

Baseline Study for the Relocation of the City of Pace WWTP Effluent to the Big Thompson River

Santa Rosa County

NPDES #FL0102202-001-DW1P

Sampled April and May 1999

January 2000

Biology Section
Division of Administrative and Technical Services
Bureau of Laboratories

Comprehensive Quality Assurance Plan No. 870346G

Introduction

The City of Pace Wastewater Treatment Plant is located in Santa Rosa County, Florida (see maps in the Appendix). This facility is a 1.0 MGD annual average daily flow domestic wastewater treatment system. Treatment includes a dual oxidation ditch with activated sludge, screening, grit removal, oxidation, nitrification/denitrificaiton, settling, filtration, chlorine high level disinfection and dechlorination for discharge to Pace Swamp and eventually to the Class III Big Simpson River (see Facility Summary in Appendix). The existing effluent (0.547 MGD) is used in land application on the Stonebrook Golf Course and the WWTP grounds. Currently, the facility is undergoing construction to divert most of its effluent to a 144–acre wetland that drains into the Class III Big Simpson River. The actual flow during this survey was 0.6 MGD.

State permit limits for the City of Pace Wastewater Treatment Plant are listed in Table 1. As of this report, the facility has completed construction for wetlands discharge by June or July, 1999 (see Facility Summary in Appendix).

Methods

The purpose of this investigation was to determine the health of the proposed test site and to compare it to the proposed control site prior to the addition of the effluent to the treatment wetland. A comparison of biological community health was made between the proposed control site (located in the Big Simpson River, approximately 60 meters upstream of the confluence with the Little Simpson River) and a proposed test site (located approximately 300 meters downstream of the control site, also within the Big Simpson River). 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 on April 8, 1999 (at low-tide) and May 7, 1999 (at high-tide). The effluent, sampled prior to wetland treatment, was analyzed for nutrients, metals, and organic constituents (base neutral and acid extractables, and pesticide extractables).

Acute screening toxicity bioassays, using the invertebrate, *Ceriodaphnia dubia,* and the fish, *Cyprinella leedsi*, as test organisms, were performed on an effluent sample. Bacterial populations were analyzed for total and fecal coliforms.

Benthic macroinvertebrates were evaluated at the proposed control and test sites using Hester-Dendy multiplate samplers, that were incubated for 28 days, along with three replicate petite Ponar grabs at each site.

Periphyton were sampled at both the proposed control and test sites by incubating glass microscope slides in a standard periphytometer for 28 days. Phytoplankton were sampled at both control and test sites via subsurface grabs. Chlorophyll *a* was determined for phytoplankton communities. *Selenastrum capricornutum* was used as the test organism for algal growth potential tests. All field and laboratory biological methods were carried out following Biology Section Standard Operating Procedures (SOP's). The SOP's can be viewed on our web site <www.dep.state.fl.us/labs/sops.htm>.

Several different measurements of macroinvertebrate and algal community health have been employed to determine the health of the proposed sites. These measurements include: habitat assessment, taxa richness, Shannon-Weaver Diversity Index, the Florida Index, Ephemeroptera/Plecoptera/Trichoptera (EPT) Index, community composition, functional feeding groups, algal biomass. For a discussion of each of these measures, see *Explanation of Measurements of Community Health* in the Appendix.

For graphical purposes, the percent differences between the control and test sites involving the number of taxa, the diversity index, the Florida Index, the EPT Index, the diatom to blue-green algae ratio, and the % filter-feeders are measured as the control site minus test site divided by the control site. The percent differences between sites involving the % contribution, algal density, chlorophyll *a*, and algal growth potential are measured as the test site minus control site divided by the control site.

The following personnel were involved in this investigation: Glenn Butts and Ken Ferguson (DEP Nothwest District), and Julie Baughman, Ken Espy, Marshall Faircloth, Michael Heyn, Joy Jackson, Vicki McGee, Elizabeth Miller, Urania Quintana, Johnny Richardson, Lisa Homann, Amy Weaver, David Whiting, and Steve Wolfe (DEP Central Biology Laboratory in Tallahassee). The report was reviewed by the Point Source Studies Review Committee, consisting of Wayne Magley, Chuck Ziegmont,

Table 1. Effluent limits and summary of chemistry data.

City of Pace WWTP	Effluent Limits	Effluent Sample	Proposed Control Site	Proposed Test Site
Organic Constituents (µg/L)				
None Detected	-	-	-	-
Metals (µg/L)				
Aluminum	1500 **	50 U	-	-
Arsenic	50 **	20 U	-	-
Cadmium	0.63 c**	0.21	-	-
Chromium	11 **	10 U	-	-
Copper	6.24 c**	16.2	-	-
Iron	1000 **	15 U	-	-
Lead	1.23 c**	1.12	-	-
Mercury	0.012 **	0.1 U	-	-
Nickel	83.78 c**	6.0 U	-	-
Selenium	50 **	35 U	-	-
Silver	0.07 **	0.04 U	-	-
Zinc	56.27 c**	6.0 U	-	-
Nutrients (mg/L)				
Ortho-phosphate	-	3.5	0.004 U	0.004 U
Total phosphorus	0.2 a*	3.2	0.038 I	0.041 J
Ammonia	2.0 b*	0.081 J	0.052	0.057
Nitrate+Nitrite	-	1.3	0.27	0.26
TKN	-	0.61	0.36 J	0.38
Organic Nitrogen	-	0.53	0.31	0.32
Total Nitrogen	3.0 a*	1.9	0.63	0.64
General Phys-Chem Parameters				
Habitat Assessment	-	-	114	111
DO (mg/L) surface	6.0 s*	6.0	6.9	6.3
DO (mg/L) bottom	-	-	4.9	3.6
pH (SU) surface	6.0 - 8.5	6.5	7.2	6.8
pH (SU) bottom	-	-	6.7	6.7
Conductivity (µmhos/cm) surface	-	674	572	3,676
Conductivity (µmhos/cm) mid	-	-	1,405	10,930
Conductivity (µmhos/cm) bottom	-	-	8,598	21,642
Salinity (ppt) surface	-	0.2	0.29	2.0
Salinity (ppt) mid-depth	-	-	0.71	6.2
Salinity (ppt) bottom	-	-	4.85	13.1
Temperature (°C) surface	-	18.6	22.9	23.5
Temperature (°C) bottom	-	-	23.3	23.4
BOD, 5 day (mg/L)	-	1.5	0.8	1.1
Turbidity (NTU)	-	0.7 Q	10	9.5 A
TRC_2-disinfection (mg/L)	1.0 s*	1.89	-	-
Hardness (mg $CaCO_3$)	Report b*	47	69	148
AGP (mg dry wt/L)	-	74.0	0.31	0.17
Toxicity (48-hour static, screening bioassay)				
Bioassay - Fish	-	Toxic	-	-
Bioassay - Invertebrate	-	Not Toxic	-	-
Microbiology (# counts/100ml)				
Fecal Coliforms	800 s*	20 B	10	10
Total Coliforms	≤ 2,400 s**	20	60 B	120 B

A - The mean of two or more determinations
B - Colony counts outside acceptable range
J - Estimated value
Q - Sample held beyond normal holding time
U - Not detected; value is the MDL

* Permit limit
** Class III water quality standard
a - Annual average
b - 16 hr composite sample
c - Value is calculated based on hardness
s - Single sample

and Michael Tanski, as well as District representatives.

Results

Most of the physical /chemical *in situ* parameters were comparable between the proposed control and test sites (Table 1). The specific conductance values, however, were not comparable. At the proposed control site, the conductivity values ranged from 572 µmhos/cm at the surface to 8,598 µmhos/cm at the bottom while those at the proposed test site were much higher and ranged from 3,676 µmhos/cm at the surface to 21,642 µmhos at the bottom. The study sites received similar habitat assessment scores (see Habitat Assessment Sheets in the Appendix).

The chemical and biological results for this report are presented in Tables 1–3.

Table 2. Algal community structure of study sites.

City of Pace WWTP	Proposed Control Site	Proposed Test Site
Phytoplankton Algae		
Number of Taxa	13	9
Shannon-Weaver diversity	2.75	1.68
Chlorophyll *a* (µg/L)	1.0 U	1.0 U
Algal Density (#/mL)	438	578
% Blue-green	25.0	12.2
% Cryptophytes	48.2	78.4
% Diatoms	8.9	5.4
% Green	17.9	4.1
Periphyton Algae		
Number of Taxa	24	24
Shannon-Weaver diversity	3.16	2.07
Algal Density (#/cm2)	1,255,229	1,930,816
% Diatoms	97.9	98.4
%Blue-green	1.1	0.8
Diatom/Diatom + B-G Ratio	1.0	1.0
AGP (mg dry wt/L)	0.3	0.2

U - Analyzed for but not detected; value is the MDL

Discussion

The copper concentration (16.2 µg/L) exceeded the Class III water quality standard (Rule 62-302.530(24) FAC), while all other effluent metals were in compliance. No organic priority pollutants were detected in the effluent. Total residual chlorine in the effluent sample (1.89 mg/L) exceeded the facility's permit limit (1.0 mg/L), however, because the facility was not discharging to surface waters during this period, the effluent was not being dechlorinated.

The effluent sample was not toxic to the invertebrate, *Ceriodaphnia dubia,* during the 48-hour bioassay. There was, however, 100% mortality to the fish, *Cyprinella leedsi,* during the first 24-hours of the 48-hour bioassay (Appendix). This mortality represents a violation of Rules 62-302.530(62), 62-302.500(1)(d), and 62-4.244(3)(a) FAC. The total residual chlorine measured in the effluent sample during the bioassay test was 0.08 mg/L and is not thought to have caused the toxicity.

With the exception of total phosphorus, the effluent nutrients complied with the facility's permit limits (Table 1). Total phosphorus in the effluent was 3.2 mg/L and exceeded the permit limit of 0.2 mg/L - as an annual average. Overall, nutrient levels at the two study sites were very similar. For example, nitrate+ nitrite levels at both study sites were higher than levels found in 70% of other Florida's streams (see *Typical Values for Selected Parameters in Florida Waters*). The effluent AGP value was 74 mg dry wt/L. The AGP values at both study sites were less than the 5 mg dry wt/L "problem threshold" (Raschke and Schultz 1987).

There were some differences in the test site periphyton algal community compared to the control site (Table 2). Although the number of taxa (24) was the same at both study sites, the diversity was 34% lower at the test site due to a 58% increase in the algal density at this site (Figure 1). Phytoplankton taxa richness and diversity were 30% and 39% lower, respectively at the test site compared to the control site (Table 2). The algal density was 32% higher at the test site compared to the control site. The cause for this difference is not clear as the nutrient levels were nearly identical at the two study sites.

Quantitative measures of macroinvertebrate community health showed some differences between the study sites (Table 3). In the Ponar samples, taxa richness declined

22% and the diversity declined by 23%, at the test site compared to the control. The EPT Index, Florida Index, and number of polychaete taxa were very similar between the study sites (Table 3). Both sites contained pollution-sensitive and pollution-tolerant organisms although the proposed downstream site contained more estuarine species (see Macroinvertebrate Taxa Lists in Appendix). In the Hester-Dendy samples, taxa richness was 50% higher at the test site compared to the control site. However, because the contribution of the dominant taxon rose from 34% at the control site to 72% at the test site, the diversity actually declined by 36% at the test site compared to the control site. The dominant taxon in this case was the filter–feeding barnacle, *Chthamalus fragilis*.

Although the Big Simpson River is classified as a Class III freshwater system, it is actually a tidally influenced stream. The proposed control site, located upstream of Pace Swamp, showed fluctuations in salinity ranging from 0.2 parts-per-thousand (ppt) at the surface and bottom at low-tide, to 0.3 ppt and 5 ppt surface and bottom at high-tide. The test site, located closer to the mouth of the stream had salinity ranges from ≤ 1 ppt at the surface and bottom during low-tide, to 2.0 ppt and 13 ppt at the surface and bottom during high-tide. Although both sites were affected by daily salinity changes, the proposed test site had significantly overall higher salinities. After the addition of the effluent, it will be difficult to determine its effect on the biological communities when they are already significantly different. It is recommended that alternate sites with more similar salinity regimes be located and used in future studies in order to determine the effect of the effluent on the receiving waters.

Table 3. Community structure of study sites.

City of Pace WWTP	Proposed Control Site	Proposed Test Site
Macroinvertebrate - Ponars		
Number of Taxa	18	14
Shannon-Weaver Diversity	2.77	2.12
% Dominant Taxon	51.3	62
EPT Index	1	0
Florida Index	3	4
Number of Polychaete Taxa	3	3
Community Composition		
% Amphipoda	4.0	9.9
% Diptera	18.4	19.8
% Ephemeroptera	2.6	0.0
% Pelecypoda	2.6	0.0
% Polychaeta	54.0	63.5
% Tubificidae	14.5	3.1
% Other	3.9	3.7
Functional Feeding Groups		
% Browsers-grazers	2.0	6.8
% Burrowing Deposit Feeders	18.4	4.2
% Predators/Carnivores	4.0	3.4
% Shredders	4.6	6.3
% Surface Deposit Feeders	61.8	71.9
% Suspension Feeders	4.6	0.8
% Unknown	4.6	6.8
Macroinvertebrate - Hester-Dendys		
Number of Taxa	18	27
Shannon-Weaver Diveristy	2.89	1.84
% Dominant Taxon	33.8	71.8
EPT Index	3	3
Florida Index	6	9
Number of Polychaete Taxa	0	3
Community Composition		
% Amphipoda	35.0	4.1
% Diptera	56.3	18.4
% Ephemeroptera	0.6	0.0
% Other	1.2	2.2
% Pelecypoda	4.4	0.8
% Plecoptera	0.0	0.1
% Polychaete	0.0	2.5
% Thoracica	0.0	71.8
% Trichoptera	2.5	0.1
Functional Feeding Groups		
% Browser-grazers	4.7	0.6
% Predators	8.4	3.4
% Scavengers	4.7	0.7
% Surface Deposit Feeders	44.7	14.2
% Suspension Feeders/Filterers	33.1	79.3
% Other	4.4	2.5

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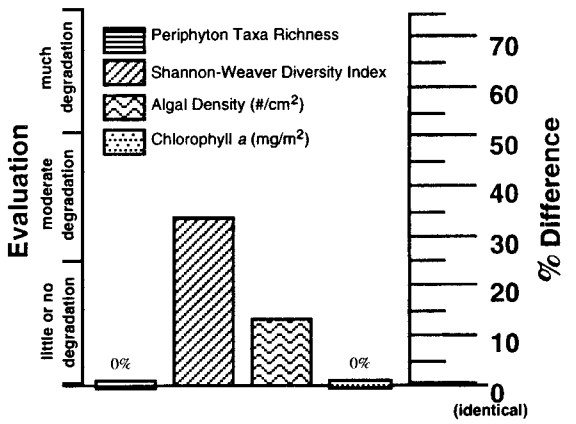


Figure 1. Effect of discharge on the algal community.

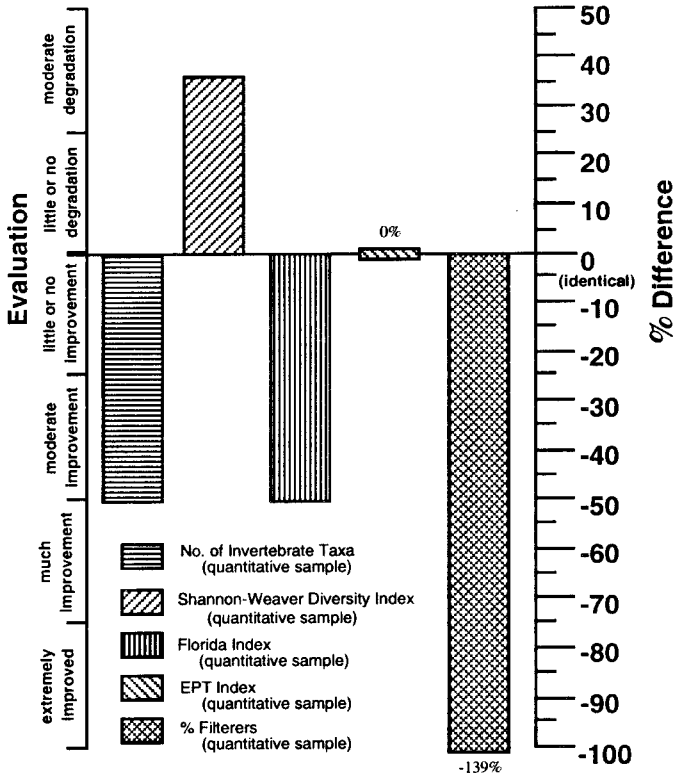


Figure 2. Effect of the discharge on the macroinvertebrates in the Hester-Dendy samples.

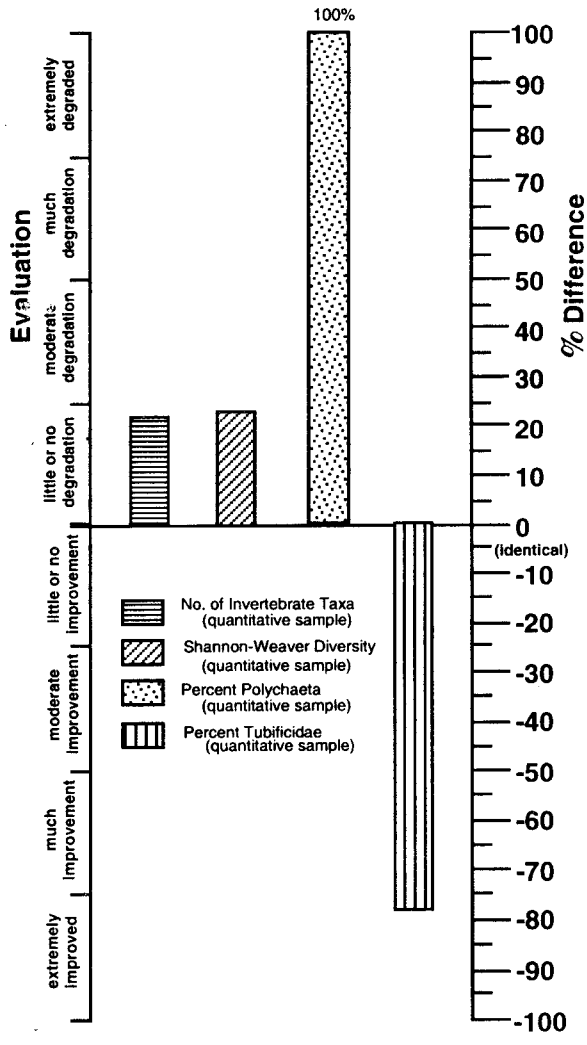


Figure 3. Effect of the discharge on the macroinvertebrate community in the Ponar samples.

Typical Values for Selected Parameters in Florida Waters

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

Percentile Distribution

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

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

Explanation of Measurements of Community Health

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

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

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

Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa.

The Florida Index: Some organisms become rare or absent as the intensity or duration of disturbance increases. 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.

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

Community structure: Substantial shifts in proportions of major groups of organisms, compared to control conditions, may indicate degradation.

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

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

The Stream Condition Index (SCI): The SCI is a composite macroinvertebrate metric (Barbour *et al.* 1996) developed for Florida. The SCI assigns points to a variety of parameters, depending on how closely each parameter approaches an expected control condition (see SCI calculation table in Appendix).

Explanation of Measurements of Community Health

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

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

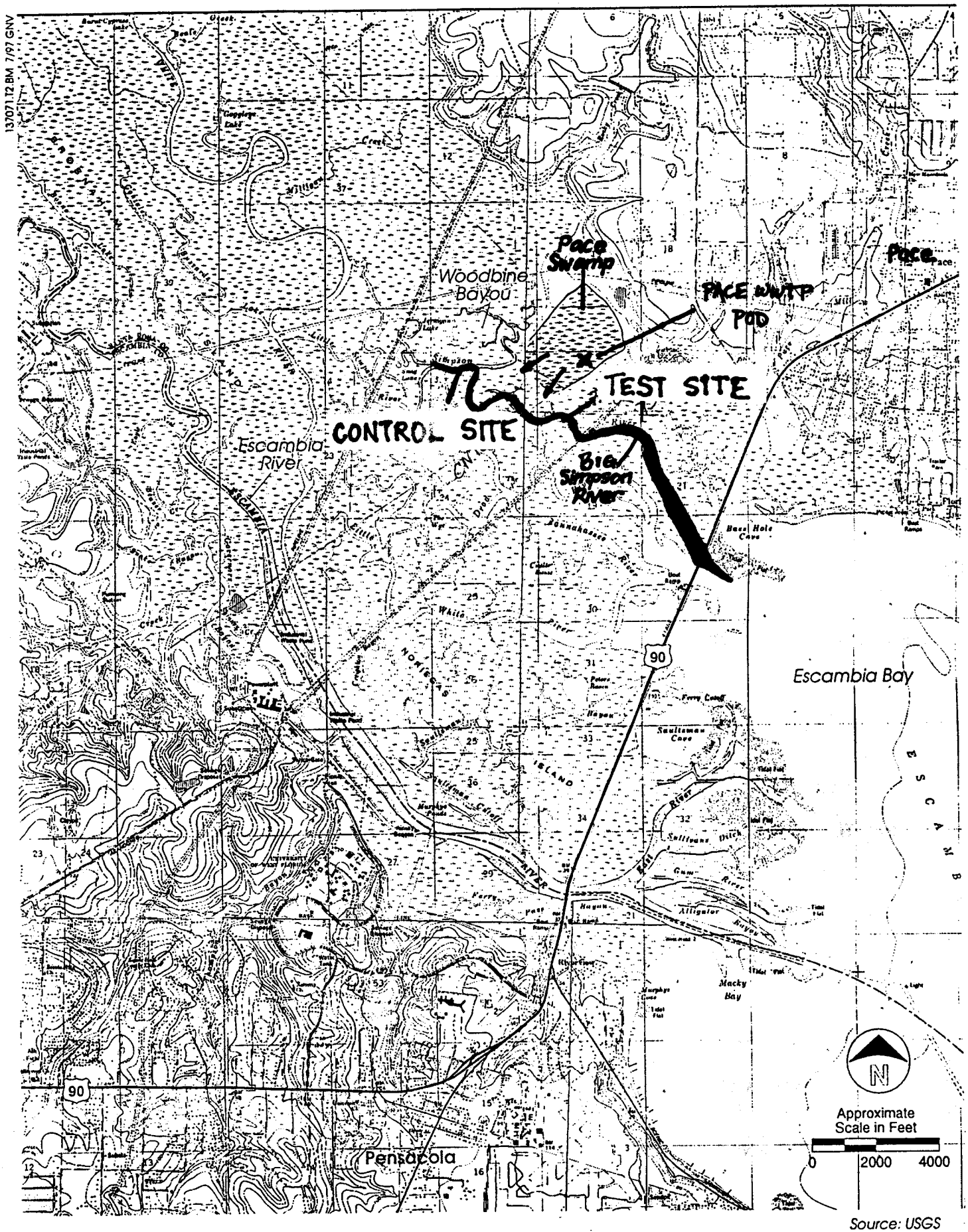
Shannon-Weaver diversity: This index is specified in the Florida Administrative Code as a measure of biological integrity. Low diversity scores are undesirable. They represent conditions where only a few organisms are abundant, to the exclusion of other taxa. Excessive numerical dominance of a single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

Numbers of pollution sensitive taxa: Some organisms become rare or absent as the intensity or duration of disturbance increases. Species sensitivity data from other sources, such as Chang *et al.* (1992), Farrell (1992), Hudson *et al.* (1990), Hulbert (1990), Lenat (1993), and Whitmore (1989), are used as appropriate.

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

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

Algal biomass: High algal biomass (algal density or chlorophyll *a*) implies nutrient stress.



Location Map for the Pace Swamp in Santa Rosa County, Florida.

Facility Summary

Facility Name: Pace Water Systems Date Summary Prepared: 4/23/99

Location map: County: Santa Rosa District: Northwest / 10

NPDES Permit # FL0102202-001-DW1P State Permit # FL0102202-001-DW1P Facility Type:Dom.
expiration date: 1/18/00 expiration date: 1/18/00

Federal and State permits combined under federal permit number

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Function of facility: To operate a 1.0 MGD annual average daily flow WWTP with service to Pace and surrounding areas.

Description of treatment process:

Treatment Facilities

The facility is a 1.0 MGD annual average daily flow (AADGF) dual oxidation ditch activated sludge wastewater treatment system. Treatment consists of screening, grit removal, oxidation, nitrification/denitrification, settling, filtration chlorine high level disinfection, and dechlorination for discharge to surface waters.

Effluent Disposal

Surface Water Discharge: A 1.0 MGD AADF permitted discharge to Pace Swamp (a 144 acre treatment wetland) to the Simpson River (Class III fresh waters) at Discharge Location (D001) which is approximately 2400 feet in length and discharges at a depth of approximately 0.0 feet. The point of discharge is located approximately at latitude 30^0 35' 43" N, longitude 87^0 11' 41: W. This permit authorizes the construction of an elevated wooden boardwalk, 3 feet in width, approximately 1360 feet in length. The boardwalk extends from wetland monitoring station WET-01(PS-1) to WET-02 (PS-2) for the purposes of maintenance, sampling, and education.

Reuse

Land Application: An existing 0.5467 MGD AADF permitted capacity slow-rate public access reclaimed water land application system (R001) consisting of Stonebrook Golf Course and the treatment facility grounds. This system includes a general reuse area for general permitting of additional major users of reclaimed water in accordance with Rule 62-610.890, F.A.C. The boundaries of the general reuse area are defined by the boundaries of the utility franchise area, as permitted by permit DC57-248252.

Receiving waters: From Outfall D001 to Pace Swamp with final discharge to the Simpson River Classification III FW

Design Flow: 1.0 MGD Mean Flow: 0.485 MGD Flow during survey: 0.600 MGD

Discharge is: Continuous Best time to sample is: N/A

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

List effluent limits (attach relevant paperwork):

Federal/State Effluent Limits

Parameter	Frequency	Sample Type	Limit (units)
Flow*	Continuous	Flow Meter	1.0 MGD (annl. avg)
CBOD (5 day)	Weekly	16-hour comp.	10.0 mg/L (mx. annl avg) 12.5 mg/L (mx. mo. avg.) 15.0 mg/L (mx wkly avg.) 20.0 mg/L (mx single samp.)
TSS	Daily	16-hour comp.	10.0 mg/L (mx. annl avg) 12.5 mg/L (mx. mo. avg.) 15.0 mg/L (mx wkly avg.) 20.0 mg/L (mx single samp.)
pH	Continuous	Automatic	6.0 to 8.5 std. units
Fecal Coliform	Daily	Grab	see below *
Total Residual Cl samp) (for disinfection)	Continuous	Automatic	1.0 mg/L (min single
Total Residual Cl samp) (for dechlorination)	Daily	Grab	0.01 mg/L (mx single
Dissolved Oxygen samp)	Daily	Grab	6.0 mg/L (min. single
Nitrogen, Total as N avg)	Weekly	16-Hr comp	1214 kg (total mo. mx
Ammonia, Total as N	Weekly	16-Hr comp	2.0 mg/L (mx. mo. avg.)
Phosphorus, Total as P avg.)	Weekly	16-Hr comp	146 kg (mo. total mx.
Copper, Total	Monthly	16-Hr comp	Report µg/L (max)

Recoverable as Cu			
Zinc, Total Recoverable as Zn	Monthly	16-Hr comp	Report µg/L (max)
Hardness, Total as $CaCO_3$	Monthly	16-Hr comp	Report mg/L (min)
Phosphorus, Total as P (from wetland)	Monthly	Grab	0.2 mg/L (mx annl avg)
Chronic Whole Effluent Toxicity	———	———	see below **
Nitrogen, Total as N (from wetland)	Monthly	Grab	3.0 mg/L (mx annl avg)
Ammonia, Unionized as N (from wetland)	Monthly	Calculated	0.02 mg/L (mx annl avg)

*The arithmetic mean of the monthly fecal coliform values collected during an annual period shall not exceed 200 per 100 ml of effluent sample. The geometric mean of the fecal coliform values for a minimum of 10 samples of effluent each collected on a separate day during a period of 30 consecutive days (monthly), shall not exceed 200 per 100 ml of sample. No more than 10 percent of the samples collected (the 90th percentile value) during a period of 30 consecutive days shall exceed 400 fecal coliform values per 100 ml of sample. Any one sample shall not exceed 800 fecal coliform values per 100 ml of sample.

**All test species, procedures, and quality assurance criteria used shall be in accordance with Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA/600/4-91/002, or the most current edition.

List permit violations (from MOR data or other source) and plant upsets within past year:

N/A, the facility is undergoing construction to divert most of its effluent to wetland treatment. Most parameters have a NODI 9 code which states that monitoring is conditional / not required during this monitoring period. The facility is expected to have completed construction for wetlands discharge by June or July 1999.

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

Pace Water System is required to perform chronic toxicity testing on Ceriodaphnia dubia and Pimephales promelas once every 2 months until 6 valid bimonthly tests that do not demonstrate unacceptable toxicity are completed. The facility can then petition the Department for a reduction in monitoring frequency.

The facility's first WET test was conducted during 1/12 through 1/19/99. During the time the test was conducted, the facility was not (and is still not) discharging to the wetlands. Because of this, the effluent tested was not dechlorinated and both species failed. However, samples dechlorinated in the laboratory resulted in NOEC's of 100%.

Discuss comparability of MOR results to past FDEP results and whether there are trends (improving, declining) in the data set: No definite trends can be identified within the data set.

Additional information:

Staff contributing to this review (signature)

Glenn Butts

Biologist

Inspector

Engineer

Kenny Ferguson Other

Kim Allen Other

Tidal cycle

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: 8010 SUBMITTING AGENCY NAME: FDEP	STORET STATION NUMBER: 32.02.0108	DATE: 05-07-99	TIME: 0918	RECEIVING BODY OF WATER: SIMPSON RIVER

REMARKS: PICK UP HD'S, PONARS, PERIPHYTON RACK	COUNTY: SANTA ROSA	LOCATION: ABOVE PACE WWTP WETLAND	FIELD NAME: #3

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify)
100							

Local Watershed Erosion: None: ☒ Slight: ☐ Moderate: ☐ Heavy: ☐

Local Watershed NPS Pollution: No evidence: ☒ Slight: ☐ Moderate potential: ☐ Obvious sources: ☐

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

List & map dominant vegetation on back

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

m wide

Artificially Channelized ☐ NO
Artificially Impounded ☐ YES
none

m/s	m/s	m/s
m deep	m deep	m deep

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

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

SEDIMENT SUBSTRATE

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	20		
Leaf Packs or Mats				Mud/Muck/Silt	10		
Aquatic Vegetation	30		PONAR	Other: Organic litter	40		PONAR
Rock or Shell Rubble				Other:			
Undercut banks/Roots				**Draw aerial view sketch of habitats found in 100 m section.**			

Water Quality	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Time	SALINITY	Secchi (m):
Top	0.2	22.93	7.19	6.89	572		0.29	1.0
Mid-depth	2.0	23.04	6.95	5.29	1405		0.71	
Bottom	4.0	23.32	6.7	4.85	8598		4.85	

System Type: Stream: ☒ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☐ Other: ☐

Water Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils: None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity: Clear: ☐ Slightly Turbid: ☒ Turbid: ☐ Opaque: ☐

Color: Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes:
OVERCAST, light rain

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

Sampling Team: G. BUTTS, K. Ferguson

Signature: Glenn Butts

Date:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	33020108	04-08-99	0526	Escambia Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Bkgd	Santa Rosa	Big Simpson River 60m abv Little Simpson Confluence	#3 CNTL

RIPARIAN ZONE/INSTREAM FEATURES

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

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

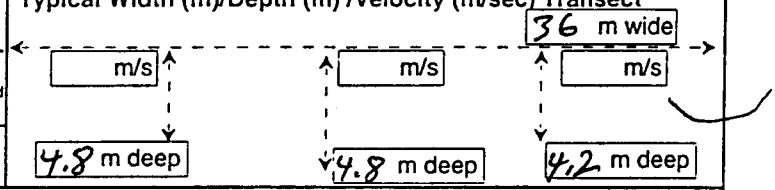
Local Watershed Erosion (check box): None ☑ Slight ☐ Moderate ☐ Heavy ☐

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

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

List & map dominant vegetation on back

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



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

Artificially Impounded ☐ yes ☐ more sinuous

High Water Mark: .6 (m above present water level) + 4.8 (present depth in m) = 5.3 (m above bed)

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	4			Sand	60		
Leaf Packs or Mats				Mud/Muck/Silt	27		
Aquatic Vegetation	6			Other: Bull Rush	2		
Rock or Shell Rubble				Other:			
Undercut banks/Roots	1			*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	.3	22.6	6.66	5.88	43 / 1.01			.4
Mid-depth								
Bottom	1.8	22.5	6.63	5.93	43 / 1.01			

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

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

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

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

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

Weather Conditions/Notes: Set HDs, Periphyton Taped 100m

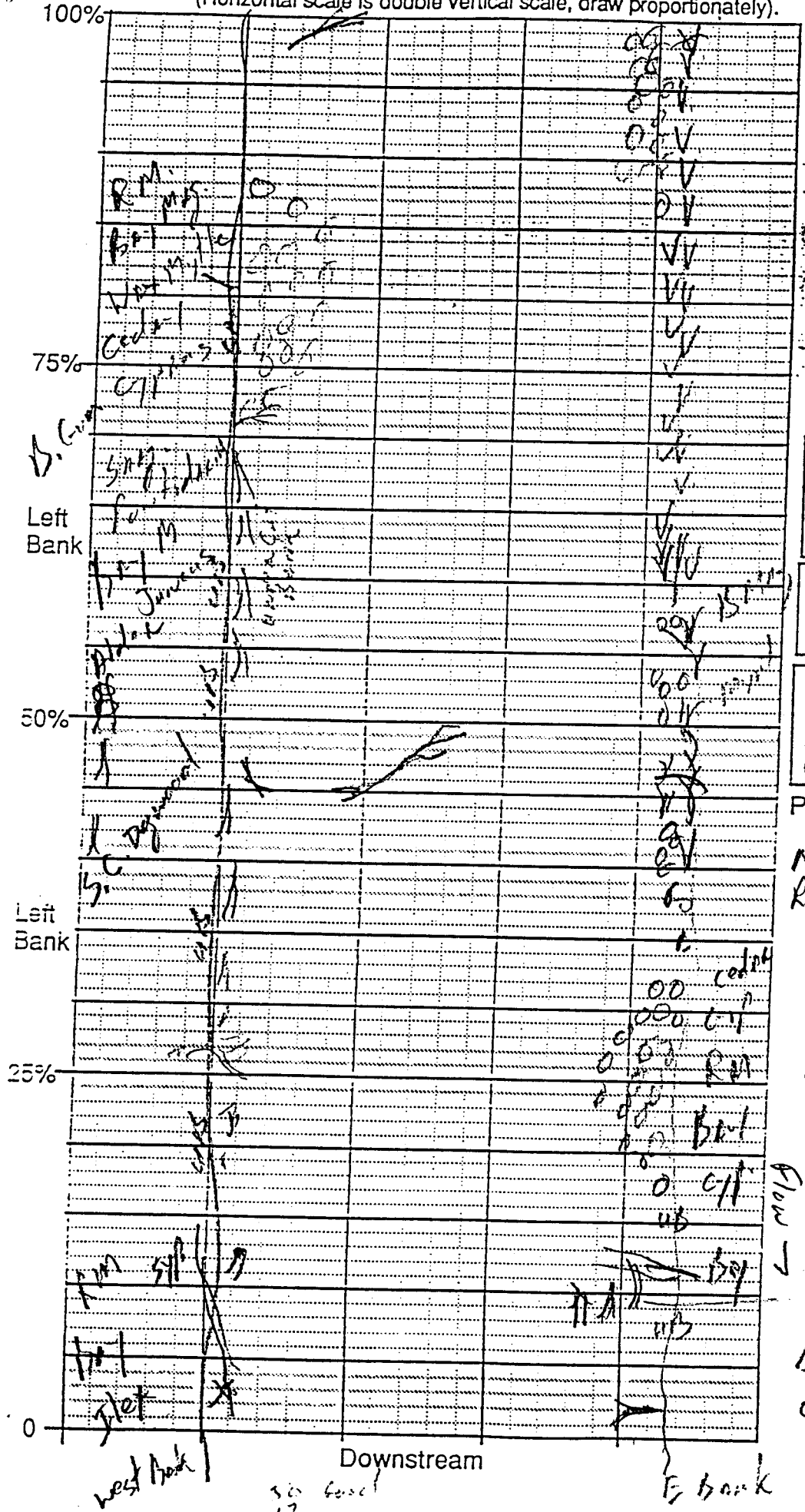
Abundance:	Absent	Rare	Common	Abundant
Periphyton	☐	☑	☐	☐
Fish	☐	☐	☑	☐
Aquatic Macrophytes	☐	☐	☑	☐
Iron/sulfur Bacteria	☑	☐	☐	☐

SAMPLING TEAM:	SIGNATURE:	DATE:
Donelan / Butts		

32020108

Site Map / Habitat Sketch

Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).



Substrates: Code key, draw proportionate habitat abundanc

- Snags
- ub — Roots/undercut banks
- Leaf Packs (or mats)
- 0 — Macrophytes
- V — Bull Rush
- :
-

Velocity:
Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.

Plants observed/other notes:

Nuphar 0
Rmaple

sags = 60 = 4%
ub = 22 = 1%
macro = 106 = 6%
V = 35 = 2%
Total = 1675

HDs, Periphyton
Bay, Pine
Cedar

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	32020108	04-08-99	Escambia Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Bkgd	Santa Rosa	Big Simpson River 60m abv Little Simpson Confluence	#3

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components Substrate Diversity [11]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [8]	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [10] tidal	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [5]	Less than 20% of habitats affected by sand or silt accumulation	20%-50% of habitats affected by sand or silt accumulation	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent
Primary Score [34]	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Secondary Habitat Components Artificial Channelization [20]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability Right Bank [10] Left Bank [10]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width Right Bank [10] Left Bank [10]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality Right Bank [10] Left Bank [10]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (e.g. grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1
Secondary Score [80]				

TOTAL SCORE [114]

ANALYSIS DATE:	ANALYST:	SIGNATURE:
		Dowelson / Butts

tidal cycle

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
PHYSICAL/CHEMICAL CHARACTERIZATION FIELD DATA SHEET (5/21/98)

SUBMITTING AGENCY CODE: 8010 SUBMITTING AGENCY NAME: FDEP	STORET STATION NUMBER: 33.02.0110	DATE: 05-07-99	TIME: 1035	RECEIVING BODY OF WATER: SIMPSON RIVER

REMARKS: PICK UP HD's, PONARS, Periphyton rack	COUNTY: SANTA ROSA	LOCATION: BELOW PACE WWTP WETLAND	FIELD NAME: #2

RIPARIAN ZONE/INSTREAM FEATURES

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

Forest/Natural	Silviculture	Field/Pasture	Agricultural	Residential	Commericial	Industrial	Other (specify)
90						10	

Local Watershed Erosion: None: ☒ Slight: ☐ Moderate: ☐ Heavy: ☐

Local Watershed NPS Pollution: No evidence: ☒ Slight: ☐ Moderate potential: ☐ Obvious sources: ☐

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

List & map dominant vegetation on back

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

m wide

Artificially Channelized ☐ NO
Artificially Impounded ☐ YES
none

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

m/s	m/s	m/s
m deep	m deep	m deep

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

SEDIMENT SUBSTRATE

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

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

Sediment Deposition: Sludge: ☐ Sand smothering: none Silt smothering: none Other: ☐

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)				Sand	10		
Leaf Packs or Mats				Mud/Muck/Silt	40		PONAR
Aquatic Vegetation	20		PONAR	Other: Organic litter	30		
Rock or Shell Rubble				Other:			
Undercut banks/Roots				**Draw aerial view sketch of habitats found in 100 m section.**			

Water Quality	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):	Time	SALINITY	Secchi (m):
Top	0.2	23.46	6.82	6.34	3676		2.0	1.1
Mid-depth	3.2	23.81	6.83	4.67	10930		6.15	
Bottom	6.4	23.42	6.72	3.62	21642		13.1	

System Type: Stream: ☐ 1st - 2nd order Lake: ☐ Wetland: ☐ Estuary: ☒ Other: ☒ Riverine Salt Marsh

Water Odors: Normal: ☒ Sewage: ☐ Petroleum: ☐ Chemical: ☐ Other: ☐

Water Surface Oils: None: ☒ Sheen: ☐ Globs: ☐ Slick: ☐

Clarity: Clear: ☐ Slightly Turbid: ☐ Turbid: ☒ Opaque: ☐

Color: Tannic: ☒ Green (algae): ☐ Clear: ☐ Other: ☐

Weather Conditions/Notes:
Overcast, light rain

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

Sampling Team: G. Butts, K. Ferguson

Signature: Glenn Butts

Date:

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	TIME	RECEIVING BODY OF WATER:
	33020110	04-08-99	1123	Escambia Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Below Pace Wetland	Santa Rosa	Big Simpson River above Southern Power Lines	#2 TST

RIPARIAN ZONE/INSTREAM FEATURES

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

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

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

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

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

List & map dominant vegetation on back

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

Artificially Impounded ☐ yes

High Water Mark: .3 (m above present water level) + 6.3 (present depth in m) = 6.6 (m above bed)

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

63 m wide

m/s	m/s	m/s
3.6 m deep	6.3 m deep	6 m deep

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

SEDIMENT/SUBSTRATE

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

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

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

Substrate Types	% coverage	# times sampled	method	Substrate Types	% coverage	# times sampled	method
Woody Debris (Snags)	3			Sand	80		
Leaf Packs or Mats				Mud/Muck/Silt	10		
Aquatic Vegetation				Other: Emerg Veg.	6		
Rock or Shell Rubble				Other:			
Undercut banks/Roots	1			*Draw aerial view sketch of habitats found in 100 m section*			

WATER QUALITY	Depth (m):	Temp. (°C):	pH (SU):	D.O. (mg/l):	Cond. (µmho/cm) or Salinity (ppt):			Secchi (m):
Top	.3	23.6	6.62	5.53	53			.5
Mid-depth	3.6	22.4	6.62	5.64	57			
Bottom	6.0	22.4	6.61	5.64	61			

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

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

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

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

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

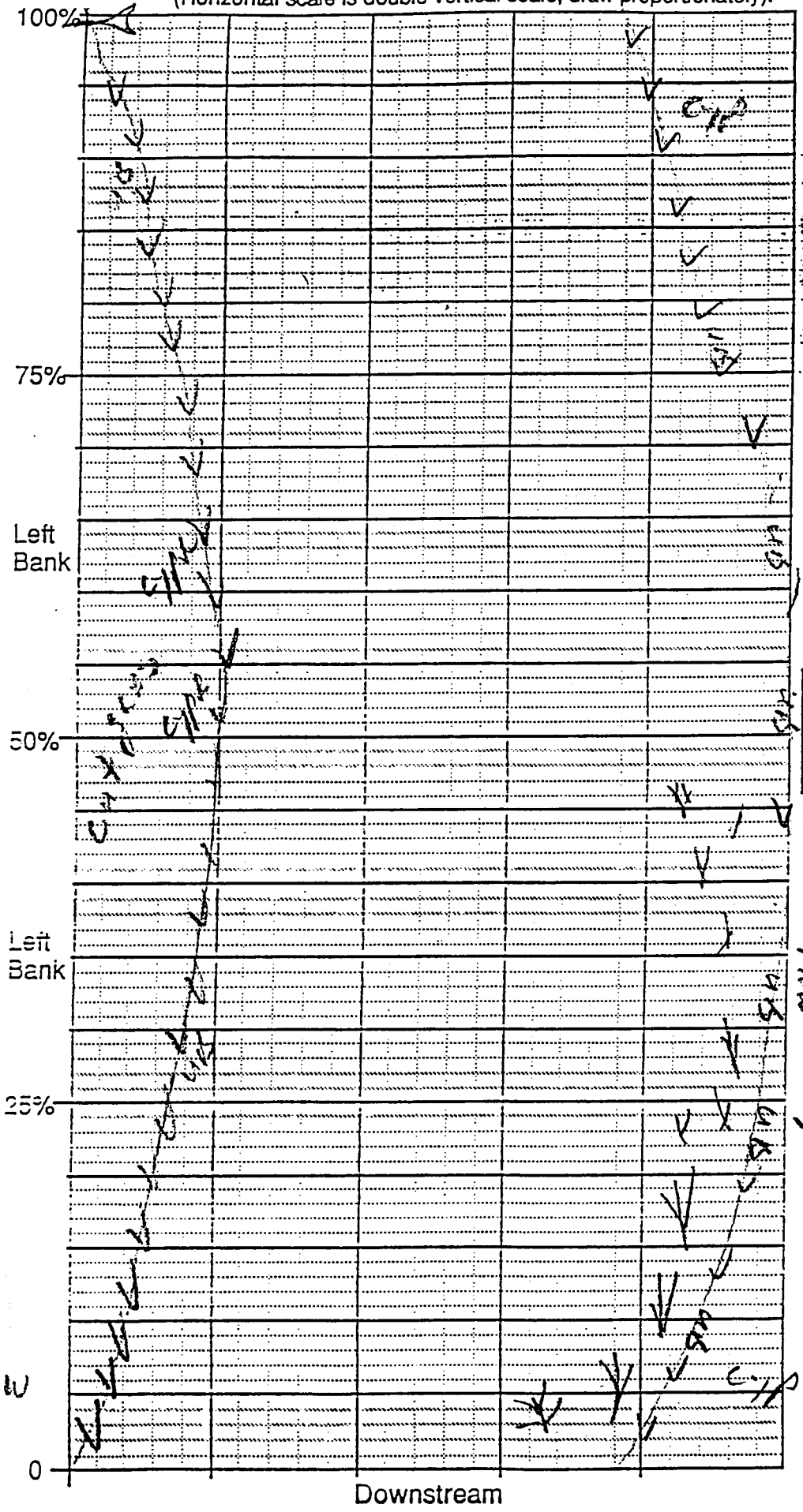
Weather Conditions/Notes:

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

SAMPLING TEAM:	SIGNATURE:	DATE:
Dowland / Butts	Dowland / Butts	

33020110

Length of grid represents 100m of stream (not linear meters).
(Horizontal scale is double vertical scale, draw proportionately).



Substrates: Code key, draw proportionate habitat abundanc

- ✓ Snags
- nb Roots/undercut banks
- ☐ Leaf Packs (or mats)
- ☐ Macrophytes
- ✓ Emergent
- ☐ _____
- ☐ _____

Velocity:
Note where velocity measures were taken.

Habitat Smothering:
Note areas (on map) where sand or silt is smothering substrates, limiting habitability.

Bank Stability:
Note areas (on map) with unstable, eroding banks.

Riparian Buffer Width:
Note areas (on map) where natural vegetaton is altered or eliminated.

Plants observed/other notes:

cyp.
[illegible]

[illegible] = 61 = 3%
[illegible] = 24 = 1%
✓ = 115 = 6%
total = 180

E

STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
FRESHWATER BENTHIC HABITAT ASSESSMENT FIELD DATA SHEET (5-27-98)

SUBMITTING AGENCY CODE: / SUBMITTING AGENCY NAME:	STORET STATION NUMBER:	DATE (M/D/Y):	RECEIVING BODY OF WATER:
	33020110	04-08-99	Escambia Bay

REMARKS:	COUNTY:	LOCATION:	FIELD ID/NAME:
Down Stream Below Pace Wetland	Santa Rosa	Big Simpson River Above Southern Power Lines	# 2

Habitat Parameter	Optimal	Suboptimal	Marginal	Poor
Primary Habitat Components				
Substrate Diversity [12]	Four or more productive habitats present (snags, tree roots, aquatic vegetation, leaf packs (partially decayed), undercut banks, rock). 20 19 18 17 16	Three productive habitats present. Adequate habitat. Some substrates may be new fall (fresh leaves or snags). 15 14 13 12 11	Two productive habitats present. Less than desirable habitat, frequently disturbed or removed. 10 9 8 7 6	One or less productive habitat. Lack of habitat is obvious, substrates unstable or smothered. 5 4 3 2 1
Substrate Availability [8]	Greater than 30% productive habitat present at site. 20 19 18 17 16	16% to 30% productive habitat, by aerial extent. 15 14 13 12 11	6% to 15 % productive habitat 10 9 8 7 6	Less than 5% productive habitat. 5 4 3 2 1
Water Velocity [8]	Max. observed at typical transect: >0.25 m/sec. but < 1 m/sec 20 19 18 17 16	Max. observed at typical transect: 0.1 to 0.25 m/sec 15 14 13 12 11	Max. observed at typical transect: 0.05 to 0.1 m/sec 10 9 8 7 6	Max. observed at typical transect <0.05 m/sec, or spate occurring; > 1 m/sec 5 4 3 2 1
Habitat Smothering [3]	Less than 20% of habitats affected by sand or silt accumulation	20%-50% of habitats affected by sand or silt accumulation	Smothering of 50%-80% of habitats with sand or silt, pools shallow, frequent sediment movement	Smothering of >80% of habitats with sand or silt, a severe problem, pools absent
Primary Score [31]	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
Secondary Habitat Components				
Artificial Channelization [20]	No artificial channelization or dredging. Stream with normal, sinuous pattern 20 19 18 17 16	May have been channelized in the past (>20 yrs), but mostly recovered, fairly good sinuous pattern 15 14 13 12 11	Channelized, somewhat recovered, but > 80% of area affected 10 9 8 7 6	Artificially channelized, box-cut banks, straight, instream habitat highly altered 5 4 3 2 1
Bank Stability: Right Bank [10] / Left Bank [10]	Stable. No evidence of erosion or bank failure. Little potential for future problems. 10 9	Moderately stable. Infrequent or small areas of erosion, mostly healed over. 8 7 6	Moderately unstable. Moderate areas of erosion, high erosion potential during floods. 5 4	Unstable. Many (60%-80%) raw, eroded areas. Obvious bank sloughing. 3 2 1
Riparian Buffer Zone Width: Right Bank [10] / Left Bank [10]	Width of native vegetation (least buffered side) greater than 18 m 10 9	Width of native vegetation (least buffered side) 12 m to 18 m 8 7 6	Width of native vegetation 6 to 12 m, human activities still close to system 5 4	Less than 6 m of native buffer zone due to intensive human activities 3 2 1
Riparian Zone Vegetation Quality: Right Bank [10] / Left Bank [10]	Over 80% of riparian surfaces consist of native plants, including trees, understory shrubs, or non-woody macrophytes. Normal, expected plant community for given sunlight & habitat conditions. 10 9	50% to 80% of riparian zone is vegetated, and/or one class of plants normally expected for the sunlight & habitat conditions is not represented. Some disruption in community evident. 8 7 6	25% to 50% of riparian zone is vegetated, and/or one or two expected classes of plants are not represented. Patches of bare soil or closely cropped vegetation, disruption obvious. 5 4	Less than 25% of streambank surfaces are vegetated and/or poor plant community (*e.g.* grass monoculture or exotics) present. Vegetation removed to stubble height of 2 inches or less. 3 2 1
Secondary Score [80]				

[111] TOTAL SCORE

ANALYSIS DATE:	ANALYST:	SIGNATURE:
	Rowell	

FDEP Biology Section — Acute Bioassay Bench Sheet

Sample Source: Pace Water System WWTP
County: Santa Rosa
Contact / District: W. Donelan / Northwest
NPDES Permit #: FL0021022202
LIMS Sample #: 380277 LIMS Job #: TLH-1999-04-20-01
sample log 4/13/99:DU

Sample Collection: Date 4-19-99 Time 0926
Test Beginning: Date 4-20-99 Time 1310
Test Ending: Date 4-22-99 Time 1320
Organism Batch #: 23 Diluent Batch #: 16
Organism Age: <24hrs SRT toxicant batch #: NA

Test Type: (Screening) Definitive
(Static) Static Renewal | Flow-through
Test Number: 1 of 2

Test organism: Ceriodaphnia dubia

Remarks: Incubator #2 temperature range 25.6°C - 27.0°C. Room temperature range N/A.

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	A	5	5	5	7.8		8.0	24.0		24.6	8.7		8.3	140		180
Control B	B	5	5	5			8.1			24.2			8.3			190
Control C	C	5	5	5			8.1			24.2			8.4			180
Control D	D	5	5	5			8.1			24.6			8.4			185
100% A	A	5	5	5	7.7		8.2	24.0		24.6	8.6		8.5	355		430
100% B	B	5	5	5			8.2			24.5			8.4			430
100% C	C	5	5	5			8.2			24.2			8.4			445
100% D	D	5	5	5			8.2			24.4			8.5			425
measured by:		MF	AS	MF	FW		MF	FW		MF	FW		MF	FW		MF
recorded by:		FW	AS	MF	AS		MF	AS		MF	AS		MF	AS		MF

Investigators' Signatures
Marshall Faircloth
Amber E. Stumatch
Fran Nesbitt

	Salt Water / Well Water	20% Min Water	Sample	Method	Measured by	Verified by
Field Total Residual Cl2 (mg/L):			1.89	—	LW Snyder	MF
Lab Total Residual Cl2 (mg/L):	—	<0.03	0.08*	DR-100	CH	FW
Alkalinity (mg/L as $CaCO_3$):	—	79	95	Hach	CH	FW
Hardness (mg/L as $CaCO_3$):	—	85	60	Hach	CH	FW
Total ammonia (mg/L as N):	—	<0.017	<0.017	Denver	MF	FW
Salinity:	—	0	0	YSI	FW	FW

reviewer form updated 5/22/98

* LAB TRC 0.08 mg/L corrected 4-20-2000 by marshall faircloth

Periphyton taxa list and densities (#/cm^2) for City of Pace WWTP, collected via glass microscope slides in the Big Simpson River, on 20 April, 1999.

	Control Site	Test Site
Bacillariophyceae		
Achnanthes lanceolata	-	3786
Achnanthes minutissima	31502	83290
Achnanthes sp.	93294	410772
Bacillaria paradoxa	9693	-
Cocconeis placentula	2423	-
Cyclotella sp.	2423	7572
Cymbella minuta	35137	30287
Cymbella tumida	39983	7572
Diploneis ovalis	-	3786
Eunotia curvata	2423	3786
Eunotia pectinalis minor	4846	-
Eunotia sp.	106622	3786
Gomphonema affine	2423	-
Gomphonema angustatum	4846	15144
Gomphonema parvulum	113891	244192
Gomphonema sp.	49676	90862
Hantzschia amphioxys	-	3786
Melosira varians	86024	-
Navicula sp.	4846	7572
Navicula viridula	4846	-
Nitzschia obtusa	-	3786
Nitzschia palea	-	3786
Surirella sp.	-	3786
Synedra ulna	7270	3786
Undetermined Bacillariophyceae	614287	950265
Undetermined Diatomaceae	12116	18930
Chlorophyceae		
Characium sp.	1212	-
Chlamydomonas sp.	1212	1893
Mougeotia sp.	1212	-
Scenedesmus sp.	1212	1893
Selenastrum sp.	-	1893
Stigeoclonium sp.	6058	1893
Undetermined Chlorophyceae	2423	7572
Cyanophyceae		
Chroococcus sp.	4846	3786
Dactylococcopsis sp.	1212	3786
Lyngbya sp.	1212	3786
Merismopedia sp.	1212	1893
Oscillatoria sp.	4846	1893

Phytoplankton taxa list and densities (#/mL) for City of Pace WWTP, collected via subsurface grabs in the Big Simpson River, on 20 April, 1999.

	Control Site	Test Site
Bacillariophyceae		
Chlamydomonas sp.	31	-
Chroomonas sp.	172	399
Cryptomonas sp.	39	55
Cyclotella sp.	23	16
Undetermined Diatomaceae	-	8
Dunaliella sp.	8	-
Navicula sp.	8	-
Nitzschia sp.	8	8
Oocystis sp.	8	-
Scenedesmus sp.	16	-
Selenastrum sp.	8	-
Chlorophyceae		
Undetermined Chlorophyceae	8	23
Cyanophyceae		
Chroococcus sp.	8	8
Dactylococcopsis sp.	94	55
Lyngbya sp.	8	-
Merismopedia sp.	-	8

Benthic macroinvertebrate taxa list for The City of Pace WWTP, collected via Ponar grab samples in the Big Simpson River, on 7 May, 1999. Densities, in number/m^2, represent the mean of three replicates.

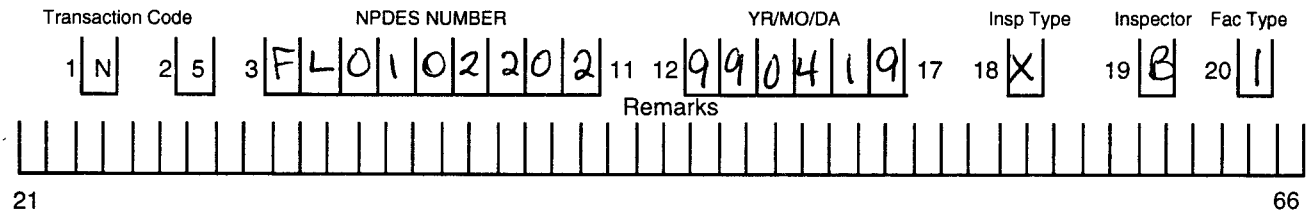
	Control Site	Test Site 1
Amphipoda		
Gammarus sp.	125	-
Grandidierella bonnieroides	-	375
Undetermined Amphipoda	-	375
Undetermined Corophiidae	-	42
Diptera		
Ablabesmyia rhamphe grp.	42	-
Coelotanypus sp.	42	-
Cryptotendipes sp.	-	83
Culicoides sp.	-	250
Dicrotendipes modestus	-	42
Dicrotendipes sp.	-	42
Palpomyia / Bezzia grp.	83	-
Polypedilum halterale grp.	292	167
Polypedilum scalaenum grp.	-	42
Polypedilum sp.	-	750
Procladius sp.	-	42
Stictochironomus devinctus	-	42
Tanytarsus sp. G Epler	42	-
Tanytarsus sp. O Epler	42	-
Tanytarsus sp.	42	42
Undetermined Chironomidae	-	83
Ephemeroptera		
Caenis sp.	83	-
Gastropoda		
Undetermined Gastropoda	42	-
Isopoda		
Edotea montosa	-	292
Oligochaeta		
Aulodrilus pigueti	42	-
Limnodrilus hoffmeisteri	83	-
Slavina appendiculata	42	-
Undetermined Enchytraeidae	42	-
Undetermined Tubificidae	333	250
Pelecypoda		
Rangia sp.	42	-
Undetermined Sphaeriidae	42	-
Polychaeta		
Capitella sp.	42	-
Hobsonia florida	1625	4000
Laeonereis culveri	42	-
Undetermined Ampharetidae	-	958
Undetermined Capitellidae	-	83
Undetermined Nereidae	-	42

Benthic macroinvertebrate taxa list for the City of Pace WWTP, collected via Hester-Dendy artificial substrates in Big Simpson River, on 7 May, 1999. Densities, in number/m^2, represent the mean of three replicates.

	Control Site	Test Site
Amphipoda		
Corophium acutum	108	130
Gammarus sp.	40	29
Grandidierella bonnieroides	-	13
Decapoda		
Undetermined Decapoda	3	8
Undetermined Portunidae	-	5
Diptera		
Ablabesmyia rhamphe grp.	40	53
Cricotopus or orthocladius	-	8
Cryptochironomus sp.	5	-
Dicrotendipes modestus	13	69
Dicrotendipes simpsoni	3	-
Dicrotendipes sp.	-	161
Nanocladius sp.	3	32
Nilothauma sp.	-	3
Palpomyia / Bezzia grp.	5	-
Polypedilum fallax	5	-
Polypedilum illinoense grp.	11	119
Polypedilum scalaenum grp.	5	3
Tanytarsus sp. C Epler	-	13
Tanytarsus sp. G Epler	-	5
Thienemannimyia grp.	-	3
Tribelos fuscicornis	140	280
Tribelos sp.	3	-
Undetermined Chironomidae	5	16
Ephemeroptera		
Stenonema mexicanum integrum	3	-
Gastropoda		
Undetermined Gastropoda	3	3
Hydrozoa		
Undetermined Hydrozoa	-	42
Isopoda		
Edotea montosa	-	5
Pelecypoda		
Mytilopsis leucophaeata	13	32
Undetermined Pelecypoda	5	3
Plecoptera		
Neoperla carlsoni	-	3
Perlesta sp.	-	3
Polychaeta		
Boccardia sp.	-	45

Undetermined Capitellidae	-	3
Undetermined Nereidae	-	58
Thoracica		
Chthamalus fragilis	-	2989
Trichoptera		
Hydroptila sp.	-	3
Neureclipsis melco	3	-
Paranyctiophylax sp.	3	-
Undetermined Polycentropodidae	5	-
Turbellaria		
Undetermined Turbellaria	-	24

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)

