Florida
Department of Environmental Protection

Biological Assessment of

Timber Energy Resources

Liberty County

NPDES #FL0039951

Sampled October 1993

February 1994

Biology Section
Division of Technical Services

Department of Environmental Protection

Results of Fifth Year Inspections

Discharger: Timber Energy Resources
County: Liberty
NPDES Number: FL0039951
State Permit Expiration Date: 1 September 1994

Toxics Sampling Inspection (XSI)

Date Sampled: 5 October 1993

Results: No organic pollutants were detected in the discharge. Iron (756 µg/L), zinc (15 µg/L), nickel (31 µg/L), and copper (92 µg/L), were found in the effluent sample. Since the effluent hardness value was 885 mg/L, the concentration of copper represents a violation of both the facility's permit limit (32 µg/L) and the Class III water quality standard (which allows a maximum copper concentration of 38.7 µg/L, based upon a hardness of 400 mg/L) (Rule 17-302.530(24) FAC).

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 5 October 1993

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 5 October 1993

Results: Macroinvertebrate taxa richness was above average at both the test and reference sites. Shannon-Weaver diversity, however, decreased from 3.5 at the reference site to 2.6 at the test site, predominantly due to the high proportions of the ephemeropteran, *Caenis* sp. This 25.7% decrease in diversity is a violation of Rule 17-302.530(11) FAC. The Florida Index was lower than expected for a perennially flowing system at both sites, but was lower at the test site. Even when one considers the hydrological factors which complicated this assessment, the data indicate that the facility is having a moderate negative effect on receiving water macroinvertebrate populations.

Water Quality Inspection (WQI)

Date Sampled: 5 October 1993

Results: Dissolved oxygen at the test site was below Class III water quality standards (Rule 17-302.530(31) FAC). The fecal coliform levels in the effluent (1150 organisms/100 mL) and at the test site (6000 organisms/100 mL) violated Class III water quality standards (Rule 17-302.530(6) FAC). The total coliform levels at test site (26,000 organisms/100 mL) also were in violation of Class III water quality standards (Rule 17-302.530 (7)FAC). Total ammonia was elevated in the effluent (5.7 µg/L), while effluent unionized ammonia was calculated to be 0.03 mg/L. This is a violation of the facility's permit limits and of Class III water quality standards (Rule 17-302.530(3) FAC). Effluent TKN was 6.0 mg/L, while effluent total phosphorus was 0.5 mg/L. However, most nutrient concentrations at the test site were typical of Florida streams, although total phosphorus was slightly higher than expected. Algal growth potential at the test site (12.6 mg dry wt/L) and in the effluent (5.7 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold".

Introduction

Timber Energy Resources, a 14 megawatt wood-fueled power plant, is located in Liberty County, Florida (see map in Appendix). The facility intermittently discharges "once-through" cooling water, at a rate of 100 GPM when operating. The wastewater treatment process consists of pH adjustment and temperature stabilization in a holding pond. The wastewater is discharged into an unnamed tributary of Stokes Branch, which flows into the Class III Telogia Creek.

Effluent permit limits are as follows: temperature (≤ 5°F above the ambient temperature at Telogia Creek at SR 65), total flow (monitor and report), copper (0.032 mg/L), iron (1.0 mg/L), TSS (20.0 mg/L), oil and grease (5 mg/L), unionized ammonia (0.02 mg/L), chlorides (250 mg/L), total residual chlorine (.01 mg/L), pH (6.5 to 8.5 S.U.), static renewal bioassays (no toxicity), and definitive bioassays (no toxicity).

The facility has been operating satisfactorily for the last two years with the following exceptions: 1) unionized ammonia has not been reported for any month during the past year; 2) discharge temperature exceeded the permit limit from October, 1992, to May, 1993; 3) TSS exceeded the permit limit on three occasions; 4) unsatisfactory flow meter operation; and 5) incorrect sampling point for certain parameters (*i.e.*, total chlorine residuals, pH, oil and grease, and chlorides).

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 (Big Boggy Branch in Wakulla County) and a test site (the area downstream of the discharge in an unnamed tributary of Stokes Branch) (see map in Appendix). The originally chosen reference site, which was located near Timber Energy, dried to a single pool during Hester-Dendy sampler incubation. 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 the 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, oil and grease, and VOC's). Nutrient analyses were performed on effluent, reference, and test sites. Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978). 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). As mentioned earlier, upon Hester-Dendy sampler recovery, it was discovered that the stream originally chosen as a reference site had dried to a single pool. Therefore, data from a previously sampled reference site (Big Boggy Br. in Wakulla County), in the same eco-region, will be used for comparisons. Due to loss of periphyton racks, attached algae were not sampled during this investigation. Bacterial populations were analyzed for total and fecal coliforms following the methods of APHA (1989).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate community health have been employed. Many of these, such as the number of taxa and the Shannon-Weaver Diversity Index are well known. Others are briefly explained here. 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 (*i.e.*, many clean-water organisms are present). Excessive numerical dominance of a single type of organism (a high % contribution of dominant taxon) is usually associated with disturbance. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major taxonomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (% composition) of 100% means that the two sites being com-

pared are identical. This same type of procedure is used for calculating the QSI (functional feeding groups).

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, the diversity index, and the Florida Index are measured as the reference site minus test site divided by the reference site. The percent difference between sites involving the percent contribution of dominant taxon is measured as the test site minus reference site divided by the reference site.

Major characteristics of community structure of control and test sites.

	Boggy Ck. Reference Site	Timber Energy Test Site
Macroinvertebrate Hester-Dendy		
Number of Taxa	27	26
Shannon-Weaver Diversity	3.5	2.6
Florida Index	7	1
% Diptera	83.9	22.6
% Ephemeroptera	0.5	44
% Odonata	1.5	8.9
% Coleoptera	0	0.6
% Gastropoda	4.9	21.7
% Malacostraca	1.9	0.3
% Other	7.3	1.9
% Predators/ Carnivores	3.4	11.2
% Deposit feeders (above surface)/ Collector-Gatherers	49.8	42.0
% Suspension feeders/ Collector-Filterers	14.1	0
% Scavengers	0	0.1
% Plant piercers	0	0.3
% Scrapers	9.9	45.0
% Shredders	16.8	0.7
% Parasites	2.4	0.3
Macroinvertebrate Qualitative		
Number of Taxa	34	33
Florida Index	9	6
% Contribution of Dominant Taxon	18.4	48.7
% Ephemeroptera	0	62.1
% Coleoptera	0	1.7
% Oligochaeta	17.2	3.9
% Diptera	52.3	25.0
% Gastropoda	13.2	3.9
% Odonata	2.3	12.5
% Predators/ Carnivores	13.1	21.1
% Deposit feeders (above surface)/ Collector-Gatherers	40.9	36.8
% Deposit feeders (below surface)	0	4.0
% Suspension feeders/ Collector-Filterers	14.1	4.7
% Plant piercers	0.3	2.0
% Scrapers	14.7	29.1
% Shredders	16.6	2.4
Algal Growth Potential (mg dry wt/L)	0.81	12.6

The following personnel were involved in this investigation: Glenn Butts and Frank Leteux (DEP Northwest District) and Chris Barge, Lyn Burton, Marshall Faircloth, Russel Frydenborg, Christy LeDuc, Kathleen Lurding, Urania Quintana, Landon Ross, David Young and Greg Wynn (Tallahassee Biology Laboratory). This 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.

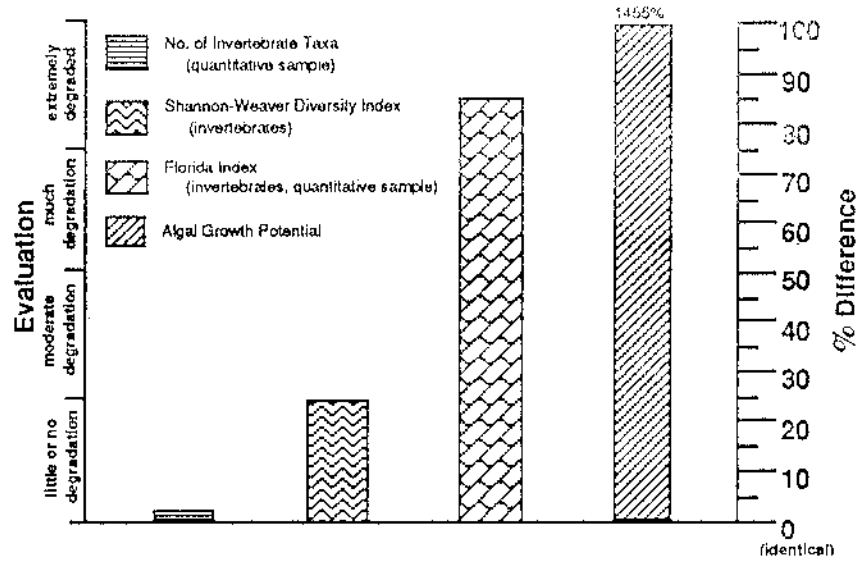
Results and Discussion

Drought conditions prevailed at the time of this survey, causing very low stream flow in north Florida. The reference site near Timber Energy, which was originally chosen for this biological assessment, was almost completely dry upon retrieval of the artificial substrate samplers. Therefore, data from a comparable type of stream system, within the same ecoregion (Big Boggy Branch in Wakulla County) were used in its place. Both the reference and test systems can be characterized as second order streams which predominantly drain swamps and pine flatwoods. The Big Boggy Branch reference site received 30 habitat assessment points, while the test site scored 64 points. Both sites were channelized, and of similar width (up to 3 m). At the time of sampling, water velocity was lower at the reference site (0.05 m/sec) than at the test site (0.3 m/sec). However,

due to the intermittent nature of the discharge and lack of flow from upstream, it is likely that velocity was often low at the test site. Aquatic vegetation, undercut banks, roots, and snags were the major important substrates at the test site, while limestone outcrops, gravel, and leaf packs were the dominant substrates at the reference site. Water was slightly alkaline at the reference site (7.9), while closer to neutral at the test site (7.2). Conductivity was 440 µmhos/cm at the reference site and 900 µmhos/cm at the test site. Elevated conductivity at the test site was related to the high specific conductance of the effluent (1800 µmhos/cm). A hydrogen sulfide/anaerobic odor was detected in sediments from the test site. The temperature of the discharge was 28.0°C (82.4°F). For temperature compliance purposes, the permit defines ambient background as Telogia Creek at SR 65. Unfortunately, temperature was not measured at this location during the survey. Dissolved oxygen was adequate at the reference site (6.8 mg/L), but somewhat depressed at the test site (4.1 mg/L). Dissolved oxygen at the test site was below Class III water quality standards (Rule 17-302.530(31) FAC).

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

No organic pollutants were detected in the discharge. Iron (756 µg/L), zinc (15 µg/L), nickel (3 µg/L), and copper (9 µg/L) were found in the effluent sample. Since the effluent hardness value was 885 mg/L, the concentration of copper represents a violation of both the facility's permit limit (32 µg/L) and the Class III water quality standard (which allows a maximum copper concentration of 38.7 µg/L, based upon a hardness of 400 mg/L) (Rule 17-302.530(24) FAC). Dissolved oxygen was also in violation of standards in the effluent, at 4.2 mg/L (Rule 17-302.530(31) FAC).



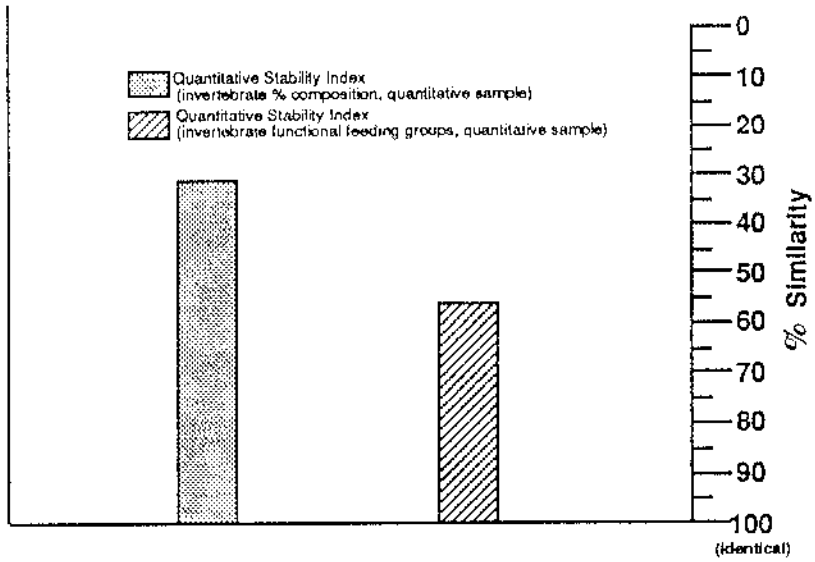
Effect of discharge on receiving stream (measured as difference between control and test sites).

Fecal coliforms were 30 organisms/100 mL at the reference site, 6000 organisms/100 mL at the test site, and 1150 organisms/100 mL in the effluent. The fecal coliform levels in the effluent and at the test site represent violations of Class III water quality standards (Rule 17-302.530(6) FAC). Total coliform bacteria were measured to be 300 organisms/100 mL at the reference site, 26,000 organisms/100 mL at the test site, and 2100 organisms/100 mL in the effluent. The total coliform levels at test site were in violation of Class III water quality standards (Rule 17-302.530(7) FAC).

Total ammonia was elevated in the effluent (5.7 mg/L), while effluent unionized ammonia was calculated to be 0.03 mg/L. This is a violation of the facility's permit limits and Class III water quality standards (Rule 17-302.530(3) FAC). Effluent TKN was 6.0 mg/L, while effluent total phosphorus was 0.5 mg/L. However, most nutrient concentrations at the test site were typical of Florida streams, although total phosphorus was slightly higher than expected (see Table of Typical Water Quality Parameters in Appendix). Reference site nutrient concentrations were normal.

Algal growth potential at the test site (12.6 mg dry wt/L) and in the effluent (5.7 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold", which indicates the likelihood of excessive macrophyte growth, algal blooms, lowered D.O., and fish kills (Raschke and Schultz 1987). It should be noted that 50% of the test site was covered with aquatic vegetation, potentially related to the AGP of the discharge. Algal growth potential at the Big Boggy Branch reference site was 0.8 mg dry wt/L).

Quantitative measures of benthic macroinvertebrate community health indicated moderate negative effects due to the discharge. The figure on this page indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) corre-



Effect of discharge on receiving stream
(measured as similarity between control and test sites).

spond with greater degrees of degradation. Negative values mean that the test site is better than the reference. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation. A complete list of taxa is in the Appendix.

Taxa richness was very similar at the two sites. A total of 27 taxa and 26 taxa colonized the Hester-Dendy samplers at the reference and test sites, respectively. This is better than the number of species found in 80% of other Florida streams (see table of Typical Water Quality Values in Appendix). In dip net sweeps, 34 taxa were found at the reference site, while 33 taxa were recovered from the test site. Again, this is better than that found in 85% of other Florida streams. Shannon-Weaver diversity, however, decreased from 3.5 at the reference site to 2.6 at the test site, predominantly due to the high proportions of the ephemeropteran, *Caenis* sp. This 25.7% decrease in diversity is a violation of Rule 17-302.530(11) FAC. The reduced diversity at the test site is partly caused by characteristics of the discharge (*e.g.*, elevated unionized ammonia), but also may be related to the hydrology of the stream. *Caenis* sp. is commonly found in great abundance in lentic systems with aquatic vegetation. Due to the intermittent nature of the discharge, and the desiccation of the surrounding streams, it is possible that lentic conditions periodically prevailed at the test site. Therefore, it was not surprising that organisms more typical of ponds, marshes, or sloughs, such as *Caenis* sp., *Asheum becki*, *Anax junius*, *Erythrodiplax connata minuscula*, and *Erythemis simplicicollis*, were common at the test site. Lentic systems generally are lower in Shannon-Weaver diversity than are lotic systems.

The Florida Index was lower than expected for a perennially flowing system at both sites. For example, using dip net sweeps, the reference site received 9 Florida Index points while the test site received 6 points. In Hester-Dendy collections, the reference site scored 7 points while the test site received only one Florida Index point. A Florida Index score of 20 points is generally expected from a healthy stream in north Florida. The intermittent, or sluggish nature of these swamp-fed streams may be one reason for the low Florida Index scores. Note however, that the Timber Energy test site had lower Florida Index values in both the quantitative and qualitative data sets, suggesting additional stress from the discharge. Even when one considers the hydrological factors which complicated this assessment, the data indicate that the facility is having a moderate negative effect on receiving water macroinvertebrate populations.

Conclusions

Dissolved oxygen at the test site and in the effluent was below Class III water quality standards (Rule 17-302.530(31) FAC).

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

No organic pollutants were detected in the discharge. Iron (756 µg/L), zinc (15 µg/L), nickel (31 µg/L), and copper (92 µg/L) were found in the effluent sample. Since the effluent hardness value was 885 mg/L, the concentration of copper represents a violation of both the facility's permit limit (32 µg/L) and the Class III water quality standard (which allows a maximum copper concentration of 38.7 µg/L, based upon a hardness of 400 mg/L) (Rule 17-302.530(24) FAC).

The fecal coliform levels in the effluent (1150 organisms/100 mL) and at the test site (6000 organisms/

100 mL) violated Class III water quality standards (Rule 17-302.530(6) FAC). The total coliform levels at test site (26,000 organisms/100 mL) also were in violation of Class III water quality standards (Rule 17-302.530(7) FAC).

Total ammonia was elevated in the effluent (5.7 µg/L), while effluent unionized ammonia was calculated to be 0.03 mg/L. This is a violation of the facility's permit limits and of Class III water quality standards (Rule 17-302.530(3) FAC). Effluent TKN was 6.0 mg/L, while effluent total phosphorus was 0.5 mg/L. However, most nutrient concentrations at the test site were typical of Florida streams, although total phosphorus was slightly higher than expected. Reference site nutrient concentrations were normal.

Algal growth potential at the test site (12.6 mg dry wt/L) and in the effluent (5.7 mg dry wt/L) exceeded the 5 mg dry wt/L "problem threshold".

Macroinvertebrate taxa richness was above average at both the test and reference sites. Shannon-Weaver diversity, however, decreased from 3.5 at the reference site to 2.6 at the test site, predominantly due to the high proportions of the ephemeropteran, *Caenis* sp. This 25.7% decrease in diversity is a violation of Rule 17-302.530(11) FAC. The Florida Index was lower than expected for a perennially flowing system at both sites, but was consistently lower at the test site. Even when one considers the hydrological factors which complicated this assessment, the data indicate that the facility is having a moderate negative effect on receiving water macroinvertebrate populations.

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Raschke, R. L. and D. A. Schultz. 1987. The use of the algal growth potential test for data assessment. J. Wat. Poll. Cont. Fed. 59(4): 222-227.

Ross, L. T. 1990. Methods for aquatic biology. Fla. Dept. Environ. Reg. Tech. Ser. 10(1): 1-47.

Weber, C. I. 1991. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. 4th edition. EPA/600/4-90/027. U. S. EPA, Cincinnati, Ohio. 216 pp.

Chemistry summary table for Timber Energy Resources.	Effluent	Boggy Br. Reference Site	Test Site
Metals (ug/L)			
Aluminum	148 I		
Copper	92		
Iron	756 J		
Selenium	34 I		
Nickel	31		
Silver	0.05 U		
Cadmium	0.08 U		
Mercury	0.1 U		
Arsenic	20 U		
Antimony	15 U		
Chromium	10 U		
Lead	15 U		
Zinc	15 J		
Nutrients (mg/L)			
Ortho-phosphate	0.1	0.08 A	0.03 I
Total phosphorus	0.5	0.2 U	0.2 A
Unionized Ammonia	0.03		
Ammonia	5.7	0.04	0.06
Nitrate+Nitrite	0.7	0.04 U	0.03 I
TKN	6.0	0.2 U	0.7
Other Parameters			
Habitat Assessment		30	64
D.O. (mg/L)	4.2	6.8	4.1
pH (SU's)	6.8	7.9	7.2
Conductivity (µmhos/cm)	1800	440	900
Hardness	885		
TSS	2 U		27
Chloride	21		52
Oil & Grease	5.0 K		
Temperature (°C)	28.0	20.8	21.0
AGP (mg dry wt/L)	5.7	0.8	12.6
Fecal coliform (org/100 ml)	1150 A	30	6000
Total coliform (org/100 ml)	2100 A	300	26000

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

J - Estimated value

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

K - Actual value is known to be less than value given

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

Typical Values for Selected Parameters in Florida Waters

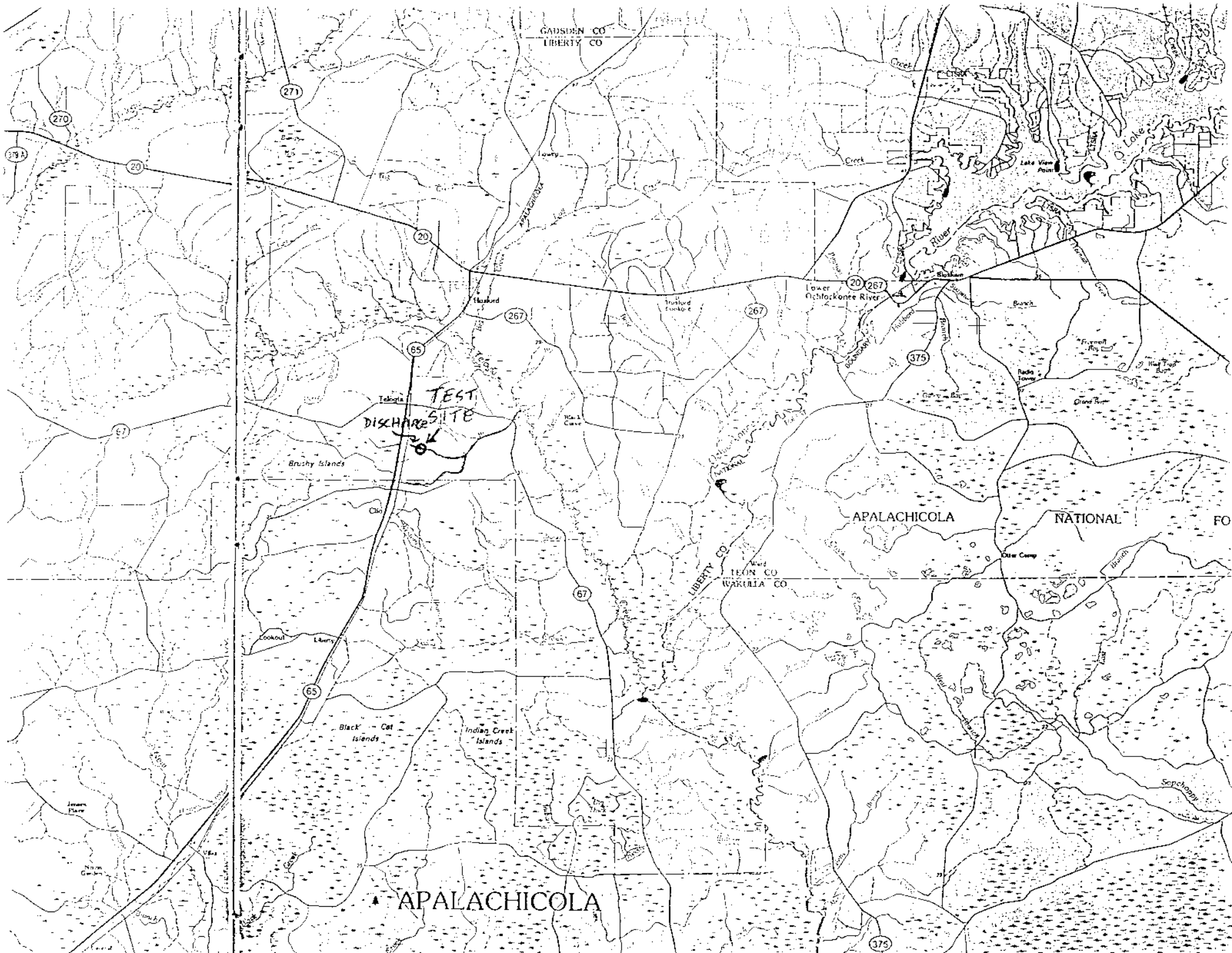
Adapted from Joe Hand, FDER, personal communication, 1991
(data was collected between 1980 and 1989)

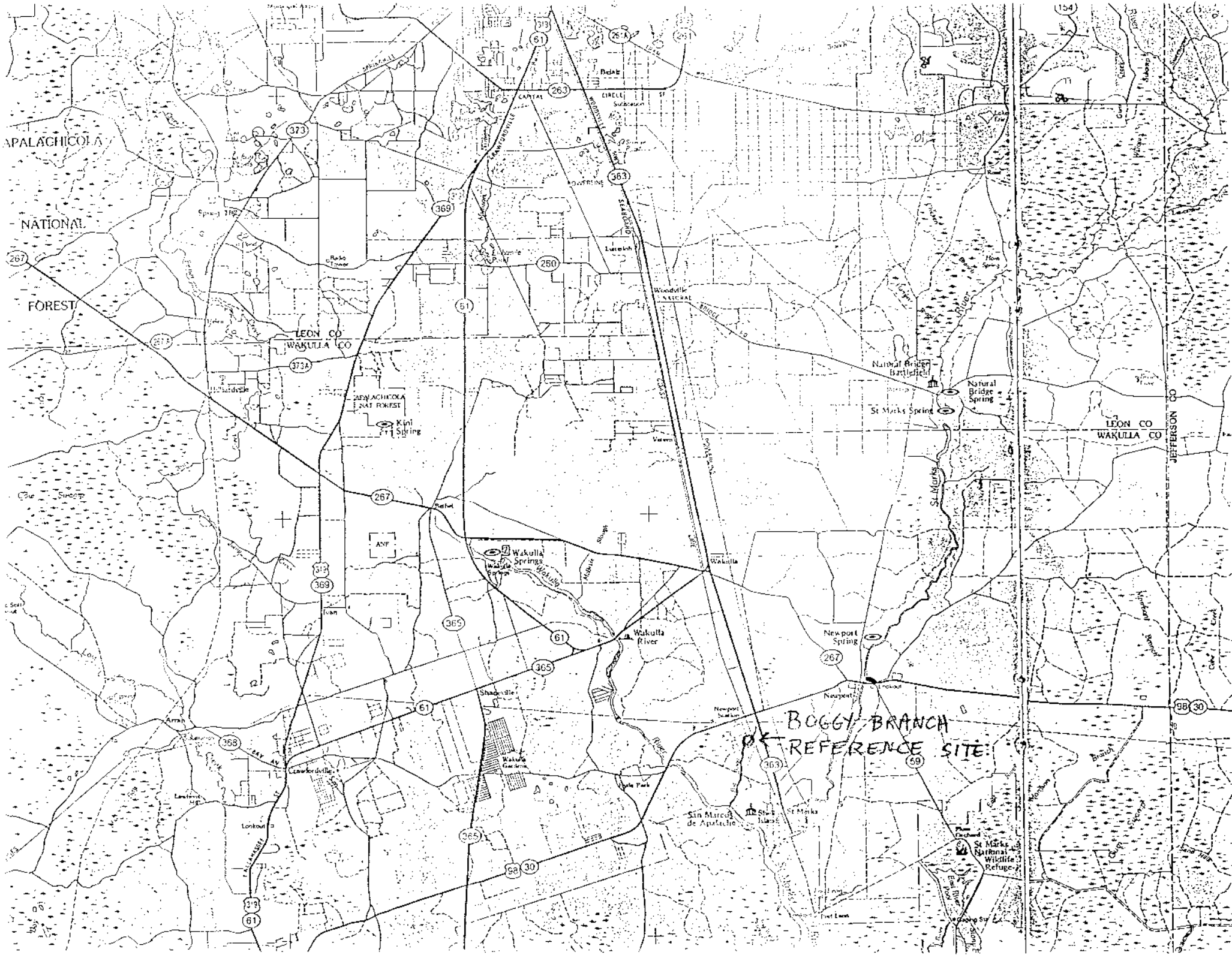
Percentile Distribution

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


GADSDEN CO
LIBERTY CO
TEST SITE
DISCHARGE
Brushy Islands
Black Cat Islands
Indian Creek Islands
APALACHICOLA
NATIONAL
LIBERTY CO
LEON CO
WAKULLA CO
Lower Ochlockonee River
Telogia
Hosford
Blountstown
APALACHICOLA


APALACHICOLA
NATIONAL
FOREST
LEON CO
WAKULLA CO
JEFFERSON CO
Woodville
Natural Bridge Battlefield
Natural Bridge Spring
St Marks Spring
Kini Spring
Wakulla Springs
Wakulla River
Newport Spring
Newport
Shadeville
Crawfordville
San Marcos de Apalachee
St Marks National Wildlife Refuge
BOGGY BRANCH
REFERENCE SITE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Facility Name: TIMBER ENERGY RESOURCES		Date Summary Prepared: 09-17-93
Location (attach detailed map): Located on State Road 65 near Telogia.	County: LIBERTY	District: N W DISTRICT
Federal Permit # and expiration date: FL0039951 6/30/97	State GMS # and State expiration date: 1039P00957 Exp. date: 9/1/94	Facility Type: (Industrial) Municipal Federal Agricultural Other (list):

Function of facility: Power Plant

Description of treatment process: Operate an intermittent discharge from the wastewater treatment facility for a 14 MW wastewood fueled power plant requiring a flow of 100 gpm of raw water at 72° F for cooling and dilution. The facility consists of two water wells with a capacity of 500 gpm each to meet the water requirements and a cooling pond to hold the flow within the pond for temperature stabilization.

Receiving waters: STOKES BRANCH	Classification: I II (III)	
Design Flow: 100gpm	Mean Flow:	Flow during survey:

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

therefore, the best time to sample is:

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

X No Mixing Zone

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

Parameter	Limit (units)
1) Discharge Temperature	1) ≤ 5° F over Ambient
2) Total Flow	2) ---
3) Copper	3) .032 mg/l
4) Iron	4) 1.0 mg/l
5.) TSS	5) 20.0 mg/l
6) Oil & Grease	6) 5 mg/l
7.) Un-Ionized Ammonia	7.) .02 mg/l
8) Chlorides	8.) 250 mg/l
9.) Chlorine (Total Residual)	9.) .01 mg/l
10.) pH	10.) 6.5 - 8.5 S.U.
11.) Static Removal	11.) —

Describe special permit conditions and permit modifications:

Timber Energy Resources
(Facility)

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s):

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: An inspection of the facility was done on January 26, 1993. The facility was operating satisfactorily at that time. During a previous inspection dated: August 19, 1992, the inspector noted the following: 1) The weir box was leaking, 2) Accumulated sand and grit was noted in the approach channel to the weir, 3) the facility's primary and secondary flow measuring devices were improperly designed.
① According to the current permit (issued September 17, 1992) the facility should be reporting Un-ionized ammonia; however, Un-Ionized Ammonia has not been reported for any month the past year.
(please see attached page)

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

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
No samples were taken during the January 1993 inspection and the August 1992 inspection; therefore, comparability of numeric data is not possible. The inspection report, however, for January 1993 stated the facility was operating satisfactory at the time. In the August 1992 inspection, the flow measurement devices was evaluated as being unsatisfactory.

Additional information:

Staff contributing to this review (signature):

Glenn Butts	(Biologist)
	(Inspector)
	(Engineer)
Karen McDonald	(Co-OP)
	( )
	( )

(2) According to the current permit, all samples should be taken from the Power Boiler Point of Discharge Area. The facility, however, is taking some of its samples from the ditch discharge at property line area (i.e. total chlorine residual; pH; Oil & Grease; and Chlorides). These samples are not being taken from the Boiler Point of Discharge area according to the facilities MORs.

(3) According to the current permit, the discharge temperature at the Boiler Point Discharge Area should be $\leq 5°F$ over the ambient temperature (which is to be taken at Telogia Creek at State Road 65 once a week). On its MORs, however, the facility is currently listing 90°F as its temperature limit. This value is incorrect ~~according to the current permit~~. The temperatures the facility reported for the following months were in excess of the limit:

(A = Ambient ; D = temperature at Discharge Area)

October 1992 (A = 72° ; D = 84°)
November 1992 (A = 60° ; D = 78°)
December 1992 (A = 62° ; D = 76°)
January 1993 (A = 63° ; D = 72°)
February 1993 (A = 64° ; D = 73°)
March 1993 (A = 66° ; D = 74°)
April 1993 (A = 67° ; D = 78°)
May 1993 (A = 67° ; D = 78°)

(cont. →)

(4) According to the current permit, T.S.S. has a limit of 20mg/L. On its MORs, the facility is currently listing 60mg/L as the limit for T.S.S. This value is incorrect ~~according to the current permit.~~ The T.S.S.s the facility reported for the following months were in excess of the limit:

February 1993 - reported 25
March 1993 - reported 26
May 1993 - reported 22

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y): 4-22-91	RECEIVING BODY OF WATER: BIG FOGGY CK.

REMARKS:	LOCATION: OLIN UPSTREAM	FIELD ID/NAME: 001

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other
50					50	

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

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

Point-Source Pollution (list location and describe):

Estimated Stream Width (range, m): 1-3 M	Estimated Stream Depth (range, m): .1-.3		yes
High Water Mark (m above bed): .4	Velocity (range, m/s): .05	Impounded ☐ Channelized ☒	

Canopy Cover % (check box): Open: ☒ Lightly Shaded: ☐ Moderately Shaded: ☐ Heavily Shaded: ☐

SEDIMENT/SUBSTRATE

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

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

Sediment Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☐ Sand: ☐ Shell: ☐ Other: ☐

Substrate Types (estimated % surface coverage):

Limestone:	10	Sand/Silt/Clay Mix:	
Consolidated Clay:		Clay/Silt (inorganic):	
Gravel/Shell	10	Coarse Organic Debris:	5
Sand:	70	Mud/Muck (organic):	5

WATER QUALITY

	Temp. (°C):	D.O. (mg/l):		
Top	20.6	6.3	Secchi Depth (m):	.5
Mid-depth			pH (SU):	7.9
Bottom	20.4	6.8	Conductivity (µmho/cm):	440
			Other Parameters:	

Stream Type (check box): Blackwater: ☒ Deep Aquifer Fed: ☒ Surficial Aquifer Fed: ☐ Alluvial: ☐ Other: ☐ SPRING

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

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

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

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

Weather Conditions: PART SUN / BREEZE FROM SOUTH

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

ANALYSIS DATE:	ANA:	SIGNATURE:
4-22-91	R. FRYDENBORG	Russell Frydenborg

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/DY): 4-22-91	RECEIVING BODY OF WATER: BIG BOGGY AR.

REMARKS:	LOCATION:	FIELD ID/NAME:
1100 HRS	UPSTREAM OLIN	001

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 15	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 5	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 2	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 5	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
—	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	30

COMMENTS: SOME COOLING EFFECT FROM NORTH

ANALYSIS DATE:	ANALYST:	SIGNATURE:
4-22-91	[illegible]	[illegible]

1100

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (Version 4)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
		10-5-93	11:10	

REMARKS:	LOCATION:	FIELD ID/NAME:
	Test Site - Timber Energy	

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest	Field/Pasture	Agricultural	Residential	Commercial	Industrial	Other (Specify)
10	10				80	

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

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

Point-Source Pollution (list location and describe):

Timber Energy

Estimated System Width (range, m): 1-3	Estimated System Depth (range, m): .5-1	Impounded	yes ☐
High Water Mark (m above bed): .5	Velocity (range, m/s): .1-.3	Channelized	☒

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 Deposits: Sludge: ☐ Paper Fiber: ☐ Mud: ☒ Sand: ☐ Shell: ☐ Other: ☒ Muck

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5	4		Riffles			
Leaf Packs				Sand			
Aquatic Vegetation	50	7		Mud/Muck/Silt	30	2	
Rock or Shell Rubble				Benthic leaf mats			
Undercut Banks/Roots	15	7		Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):			Secchi (m):
Top		21	7.2	4.1	400			
Mid-depth								
Bottom								

System Type : Stream: ☒ (Sand Bottomed / Swamp & Bog / Alluvial / Sand Bot w/ Spring / Calcareous / Misc.) 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:

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Greg Wynn, Lin Burton, David Evans, Chris Leduc, Christy LeDuc, Frank Letuc		10-5-93

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
		10-5-93	

REMARKS:	LOCATION:	FIELD ID/NAME:
	Test Site - Timber Energy	

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 25	Greater than 40% snags, logs, tree roots, emergent vegetation, leaf packs, undercut banks, rubble, or other stable habitat. **23-30 points**	20% to 40% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Adequate habitat. **16-22 points**	5% to 20% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Less than desirable habitat. **8-15 points**	Less than 5% snags, logs, tree roots, emergent vegetation, leaf packs, etc. Lack of habitat is obvious. **0-7 points**
Water Velocity 16	Max. observed; >0.3 m/sec. **23-30 points**	Max. observed; 0.1 to 0.3 m/sec **16-22 points**	Max. observed; 0.05 to 0.1 m/sec **8-15 points**	Max. observed; <0.05 m/sec **0-7 points**
Artificial Channel/ Flow Alteration 3	No artificial channelization. Little activity (impervious surface) in watershed which would cause scouring during spates. **12-15 points**	—	—	Artificially channelized, or scouring present during spates because of excess impervious surface in watershed. **0-3 points**
Bank Stability 10	Stable. No evidence of erosion or bank failure. Little potential for future problems. **9-10 points**	Moderately stable. Infrequent or small areas of erosion, mostly healed over. **6-8 points**	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. **3-5 points**	Unstable. Many raw, eroded areas. Obvious bank sloughing. **0-2 points**
Riparian Zone Vegetation Quality 10	Over 80% of streambank surfaces consist of native plants, classified as: bottomland hardwoods, understory shrubs, or non-woody macrophytes. **9-10 points**	50% to 80% of riparian zone is vegetated, but one class of plants is not represented. **6-8 points**	25% to 50% of riparian zone is vegetated, but one or two classes of plants are not represented. **3-5 points**	Less than 25% of streambank surfaces are vegetated. Poor plant community (e.g. grass monoculture) present. **0-2 points**

Adjustments		TOTAL SCORE
	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	64

COMMENTS:

ANALYSIS DATE:	ANALYST:	SIGNATURE:
10-5-93	Gray Lyon	Gray Lyon

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Timber Energy RESOURCES
Location: TELOGIA
County: LIBERTY
Contact/District: LYN BURTON TALLA
NPDES Permit #: FL00 39951 Outfall #: —

Sample Collection: Date 10-5-93 Time 1200
Test Beginning: Date 10-5-93 Time 1600
Test Ending: Date 10-7-93 Time 16:00
Organism Batch #: 39 Diluent Batch #: well
Organism Age: 12 days

Test Organism: Cyprinella leedsi

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

63342 93-OCT-05-22

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	24.5 @ 24.6	8.3 @ 24.5	1010 @ 1,000 9550 @ 10,000 @ 24.3 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.9 @ 24.0	8.3 @ 24.4	1010 @ 1,000 9050 @ 10,000 @ 24.5 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.5	8.3 @ 24.4	1010 @ 1,000 9490 @ 10,000 @ 24.6 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control A	390	5	5	5	7.9	8.2	8.3	24.3	23.9	24.2	7.9	7.5	7.8	270	270	270
Control B	147	5	5	5	7.9	8.2	8.3			24.2	7.9	7.4	7.9	250	250	250
100% A	10	5	5	5	7.1	7.7	8.0	24.0	23.9	24.2	6.0	7.1	7.9	1645	1640	1655
100% B	65	5	5	5	7.1	7.7	8.0			24.2	6.1	7.2	7.9	1650	1600	1610
Measured/Loaded by:		TM	TM	TM	TM	MF	TM	TM	MF	TM	TM	MF	TM	TM	MF	MF
Recorded by:		TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR	TR	TM	TR

Investigators' Signatures

Tobin C. Rodden
Tina Mitchell
Marshall Faircloth

Reviewer

	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	<0.03	.04	DR-100	TM
Alkalinity:	125	70	95	Hach	TR
Hardness:	120	80	795	Hach	TR
Total Ammonia:	<0.017	<0.017	7.67	auto	MF

Ammonia Meter #98136 Ammonia Meter Slope: -55.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 1 ppt

form updated 7/8/93

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Timber Energy RESOURCES
Location: TELOGIA
County: LIBERTY
Contact/District: LYN BURTON TALLA
NPDES Permit #: FL00 39951 Outfall #: —

Sample Collection: Date 10-5-93 Time 1200
Test Beginning: Date 10-5-93 Time 1600
Test Ending: Date 10-7-93 Time 1600
Organism Batch #: 112 Diluent Batch #: 26
Organism Age: < 24 hrs
Test Organism: Ceriodaphnia dubia

63342 93-OCT-05-22

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	24.5 @ 24.4	8.3 @ 24.5	1010 @ 1,000 9550 @ 10,000 @ 24.5 °C
24 hr	7.0 @ 7.0 9.0 @ 9.0	23.9 @ 24.0	8.3 @ 24.4	1010 @ 1,000 9630 @ 10,000 @ 24.5 °C
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.5	8.3 @ 24.4	1012 @ 1,000 9690 @ 10,000 @ 24.6 °C

Conc.	Chamber #	Number Live 0 hr	Number Live 24 h	Number Live 48 h	pH 0 hr	pH 24 h	pH 48 h	Temperature (°C) 0 hr	Temperature (°C) 24 h	Temperature (°C) 48 h	D.O. (mg/L) 0 hr	D.O. (mg/L) 24 h	D.O. (mg/L) 48 h	UNCORRECTED Cond. (mmhos/cm) Cond. (µmhos/cm) 0 hr	24 h	48 h
Control	A	5	5	5	8.2		8.3	23.7		23.6	8.2		7.9	940		200
Control	B	5	5	5			8.3			23.5			7.9			200
Control	C	5	5	5			8.3			23.5			7.9			210
Control	D	5	5	5			8.3			23.4			7.9			200
100%	A	5	5	5	7.2		8.1	24.0		23.6	6.3		7.9	1505		1830
100%	B	5	5	4			8.2			23.6			8.0			1700
100%	C	5	5	4			8.2			23.6			7.9			1900
100%	D	5	5	5			8.2			23.6			8.0			2070
Measured/Loaded by:		MF	TMF	MF	TM		TMF	TM		MF	TM		MF	TM		MF
Recorded by:		TM	TM	MF	TR		TR	TR		TR	TR		TR	TR		TR

Investigators' Signatures

Robin C. Roden
Tina Mikulski
Marshall Barnhill

Reviewer

form updated 7/8/93

	Salt Water/ Well Water	Water Quality Parameters: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			not measured		
Lab Total Residual Cl2:	<0.03	<0.03	.04	DR-100	TM
Alkalinity:	125	70	95	Hach	TR
Hardness:	120	80	795	Hach	TR
Total Ammonia:	<0.017	<0.017	.767	Orion	MF

Ammonia Meter #98136 Ammonia Meter Slope: −55.6 Ammonia Blank: <0.017 Control Salinity: 0 ppt Sample Salinity: 1 ppt

Taxa list for Timber Energy Resources collected via Hester-Dendy artificial substrates. Test site was sampled below the discharge in an unnamed tributary of Stokes Branch on 5 October, 1993. Reference site was collected on 22 April, 1991 in Big Boggy Branch, Wakulla County.

	Reference Site	Test Site
Coleoptera		
Berosus sp.	–	2
Stenelmis sp.	1	–
Diptera		
Asheum beckae	–	4
Ablabesmyia cinctipes ?	1	–
Ablabesmyia mallochi	4	–
Chironomus sp.	33	1
Cladotanytarsus sp.	2	–
Clinotanypus sp.	–	1
Cryptochironomus sp.	3	–
Dicrotendipes modestus	2	–
Dicrotendipes neomodestus	8	–
Goeldichironomus carus	–	18
Goeldichironomus holoprasinus	18	30
Goeldichironomus natans ?	–	4
Labrundinia becki	2	–
Orthocladius annectens	1	–
Palpomyia grp. sp.	1	–
Polypedilum fallax grp.	1	–
Polypedilum illinoense	1	–
Polypedilum scalaenum grp.	–	4
Undetermined dipteran pupae	10	6
Tanytarsus sp.	12	–
Tanytarsus sp. E Epler	–	4
Tanytarsus sp. F Epler	–	2
Tanytarsus sp. G Epler	–	1
Tanypus neopunctipennis	–	1
Tribelos jucundum	1	–
Tribelos sp.	1	–
Ephemeroptera		
Caenis sp.	–	153
Callibaetis floridanus	1	–
Gastropoda		
Hebetancyclus excentricus	4	48
Physella sp.	1	8
Planorbella duryi	–	17
Hemiptera		
Hydrometra sp.	–	1
Hirudinea		
Helobdella sp.	5	–

Helobdella triserialis	–	1
Amphipoda		
Hyalella azteca	1	1
Odonata		
Anax junius	–	2
Argia moesta	1	–
Enallagma cardenium	1	–
Erythrodiplax connata minuscula	–	18
Erythemis simplicicollis	–	1
Ischnura sp.	–	3
Libellula incesta	2	–
Pachydiplax longipennis	–	6
Oligochaeta		
Dero trifida	–	1
Trichoptera		
Oxyethira sp.	2	–
Undetermined trichopteran pupa	1	–

Taxa list for Timber Energy Resources collected via 20 dip net sweeps. Test site was sampled below the discharge in an unnamed tributary of Stokes Branch on 5 October, 1993. Reference site was collected on 22 April, 1991 in Big Boggy Branch, Wakulla County.

	Reference Site	Test Site
Acarina		
Koenikea sp.		2
Coleoptera		
Berosus sp.		3
Undetermined Curculionidae	12	–
Hydrobius sp.	24	–
Laccornis		1
Diptera		
Ablabesmyia mallochi	12	–
Laccophilus sp.		1
Chironomus decorus grp.	42	–
Cladotanytarsus sp.	108	–
Clinotanypus sp.	6	–
Conchapelopia sp.	6	–
Cricotopus bicinctus	192	–
Cryptochironomus sp.	6	–
Goeldichironomus holoprasinus		2
Labrundinia neopilosella		1
Larsia decolorata	6	5
Meropelopia sp.	6	–
Monopelopia boliekae		1
Odontomesa sp.		4
Palpomyia grp. sp.		3
Polypedilum convictum grp.		1
Polypedilum halterale grp.	6	–
Polypedilum illinoense	60	1
Polypedilum scalaenum	6	–
Polypedilum trigonus		14
Procladius bellus	6	–
Procladius sp.	6	–
Undetermined dipteran pupae		4
Tanytarsus sp.	30	1
Tanytarsus sp. E Epler		2
Tanytarsus sp. F Epler		18
Tanypus carinatus		1
Tanypus neopunctipennis	12	–
Ephemeroptera		
Caenis sp.		113
Callibaetis floridanus		1
Gastropoda		
Hebetancyclus excentricus	24	5
Physella sp.	78	–
Pseudosuccinea columella	36	3

Pyrogophorus platyrachis		1
Hemiptera		
Belostoma sp.		1
Neoplea sp.		3
Undetermined Hemiptera sp.		3
Lepidoptera		
Munroessa sp.	6	–
Undetermined Noctuidae sp.	12	–
Malacostraca		
Hyalella azteca	18	–
Odonata		
Boyeria vinosa		6
Erythemis simplicicollis		1
Ischnura sp.		7
Ischnura ramburii	18	–
Orthemis ferruginea	6	–
Pachydiplax longipennis		15
Oligochaeta		
Allonais paraguayensis		3
Aulodrilus pigueti	42	–
Dero digitata	6	–
Dero lodeni		1
Limnodrilus angustipenis	6	–
Limnodrilus hoffmeisteri	30	4
Lumbriculus inconstans	96	1
Pelecypoda		
Undetermined sphaeriid	72	–
Trichoptera		
Cheumatopsyche sp.	6	–
Oxyethira sp.	6	–

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0039951		931005		X	S	2

Remarks

21 66

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

1	2	3	11	12	17	18	19	20
Transaction Code		NPDES NUMBER		YR/MO/DA		Insp Type	Inspector	Fac Type
N	5	FL0039951		931005		B	S	2

Remarks

21 66