Florida
Department of Environmental Protection

Biological Assessment of

Bonifay Wastewater Treatment Plant

Holmes County

NPDES #FL0027731

Sampled March 1993

August 1993

Biology Section
Division of Technical Services

Department of Environmental Protection
Results of Fifth Year Inspections

Discharger: Bonifay WWTP
County: Holmes
NPDES Number: FL0027731
State Permit Expiration Date: 5 July 1993

Toxics Sampling Inspection (XSI)

Date Sampled: 22 March 1993

Results: No organic pollutants were detected in the effluent or at the test site. Only zinc (29 µg/L) was found in the effluent, and this level is well within Class III standards.

Compliance Biomonitoring Inspection (CBI)

Date Sampled: 22 March 1993

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

Impact Bioassessment Inspection (IBI)

Date Sampled: 25 March 1993

Results: Qualitative measures of benthic macroinvertebrate community health indicated that both sites were degraded, but that conditions were moderately worse downstream of the Bonifay WWTP discharge. Taxa richness and the Florida Index were unusually depressed at both stations, but somewhat lower at the test site. Another indication of degradation seen at the test site was the domination (72.3% of the benthic population) by *Chironomus* sp., an organism typical of polluted situations. The stress seen in macroinvertebrate populations at the upstream reference site was probably caused by the poor habitat quality and by the general water quality problems associated with urban stormwater runoff (*e.g.*, turbidity, BOD, oils and greases, scouring). The less hospitable conditions found below the discharge were probably caused by these same factors and perhaps by some intermittent problem that may be related to the effluent. Macroinvertebrate communities are known to respond to, and integrate the effects of, sporadic pollution events. Periphyton communities were only somewhat affected by the WWTP discharge. There were no major differences in chlorophyll *a*, taxa richness, or the diatom to blue green algae ratio at the test site, compared to the control. Although the percent contribution of the dominant taxon was lower at the test site, the dominant species there, *Navicula minima,* is tolerant of eutrophic conditions.

Water Quality Inspection (WQI)

Date Sampled: 22 March 1993

Results: Fecal coliforms (10,400 organisms/100 ml) at the test site violated Class III standards, Rule 17-302.560(6) FAC. The Bonifay WWTP contributed to elevated nutrients in the receiving waters. Water at the test site was enriched with nitrate-nitrite, where concentrations exceeded 94% of other Florida streams. Test site total phosphorus and ortho-phosphate were higher than 84% and 88%, respectively, of other Florida streams. Algal growth potential at the test site was above the 5 mg dry wt/L "problem threshold".

Introduction

The City of Bonifay Wastewater Treatment Plant is located in Holmes County, Florida (see maps in Appendix). The facility provides advanced domestic wastewater treatment for Bonifay and a correctional institution. The design flow for this facility is 1.4 MGD, although the mean discharge has been only 0.9 MGD. Effluent is discharged through a 12 inch PVC pipe to the Class III Camp Branch, which flows to Holmes Creek, and thence, to the Choctawhatchee River.

State permit limits for the effluent, based on a wasteload allocation, are as follows: flow (1.4 MGD), TSS (8 mg/L), BOD (5 mg/L), total nitrogen (5 mg/L), and total phosphorus (3 mg/L) (see facility summary in Appendix).

Until 1991, the facility had a history of problems, including numerous violations of permit limits for BOD and TSS, as well as excessive nutrients and fecal coliforms in the effluent. These deficiencies led to biological degradation in Camp Branch (Butts 1990). Since the facility upgraded to advanced wastewater treatment (AWT) in December, 1991, Monthly Operating Reports show compliance with permit limits. However, during the AWT construction activities, the City of Bonifay was responsible for a major dredge and fill violation in Camp Branch in the vicinity of the WWTP outfall. The stream was dredged for approximately 1000 feet and the spoil was placed into adjacent wetlands. This caused degradation to the aquatic habitat in Camp Branch.

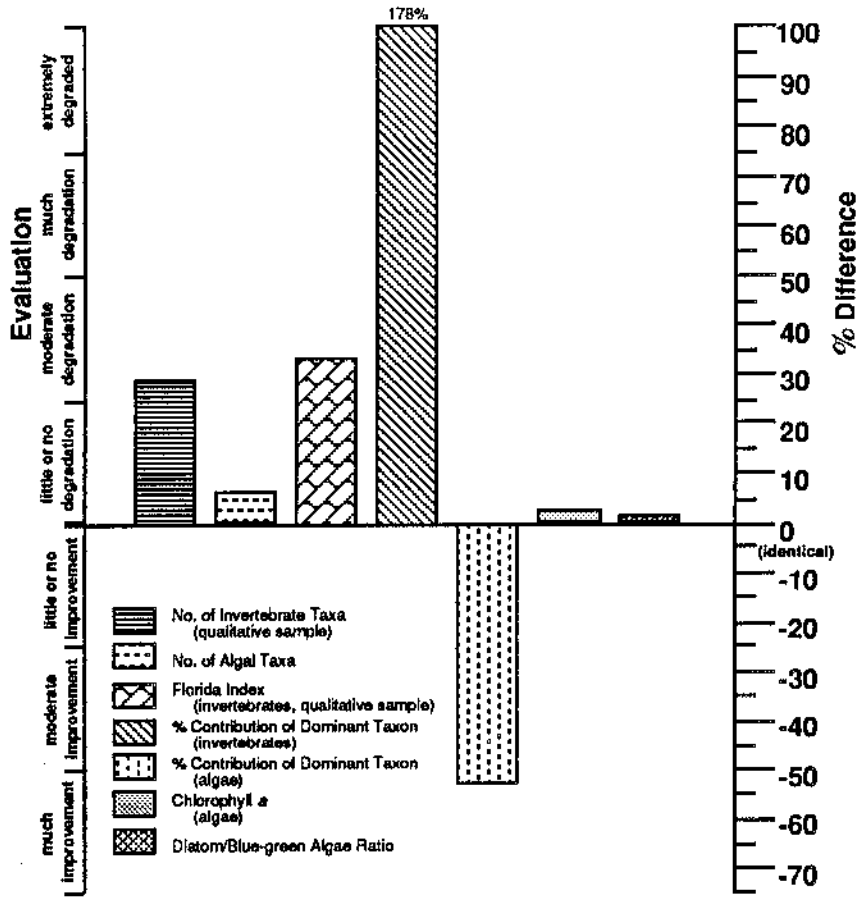
Methods

The focus of this investigation was to determine the discharger's effects on the receiving waters. A comparison of biological community health was made between a reference site (located in Camp Branch, 50 yards upstream of the discharge) and a test site (located in Camp Branch,

Major characteristics of community structure of control and test sites.

	Reference Site	Test Site
Macroinvertebrate Qualitative	20 dip net sweeps	20 dip net sweeps
Number of Taxa	17	12
Florida Index	6	4
% Contribution of Dominant Taxon	26.2	72.8
% Oligochaeta	3.3	5.1
% Diptera	90.2	91.5
% Pelecypoda	6.6	0
% Trichoptera	0	1.7
% Acarina	0	1.7
% Predators/ Carnivores	23.3	5.0
% Above Surface Deposit Feeders	37.9	46.0
% Below Surface Deposit Feeders	3.5	5.2
% Suspension Feeders	7.0	2.2
% Shredders	28.2	41.6
Macroinvertebrate Hester-Dendy	2 replicates only	4 replicates
Number of Taxa	17	21
Florida Index	6	10
Shannon-Weaver Diversity	3.6	2.5
% Oligochaeta	6.7	1.7
% Diptera	86.5	95.4
% Trichoptera	0	2.9
% Platyhelminthes	3.4	0
% Coleoptera	3.4	0
% Predators/ Carnivores	9.1	16
% Above Surface Deposit Feeders	50.3	40
% Below Surface Deposit Feeders	11.4	2.3
% Suspension Feeders	11.4	4
% Scrapers	0	0.5
% Shredders	17.7	37.3
Periphyton Algae		
Number of Taxa	16	15
% Contribution of Dominant Taxon	75.3	36.1
Chlorophyll a (mg/sq. m)	24.6	25.2
Diatom/Diatom + B-G Abundance Ratio	1.0	0.99
% Blue-green	0.3	1.0
% Green	2.2	21.4
% Diatoms	97.6	77.6
Algal Growth Potential (mg dry wt/L)	Sandy Creek Reference Site = 0.2	BonifayTest Site = 8.5

100 yards downstream of the discharge). Data from an additional site in Sandy Creek was also collected for comparison with the reference site to evaluate the extent of habitat destruction (from previous dredge and fill violations) and non-point source pollution which would affect Camp Branch even in the absence of the WWTP (see maps in Appendix). 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 *Notropis leedsi* as test organisms, were performed on an effluent sample (Weber 1991). The effluent was analyzed for metals and for organic constituents (base neutral and acid extractables, and pesticide extractables). Additionally, nutrient analyses were performed on the effluent, the Sandy Creek reference site , and the Camp Branch test site. Methods used for all chemical analyses are on file at the Tallahassee DEP Chemistry Laboratory.



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

Benthic macroinvertebrate communities were evaluated at the Camp Branch reference and test sites. Invertebrates were collected from multiple substrates (*e.g.*, snags, leaf packs, vegetation) using discrete dip net sweeps. Invertebrates were also collected with Hester-Dendy artificial substrates which were incubated for 28 days (Ross 1990), although 2 of the 4 replicates were not recovered (sedimentation problems) from the Camp Branch reference site. Historic benthic data from Sandy Creek (considered a regional reference site) was used for comparison with the Camp Branch sites. Periphyton was sampled at the Camp Branch reference and test sites by incubating glass microscope slides in a standard periphytometer for 28 days (Ross 1990). Chlorophyll *a* was also determined for periphyton communities (Ross 1990). Algal Growth Potential tests, using *Selenastrum capricornutum* as the test organism, followed Miller *et al.* (1978).

Explanation of Measurements of Community Health

Several different measurements of macroinvertebrate and algal community health have been employed in this report. Many of these, such as the number of taxa, Shannon-Weaver diversity, and chlorophyll *a* 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. 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. The determination of the Quantitative Stability Index (for taxonomic % composition) is a two step process. First, the relative proportions of major tax-

onomic groups are calculated for each site. Then, the lesser of the two percentages for each discrete taxonomic group is totaled. A QSI (for % composition) of 100% means that the two sites being compared are identical. This same type of procedure is used for calculating the QSI for functional feeding groups.

For graphical purposes, the percent differences between the reference and test sites involving the number of taxa, Florida Index and the diatom to blue-green algae ratio are measured as the reference site minus test site divided by the reference site. The percent differences between sites involving the percent contribution of dominant taxon, and chlorophyll *a* are measured as the test site minus reference site divided by the reference site.

The following personnel were involved in this investigation: Glenn Butts (DEP Northwest District) and Lyn Burton, Marshall Faircloth, Russel Frydenborg, Kathleen Lurding, Kim Pearce, Urania Quintana, Landon Ross, and Greg Wynn (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

Habitat was an obvious limiting factor for biological success in Camp Branch, with only 28 points at the reference site and 24 points at the test site (Appendix). Very little productive substrate, consisting of a few snags, benthic leaf mats, and sparse macrophyte coverage, was available at either station. The banks of this steeply sloped, channelized stream were heavily eroded. It appears that a cycle of scouring and sedimentation following rain events (related to urban stormwater runoff) significantly hinders the development of healthy biological populations in the stream. For example, the high water mark was 3 meters above the normal water level, which would lead to catastrophic drift in the benthos during a spate. The Hester-Dendy samplers were observed to be smothered by sediments, and then uncovered by subsequent high water velocities, during their incubation period. As a result, only two of the four replicates were recovered from the upstream reference site. Because of the problems with the Hester-Dendy samplers, the sweep net data will be emphasized in this report.

The observed water velocity was more favorable for benthic macroinvertebrates at the test site (0.3 m/sec) than at the upstream reference site (0.15 m/sec), probably due to the input of effluent. At the sampling stations, the stream was moderately shallow, and lightly to moderately shaded by trees. Non-point sources of pollution from roadways, as well as from residential, commercial, and industrial areas, were obvious at both sites.

Dissolved oxygen was adequate at the test site (8.1 mg/L). Test site specific conductance was normal (180 µmhos/cm), and the water was slightly acidic (6.3). These readings were not taken from the upstream reference site.

No organic pollutants were detected in the effluent or at the test site. Only zinc (29 µg/L) was found in the effluent at a concentration above the practical quantitation limit, and this level is well within Class III standards.

The effluent sample was not toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred in either 48 hour static acute bioassay (Appendix).

Fecal coliform bacteria at the test site (10,400 organisms/100 mL) violated Class III water quality standards, Rule 17-302.560(6) FAC. Total coliforms were too numerous to count at the test site (implying that levels were high enough to be a violation). As expected, water at the Sandy Creek reference site had low counts of fecal coliform (70 organisms/100 mL) and total coliform (180 organisms/100 mL) bacteria. Fecal and total coliforms were undetected in the chlorinated effluent. Because the upstream reference site in Camp Branch was not sampled for microbiological parameters, it is difficult to determine whether the source of the bacteria at the test site was from stormwater runoff or relatively recent, perhaps inadequately chlorinated, inputs from the WWTP.

Water at the test site was enriched with nitrate-nitrite, where concentrations exceeded 94% of other Florida streams (see Table of typical water quality parameters in the Appendix). Nitrate-nitrite was 0.92 mg/L in the effluent and 0.98 mg/L downstream of the facility. Ammonia at the test site (0.07 mg/L) was normal. The total phosphorus level in the effluent (0.56 mg/L) was similar to that found in the downstream receiving waters (0.52 mg/L at the test site), where it was higher than 84% of other Florida streams. Similarly, ortho-phosphate at the test site (0.55 mg/L) was in the 88th percentile compared to other Florida stream systems. Elevated nutrients at the test site may have been due to the

influence of the WWTP, but because no nutrient samples were taken at the upstream reference site, the relative contribution of nonpoint sources could not be quantified.

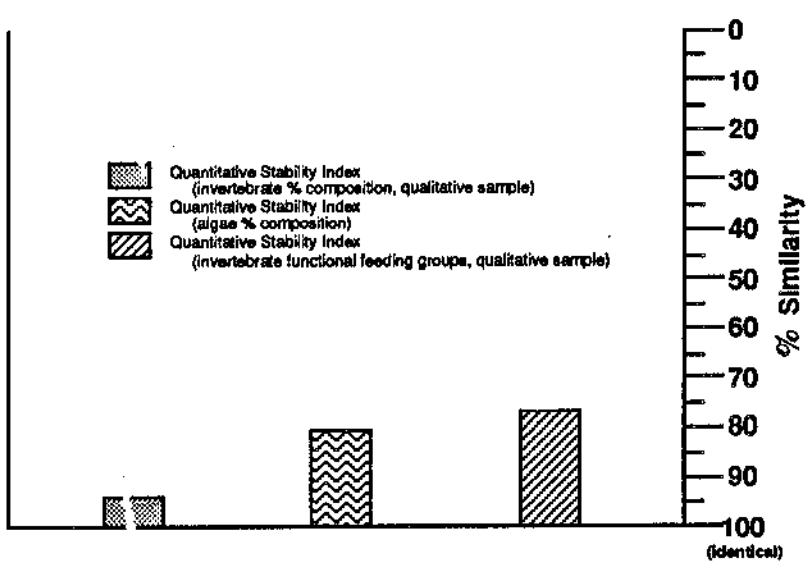
Algal growth potential tests indicated that the test site was moderately nutrient enriched. AGP was 8.5 mg algal dry wt/L at the test site. According to Raschke and Schultz (1987), at AGP levels above 5 mg dry wt/L, enrichment problems such as excessive algal growth and fish kills are likely to occur. The effluent AGP was only 0.23 mg algal dry wt/L, perhaps due to an unidentified inhibiting substance.

Qualitative measures of benthic macroinvertebrate community health indicated that both sites in Camp Branch were degraded, but that conditions were moderately worse downstream of the Bonifay WWTP discharge. As mentioned earlier, data from sweep net samples are discussed here due to loss of half the Hester-Dendy replicates at the Camp Branch reference site, and because of the observed sediment smothering which occurred during part of the incubation period of the artificial substrates. The figure on p. 2 indicates the degree of difference between the reference and test sites. Larger differences (that is, higher percentages) correspond with greater degrees of degradation. Negative values mean that the test site is better than the reference site. The relative abundance of each individual taxon appears in the Appendix. The figure on this page summarizes similarities between the sites. Smaller similarities (lower percentages) generally correspond with greater degradation.

Taxa richness was unusually depressed at both Camp Branch stations, ranging from 16 to 10 taxa at the upstream reference site and downstream test site, respectively. These values are lower than 80% (reference site) to 90% (test site) of typical Florida streams. Florida Index was also much lower than expected at both sites, which should be 20 points at a minimum for flowing streams in north Florida. Florida Index was reduced from 6 points at the Camp Branch reference site to 4 points at the test site. This indicates that pollution sensitive taxa were very scarce in the stream, with conditions being slightly worse below the discharge. In contrast, the taxa richness found in the Sandy Creek reference site (considered a normal stream in the region with favorable habitat) was 32, and the Florida Index was 25.

Another indication of degradation seen at the test site was the domination (72.3% of the benthic population) by *Chironomus* sp., an organism typical of polluted situations (Hudson *et al.* 1990). Butts (1990) previously found high numbers of *Chironomus* sp. below the Bonifay WWTP discharge. The stress seen in macroinvertebrate populations at the Camp Branch reference site was probably caused by the poor habitat quality and by the general water quality problems associated with urban stormwater runoff (*e.g.*, turbidity, BOD, oils and greases, scouring). The less hospitable conditions found below the discharge were probably caused by these same factors and perhaps by some intermittent problem that may be related to the effluent. Macroinvertebrate communities are known to respond to, and integrate the effects of, sporadic pollution events.

Periphyton communities did not appear to be much affected by the WWTP discharge. While 16 taxa were collected at the Camp Branch reference site, 15 were represented in the test site sample (see taxa list in Appendix). There were no major differences in periphyton biomass (chlorophyll *a*) at the test site (24.6 mg/ m^2), compared to the upstream control (25.2 mg/ m^2). The percent contribution of the dominant taxon was lower at the test site (usually regarded as improvement). However the dominant species at the test site, *Navicula minima,* is tolerant of eutrophic conditions (Whitmore 1989). Diatoms (97.6%) were most numerous at the Camp Branch reference site, while 0.3 % of the population there consisted of cyanophytes.



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

The test site population had a similar abundance of blue-greens (1.0%) but fewer diatoms (77.6%) due to an increase in chlorophytes there (21.4%). The diatom to blue green ratio was very similar at both sites.

Conclusions

Poor quality habitat and stormwater runoff were factors affecting the biological success at both study sites in Camp Branch.

No organic pollutants were detected in the effluent or at the test site. Only zinc (29 µg/L) was found in the effluent at a concentration above the practical quantitation limit, and this level is well within Class III standards.

The effluent sample was not toxic to the invertebrate, *Ceriodaphnia dubia*, or to the fish, *Notropis leedsi*. No mortality occurred in either 48 hour static acute bioassay (Appendix).

The Bonifay WWTP may have contributed to elevated nutrient concentrations in the receiving waters. Because no upstream samples were taken, the relative contribution of stormwater in causing this could not be determined. Water at the test site was enriched with nitrate-nitrite, where concentrations exceeded 94% of other Florida streams. Test site total phosphorus and ortho-phosphate were higher than 84% and 88%, respectively, of other Florida streams. Algal growth potential at the test site was above the 5 mg dry wt/L "problem threshold".

Qualitative measures of benthic macroinvertebrate community health indicated that both sites in Camp Branch were degraded, but that conditions were moderately worse downstream of the Bonifay WWTP discharge. Taxa richness and the Florida Index were unusually depressed at both stations, but somewhat lower at the test site. Another indication of degradation seen at the test site was the domination (72.3% of the benthic population) by *Chironomus* sp., an organism typical of polluted situations. The stress seen in macroinvertebrate populations at the Camp Branch reference site was probably caused by the poor habitat quality and by the general water quality problems associated with urban stormwater runoff (*e.g.*, turbidity, BOD, oils and greases, scouring). The less hospitable conditions found below the discharge were probably caused by these same factors and perhaps by some intermittent problem that may be related to the effluent. Macroinvertebrate communities are known to respond to, and integrate the effects of, sporadic pollution events.

Periphyton communities were only somewhat affected by the WWTP discharge. There were no major differences in chlorophyll *a*, taxa richness, or the diatom to blue green ratio at the test site, compared to the control. Although the percent contribution of the dominant taxon was lower at the test site, the dominant species there, *Navicula minima*, is tolerant of eutrophic conditions.

Literature Cited

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Chemistry summary table for

Bonifay WWTP.	Effluent	Eco-regional Reference Site (Sandy Ck)	Camp Branch Test Site
Organic Constituents (ug/L)			
	None detected		None detected
Metals (ug/L)			
Aluminum	100 U		
Arsenic	20 U		
Cadmium	0.16 U		
Copper	5 U		
Chromium	10 U		
Iron	7 T		
Lead	15 U		
Mercury	0.1 U		
Nickel	5 U		
Silver	0.05 U		
Zinc	29 A		
Nutrients (mg/L)			
Ortho-phosphate	0.59	0.02 U	0.55
Total phosphorus	0.56	0.04 T	0.52
Ammonia	0.05	0.14	0.17
Nitrate+Nitrite	0.92	0.29	0.98
TKN	0.35	0.38	0.36
Other Parameters			
Habitat Assessment		29 *	24
D.O. (mg/L)			8.1
pH (SU's)	7.6		6.3
Conductivity (µmhos/cm)	230		180
Temperature (°C)			16.8
Hardness (mg CaCO3)	62.4		
AGP (mg dry wt/L)	0.23	0.23	8.5
Bioassay Fish	Not toxic		
Bioassay Invertebrate	Not toxic		
Fecal coliform (org/100 mL)	10 U	70	10,400
Total coliform (org/100 mL)	10 U	180	Too numerous to count
BOD (mg/L)	1.0	0.7	0.7

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

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

T - Value reported is less than the practical quantitation limit

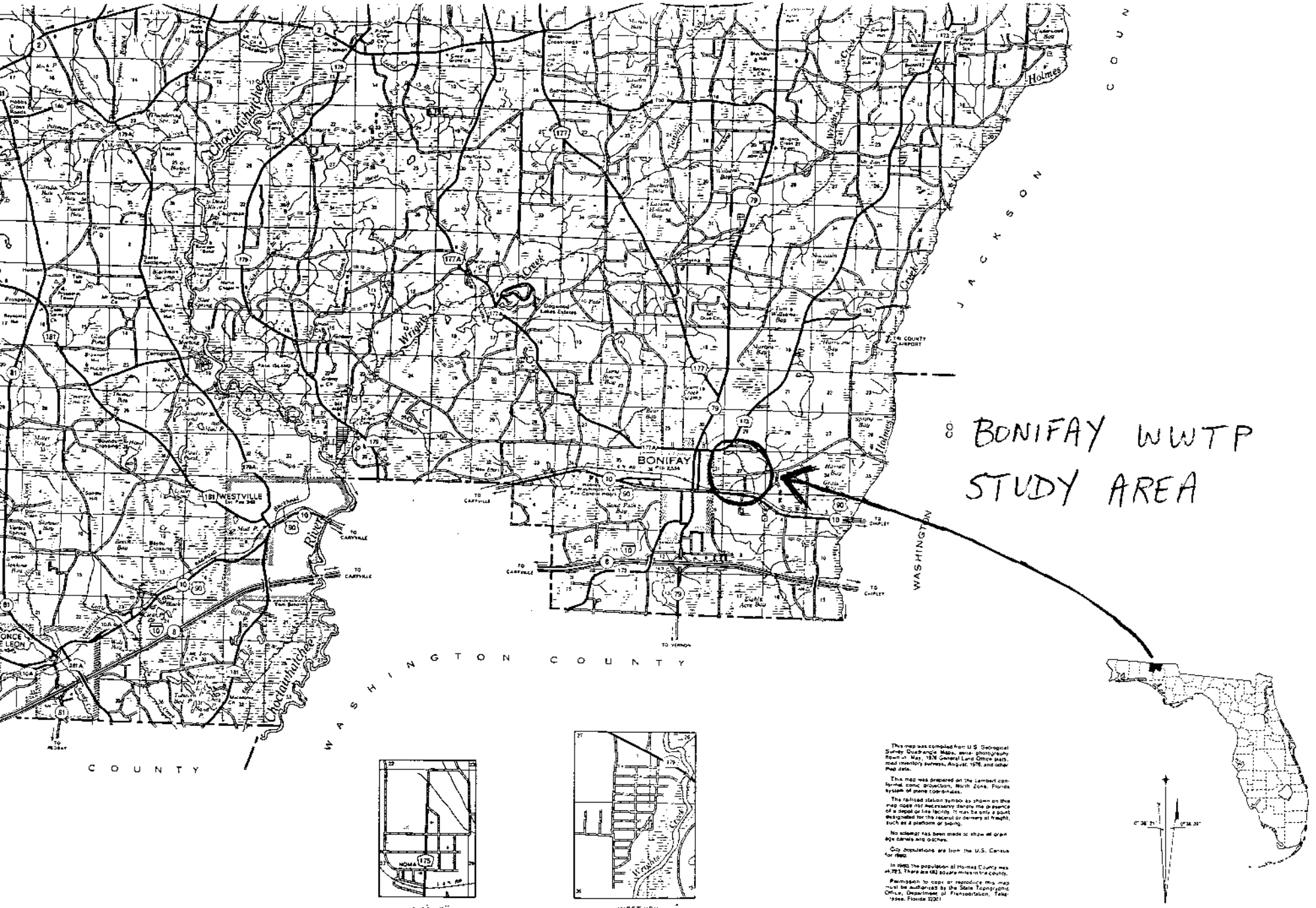
* - Camp Branch upstream reference site

Typical Values for Selected Parameters in Florida Waters

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

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

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



This map was compiled from U.S. Geological Survey Quadrangle Maps, aerial photography flown in May, 1976, General Land Office plats, road inventory surveys, August, 1976, and other map data.

This map was prepared on the Lambert conformal conic projection, North Zone, Florida system of plane coordinates.

The railroad station symbol as shown on this map does not necessarily denote the presence of a depot or like facility. It may be only a point designated for the receipt or delivery of freight, such as a platform or siding.

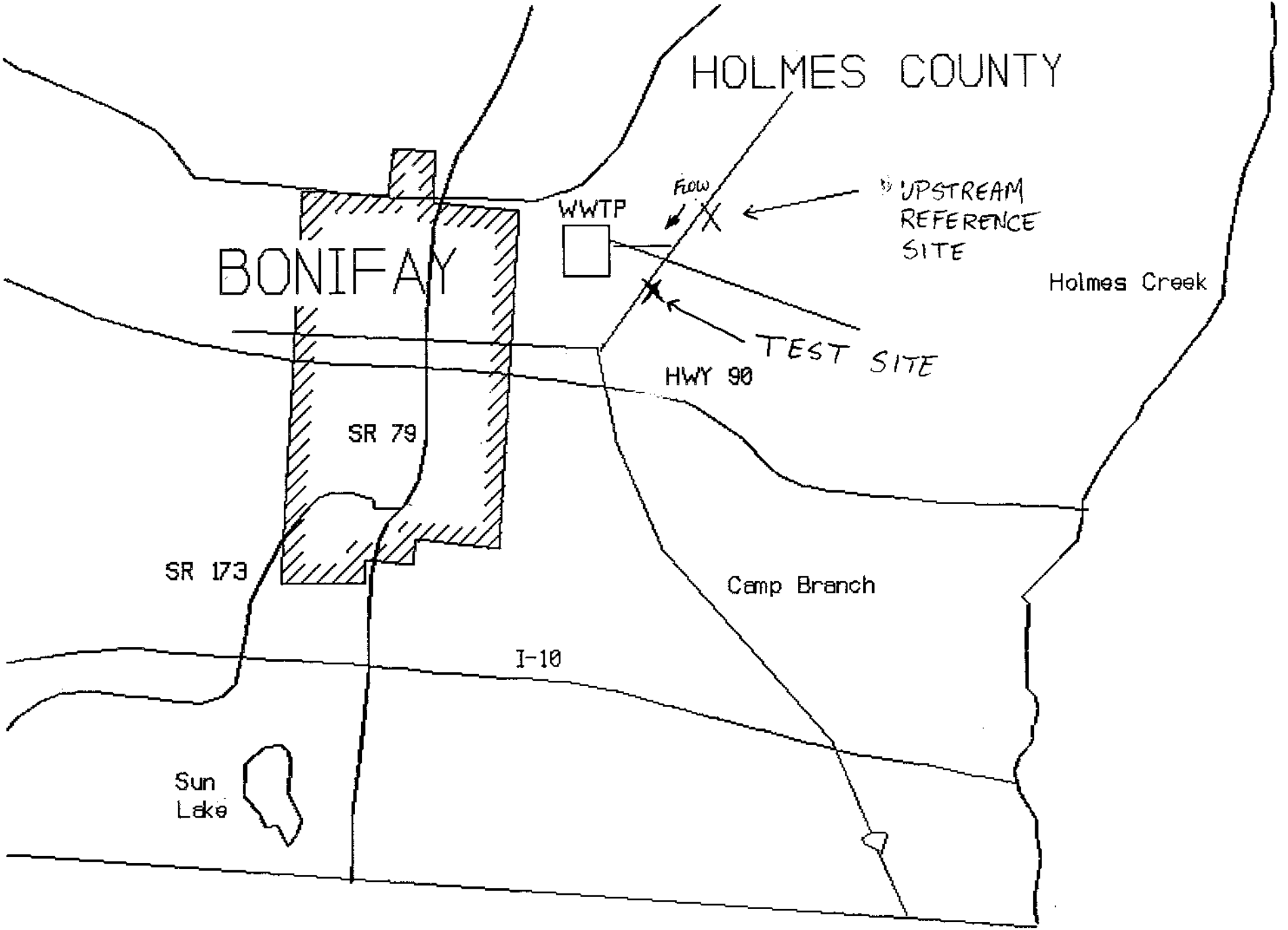
No attempt has been made to show all irrigation canals and ditches.

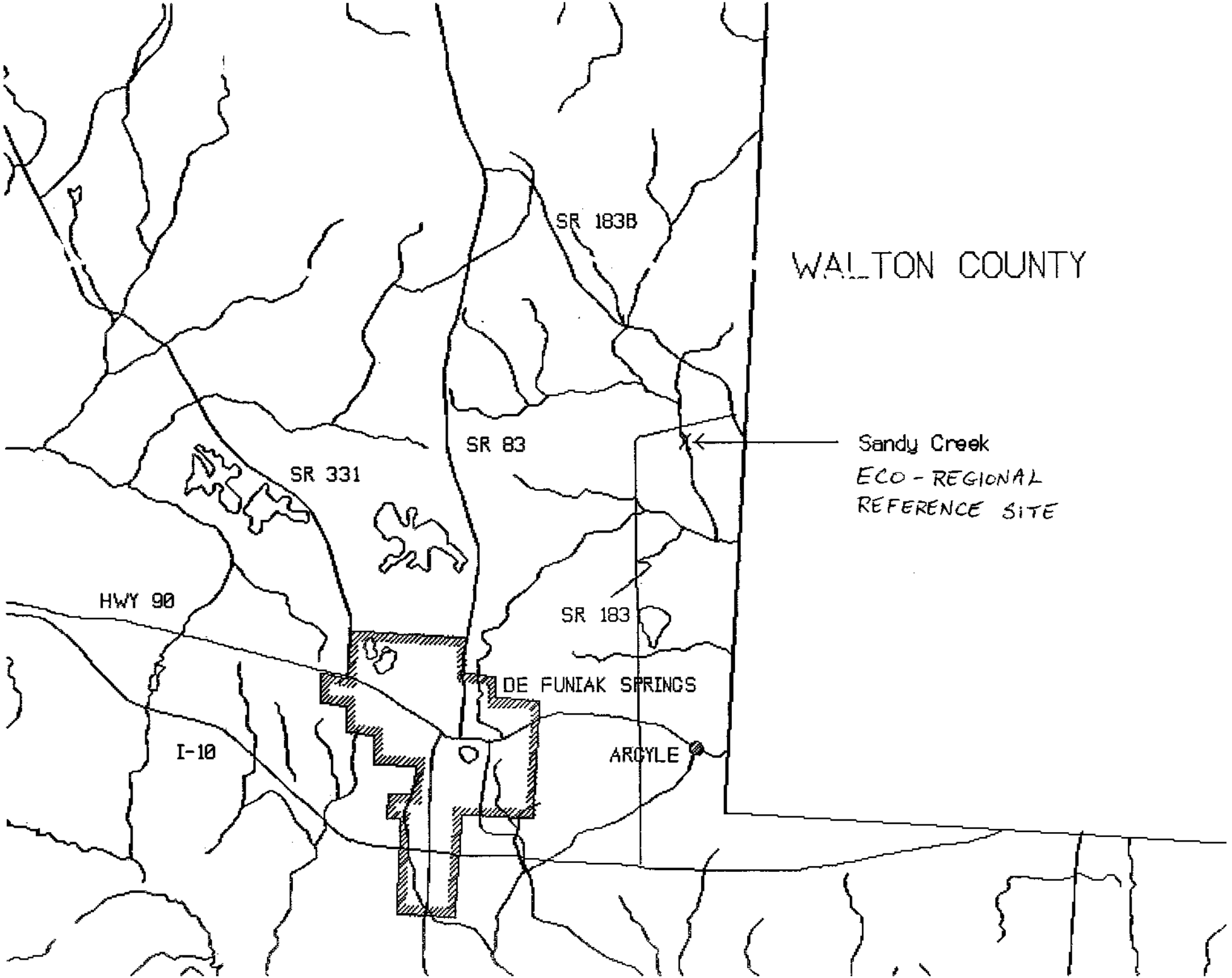
City populations are from the U.S. Census for 1980.

In 1980, the population of Holmes County was 16,793. There are 482 square miles in the county.

Permission to copy or reproduce this map must be authorized by the State Topographic Office, Department of Transportation, Tallahassee, Florida 32301

GRID NORTH IS EASTERLY FROM TRUE NORTH
MAGNETIC NORTH IN SEPTEMBER 1977 IS APPROXIMATELY 1° 30' EAST OF TRUE NORTH
ANNUAL MAGNETIC CHANGE IS APPROXIMATELY 7.8' WESTWARD


HOLMES COUNTY
BONIFAY
WWTP
FLOW
UPSTREAM REFERENCE SITE
Holmes Creek
TEST SITE
HWY 90
SR 79
SR 173
Camp Branch
I-10
Sun Lake


SR 183B
WALTON COUNTY
SR 83
Sandy Creek
ECO - REGIONAL
REFERENCE SITE
SR 331
HWY 90
SR 183
DE FUNIAK SPRINGS
I-10
ARGYLE

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION

FACILITY SUMMARY

Facility Name:		Date Summary Prepared :
Location (attach detailed map):	County	District
Federal Permit # FL0027731 and expiration date: Sept 30 1996	State GMS # and State expiration date: 1050001 July 1 1995	Facility Type: Industrial Municipal Federal Agricultural Other (list):

Function of facility: PROVIDE AWT TREATMENT OF DOMESTIC WASTE AND A PRISON FACILITY

Description of treatment process:

Receiving waters: CAMP BRANCH CREEK	Classification: I II III	
Design Flow: 1.4 MGD	Mean Flow: 0.9 MGD	Flow during survey:

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

therefore, the best time to sample is: SUMMER STRESS PERIOD

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)
BOD	8 mg/L
TSS	5 mg/L
T NITROGEN	5 mg/L
T phosphorus	3 mg/L
Flow	1.4 MGD

Describe special permit conditions and permit modifications:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL REGULATION
FACILITY SUMMARY

Description of permitted outfall(s): DISCHARGE VIA 12" PVC PIPE INTO CAMP BRANCH

List permit violations (from MOR data or other source) and plant upsets that occurred within past year: GOOD OPERATION SINCE DEC 5, 1991. MOR REPORTS SHOW PERMIT COMPLIANCE.

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

Discuss comparability of MOR results to past DER results and whether there are trends (improving, declining) in the data set:
CURRENT RESULTS INDICATE IMPROVING CONDITIONS IN CREEK. BIOLOGICAL IMPROVEMENTS SHOULD BE SLOW DUE TO HEAVY STORMWATER / DREDGE + FILL INFLUENCE. RESTORATION OF HABITAT IS NECESSARY.

Additional information:

Staff contributing to this review (signature):

Glenn Butts	(Biologist)
	(Inspector)
	(Engineer)
	( )
	( )
	( )

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:

REMARKS:	LOCATION:	FIELD ID/NAME:

Habitat Parameter / score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 5	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 10	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 4	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 [ ]

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

TOTAL SCORE 24

COMMENTS: CITY CLEARED AREA AT POD AND JOB JDS DOWNSTREAM, UNPAVED EVIDENT: NW DISTRICT DEP IS INVOLVED

ANALYSIS DATE:	ANALYST: G. BUTTS	SIGNATURE:

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:

REMARKS:	LOCATION:	FIELD ID/NAME:

Habitat Parameter score	Excellent	Good	Fair	Poor
Bottom Substrate/ Available Cover 6	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. but < 1 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, or spate occurring; > 2 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 5	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	Add **5 points** if cross-sectional area of flow is estimated to be greater than one square meter during periods of normal flow.	**TOTAL SCORE**
		7

COMMENTS: THIS AREA HAS NOT BEEN CHANNELIZED IN RECENT PAST, HOWEVER IT IS A TRASH DUMP AND STORMWATER CONDUIT. UN-NATURAL HABITAT

ANALYSIS DATE:	ANALYST:	SIGNATURE:
03-22-93	G. BUTTS	Glenn Butts

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:

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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 System Width (range, m): 15 ft	Estimated System Depth (range, m): 1 - 3		yes
High Water Mark (m above bed): 3.0	Velocity (range, m/s):	Impounded ☐	
		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: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5			Riffles			
Leaf Packs	5			Sand	55		
Aquatic Vegetation	20			Mud/Muck/Silt			
Rock or Shell Rubble	5			Benthic leaf mats	5		
Undercut Banks/Roots	10			Other:			

WATER QUALITY

	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm):	TSS	TURB	Secchi (m):
Top	1.0	16.8	6.3	8.1	180	5	5	
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:
G. BUTTS	Glenn Butts	03-22-93

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:

REMARKS:	LOCATION:	FIELD ID/NAME:

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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): NO DIRECT

VERY PROBABLE

Estimated System Width (range, m):	Estimated System Depth (range, m):	yes
High Water Mark (m above bed):	Velocity (range, m/s):	Impounded ☐ 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: ☒

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	5			Riffles			
Leaf Packs				Sand	10		
Aquatic Vegetation				Mud/Muck/Silt			
Rock or Shell Rubble	70			Benthic leaf mats	5		
Undercut Banks/Roots	10			Other:			

WATER QUALITY

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

System Type : Stream: ☒ (Sand Bottomed, Sand Bot w/ Spring, Swamp & Bog, Calcareous, Alluvial, 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: Cool, Cloudy

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Glenn. Butts	Glenn Butts	

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Bonifay
Location:
County: Holmes
Contact/District: Glenn Botts / NW
NPDES Permit #: FL0027731 Outfall #:

Sample Collection: Date 3/22/93 Time 10:15
Test Beginning: Date 3/23/93 Time 12:30
Test Ending: Date 3/25/93 Time 1300
Organism Batch #: 13 Diluent Batch #: well
Organism Age: 9 days
Test Organism: Notropis leedsi

93 MAR 23 A 7 52164

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

Test Number: 2 of 2

Remarks:

Instrument Calibrations:

	pH	Temperature °C	D.O. mg/L	Conductivity µmhos/cm
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.4 @ 24.0	999 @ 1,000 10,000 @ 10,000 @24.7
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.5	8.3 @ 24.4	1000 @ 1,000 @24.5 10,100 @ 10,000
48 hr	7.0 @ 7.0 9.2 @ 9.0	24.2 @ 24.5	8.35 @ 24.2	1000 @ 1,000 24.5 10/10 @ 10,000

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (mmhos/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	3	5	5	5	8.0	8.2	8.4	24.5	23.6	23.4	7.8	8.2	7.9	250	250	250
Control	76	5	5	5	8.0	8.2	8.5				7.8	8.1	8.1	250	245	245
100%	28	5	5	5	7.6	7.8	8.1	24.7	23.5	23.3	7.7	8.0	7.7	230	225	225
100%	57	5	5	5	7.6	7.8	8.1				7.8	8.0	7.5	220	225	230
Measured/Loaded by:		TM	TM	TM	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF	MF
Recorded by:		TM	TM	TM	TM	TM	RT	TM	TM	RT	TM	TM	RT	TM	TM	RT

Investigators' Signatures

Tina Mikolski
Marshall Faircloth
Kim Pearce
Rosalyn Nobles

Reviewer

form updated 10/20/92

	Salt Water/ Well Water	Water Quality Parameters: 20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.02		GB
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR4CO	TM
Alkalinity:	125	70	70	Hach	TM
Hardness:	125	80	55	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Orion	MF

Cl_2 Blank: ____ Ammonia Meter Slope: -56.3 Ammonia Blank: <0.017 Sample Salinity: 0 ppt

DER Biology Section — Acute Bioassay Bench Sheet

Sample Source: Bonifay
Location:
County: Holmes
Contact/District: Glenn Butts / NW
NPDES Permit #: FL0027731 Outfall #:

Sample Collection: Date 3/22/93 Time 10:15
Test Beginning: Date 3/23/93 Time 12:30
Test Ending: Date 3/25/93 Time 13:00
Organism Batch #: 13 Diluent Batch #: ~~well~~ 4
Organism Age: <24 hrs
Test Organism: Ceriodaphnia dubia

93/MAY 23.21 [illegible]

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
0 hr	7.0 @ 7.0 9.0 @ 9.0	24.0 @ 24.1	8.4 @ 24.0	999 @ 1,000 (0.247) 10000 @ 10,000
24 hr	7.0 @ 7.0 9.0 @ 9.0	24.4 @ 24.5	8.3 @ 24.9	1000 @ 1,000 (0.247) 10,000 @ 10,000
48 hr	7.0 @ 7.0 9.0 @ 9.0	24.2 @ 24.5	8.35 @ 24.2	1000 @ 1,000 10000 @ 10,000

24.5 mf

		Number Live			pH			Temperature (°C)			D.O. (mg/L)			Cond. (~~mmhos~~/cm) Cond. (µmhos/cm)		
Conc.	Chamber #	0	24	48	0	24	48	0	24	48	0	24	48	0	24	48
Control	A	5	5	5	8.2		8.5	24.0		23.5	7.9		8.7	165		195
Control	B	5	5	5			8.5						8.7			185
Control	C	5	5	5			8.5						8.7			180
Control	D	5	5	5			8.5						8.7			175
100%	A	5	5	5	7.8		8.4	23.8		23.5	8.0		8.5	215		~~2650~~ 250
100%	B	5	5	5			8.4						8.5			235
100%	C	5	5	5			8.4						8.5			230
100%	D	5	5	5			8.4						8.4			225
Measured/Loaded by:		mF	TM	TM	mF		MF	mF		MF	mF		MF	mF		MF
Recorded by:		TM	TM	TM	TM		KP	TM		KP	TM		KP	TM		KP

Investigators' Signatures

Tina Mikulski
Marshall Faircloth
Kim Pearce

Reviewer

form updated 10/20/92

Water Quality Parameters	Salt Water/ Well Water	20% Min Water	Sample	Method	Measured by
Field Total Residual Cl2:			<0.02	—	GB
Lab Total Residual Cl2:	<0.03	<0.03	<0.03	DR-100	TM
Alkalinity:	125	70	70	Hach	TM
Hardness:	125	80	55	Hach	TM
Total Ammonia:	<0.017	<0.017	<0.017	Hach	MF

Cl_2 Blank: _____ Ammonia Meter Slope: -56.3 Ammonia Blank: <0.017 Sample Salinity: 0 ppt

Benthic macroinvertebrate taxa list for Bonifay WWTP, collected via Hester-Dendy artificial substrates in Camp Branch, on 25 March, 1993. Only 2 replicates were recovered from the reference site while all 4 replicates were recovered from the test site. Densities are in number/m^2.

	Reference Site	Test Site
Coleoptera		
Hydroporus sp.	1	–
Diptera		
Ablabesmyia mallochi	1	1
Chironomus sp.	3	24
Conchapelopia sp.	–	10
Corynoneura sp.	1	1
Cricotopus bicinctus	2	117
Dicrotendipes modestus	1	–
Dicrotendipes simpsoni	2	3
Hayesomyia sp.	–	1
Helopelopia sp.	1	11
Krenopelopia hudsoni	–	1
Polypedilum illinoense	–	20
Polypedilum scalaenum grp.	1	17
Polypedilum tritum	1	–
Parametriocnemus sp.	1	–
Paratanytarsus sp. A Epler	2	2
Rheocricotopus robacki	–	1
Tanytarsus sp. C Epler	–	1
Tanytarsus sp. T Epler	1	–
Tribelos jucundum	–	1
Gastropoda		
Physella sp.	–	1
Oligochaeta		
Dero digitata	–	1
Dero sp.	1	–
Limnodrilus hoffmeisteri	1	–
Nais communis	–	1
Slavina appendiculata	–	2
Tubifex tubifex	–	1
Platyhelminthes		
Dugesia sp.	1	–
Trichoptera		
Cheumatopsyche sp.	–	6

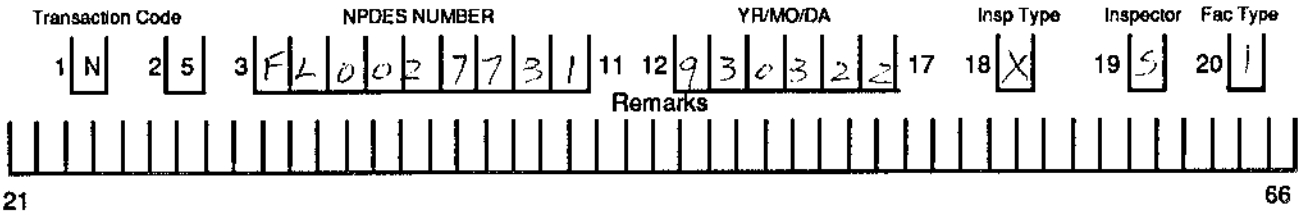
Taxa list for Bonifay WWTP, collected via 20 dip net sweeps in Camp Branch, above and below the discharge, on 25 March 1993.

	Reference Site	Test Site
Acarina		
Undetermined Acarina	–	1
Diptera		
Ablabesmyia mallochi	3	–
Chironomus sp.	16	43
Conchapelopia sp.	3	1
Cricotopus bicinctus	7	4
Cryptochironomus sp.	1	–
Endotribelos hesperium	–	1
Glyptotendipes sp.	–	1
Phaenopsectra obediens	2	–
Phaenopsectra punctipes	1	–
Polypedilum illinoense	4	2
Polypedilum scalaenum grp.	9	1
Polypedilum tritum	1	–
Procladius bellus	1	–
Paratanytarsus sp. A Epler	2	–
Tribelos fuscicorne	2	1
Tribelos jucundum	1	–
Zavrelimyia sp.	2	–
Oligochaeta		
Eclipidrilus palustris	–	1
Limnodrilus hoffmeisteri	2	2
Pelecypoda		
Sphaerium or *Musculium* sp.	4	–
Trichoptera		
Cheumatopsyche sp.	–	1

Periphyton taxa list and densities (#/mm^2) for Bonifay STP, collected via glass microscope slides in Camp Branch Creek, on 22 March, 1993.

	Reference Site	Test Site
Diatoms		
Achnanthes exigua	–	11
A. linearis	359	253
A. minutissima	3427	814
Cocconeis placentula	12	–
Cymbella minuta	62	–
Eunotia sp.	12	–
E. curvata	37	–
Gomphonema parvulum	445	715
Navicula decussis	–	11
N. minima	–	1650
N. viridula	25	–
Nitzschia amphibia	–	11
N. palea	25	22
Pinnularia microstauron	12	–
Synedra radians	–	55
S. rumpens	12	11
S. ulna	12	–
Chlorophyta		
Characium sp.	62	858
Cosmarium sp.	12	–
Stigeocolonium sp.	25	121
Cyanophyta		
Anabaena sp.	–	22
Chroococcus sp.	–	11
Dactylococcopsis sp.	12	–
Phormidium sp.	–	11
Total density	4551	4576

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



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

