Undetermined Baetidae	2	-
Baetis sp.	35	6

Baetis intercalaris	57	3
Caenis sp.	2	-
Labiobaetis sp.	1	-
Stenonema exiguum	5	-
Undetermined Tricorythidae	-	6
Tricorythodes albilineatus	75	129
Gastropoda		
Amnicola dalli johnsoni	2	4
Undetermined Ancylidae	5	4
Undetermined Gastropoda	1	-
Undetermined Hydrobiidae	-	2
Laevapex sp.	2	-
Pyrogophorus platyrachis	41	-
Hirudinea		
Mooreobdella tetragon	-	1
Isopoda		
Caecidotea sp.	3	6
Megaloptera		
Corydalus cornutus	6	1
Odonata		
Argia moesta	1	-
Calopteryx sp.	1	-
Undetermined Coenagrionidae	1	-
Hetaerina sp.	1	-
Oligochaeta		
Undetermined Enchytraeidae	-	2
Haemonais waldvogeli	-	3
Nais communis	-	3
Nais pardalis	1	68
Pristinella sima	-	3
Trichoptera		
Cheumatopsyche sp.	77	247
Hydropsyche sp.	8	20
Undetermined Hydropsychidae	16	63
Hydroptila sp.	44	48
Undetermined Hydroptilidae	1	-
Mayatrichia ayama	-	5
Ochrotrichia sp.	7	10
Oecetis sp.	-	1
Undetermined Trichoptera	23	6

Phytoplankton taxa list and densities (#/mL) for the City of Mulberry WWTP, collected via subsurface grabs in the North Prong of the Alafia River, on 24 February, 1997.

	Background Site	Reference Site	Test Site
Bacillariophyceae			
Achnanthes sp.	4	-	16
Cocconeis sp.	-	21	64
Cyclotella sp.	12	21	48
Cymbella sp.	4	12	-
Undetermined Diatomaceae	8	4	24
Eunotia sp.	-	4	-
Gomphonema sp.	-	-	8
Melosira sp.	16	4	8
Navicula sp.	4	21	72
Nitzschia sp.	8	16	121
Undetermined Pennales	33	-	-
Chlorophyceae			
Carteria sp.	4	-	-
Chlamydomonas sp.	-	4	-
Undetermined Chlorophyceae	4	12	24
Crucigenia sp.	-	4	-
Dictyosphaerium sp.	8	-	-
Mougeotia sp.	8	-	-
Pediastrum sp.	-	4	-
Scenedesmus sp.	25	8	16
Spermatozoopsis sp.	-	8	-
Tetraedron sp.	-	-	16
Chrysophyceae			
Synura sp.	-	8	-
Cryptophyceae			
Cryptomonas sp.	12	-	8
Cyanophyceae			
Chroococcus sp.	4	-	-
Dactylococcopsis sp.	16	16	24
Merismopedia sp.	4	-	-
Microcystis sp.	4	-	-
Oscillatoria sp.	16	-	-
Euglenophyceae			
Phacus sp.	-	4	-

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



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